DRAFT REPORT

Niğde G4-Bor-1 Solar Power Plant Project

Supplementary Environmental and Social Assessment

Submitted to:

Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San ve Tic A.Ş.

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23633814_v6

June, 2025

Distribution List

1 copy - Lenders

1 copy - Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San ve Tic A.Ş.

1 copy - WSP (Türkiye) Ltd.

Record of Issue

Company	Client Contact	Version	Date Issued	Method of Delivery
Smart Güneş Enerjisi Teknolojileri	Ebru Sağ	V0	31.01.2025	e-mail
Smart Güneş Enerjisi Teknolojileri	Ebru Sağ	V1	05.02.2025	e-mail
Smart Güneş Enerjisi Teknolojileri	Ebru Sağ	V2	05.03.2025	e-mail
Smart Güneş Enerjisi Teknolojileri	Ebru Sağ	V3	10.04.2025	e-mail
Smart Güneş Enerjisi Teknolojileri	Ebru Sağ	V4	12.05.2025	e-mail
Smart Güneş Enerjisi Teknolojileri	Candan Bayri Abuoudeh	V5	23.05.2025	e-mail
Smart Güneş Enerjisi Teknolojileri	Candan Bayri Abuoudeh	V6	30.06.2025	e-mail

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Acronyms and Abbreviations

Abbreviation	Definition
AoI	Area of Influence
AZE	Alliance for Zero Extinction
CHA	Critical Habitat Assessment
CIA	Cumulative Impact Assessment
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
dBA	Decibels A
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EIA-AF	EIA Application File
EPRP	Emergency Preparedness and Response Plan
EPs	Equator Principles
ESA	Environmental and Social Assessment
ESDD	Environmental and Social Due Diligence
ESGA	Environmental and Social Gap Assessment
ESIA	Environmental and Social Impact Assessment
ESIZ	Energy Specialized Industrial Zone
ESMS	Environmental and Social Management System
ETL	Energy Transmission Line
EU	European Union
E&S	Environmental and Social
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
ha	hectare
IBA	Important Bird Area
ICOMOS	The International Council on Monuments and Sites
ICP	Informed Consultation and Participation

Abbreviation	Definition
IFC	International Finance Corporation
IFI	International Financial Institutions
IPA	Important Plant Area
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
km	Kilometer
LESC	Lenders' Environmental and Social Consultant
LRP	Livelihood Restoration Plan
m	Meter
m^3	Cubic meter
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MWp	Megawatt Power
N/A	Not Applicable
NGO	Non-Governmental Organization
NT	Near Threatened
PDoEUCC	Provincial Directorate of Environment, Urbanization and Climate Change
PM	Particulate Matter
PSs	Performance Standards
PV	Photovoltaic
RAP	Resettlement Action Plan
SCADA	Supervisory Control and Data Acquisition
Smart	Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San ve Tic A.Ş. (Project Owner)
SPP	Solar Power Plant
TCFD	Task Force on Climate-related Financial Disclosures
TEİAŞ	Turkish Electricity Transmission Corporation
UNESCO	United Nations Educational, Scientific and Cultural Organization
VEC	Valued Environmental and Social Component
WSP Türkiye	WSP Danışmanlık ve Mühendislik Ltd. Şti.
YEKA	Renewable Energy Source Area

1.0 INTRODUCTION

1.1 Project Background

Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San. ve Tic. A.Ş. (hereinafter referred as “Smart”) planned to invest a solar power plant project with a total installed capacity of 140 MWp / 100 Mwe in Seslikaya and Badak Villages of Bor District, Niğde Province, namely Niğde G4-Bor-1 Solar Power Plant Project (hereinafter referred as “the Project’”). A national Environmental Impact Assessment (“EIA”) report has been prepared for the Project in accordance with the requirements of Turkish EIA Regulation, and the “EIA Positive” decision has been obtained on October 27th, 2022, with the decision number of 6882.

As a part of financial loan purposes of the Project, Smart retained WSP Danışmanlık ve Mühendislik Ltd. Şti. (“WSP Türkiye”) in 2024 to perform the Environmental and Social Impact Assessment (“ESIA”) Study for the Project in line with the International Finance Institutions’ (“IFIs”) standards, Equator Principles (“EPs”) IV, International Finance Corporation (“IFC”) Performance Standards (“PSs”), and Environmental, Health, and Safety (“EHS”) Guidelines, and the best practices in the industry.

With in this regard, an ESIA Report was prepared by WSP Türkiye for the Project and submitted in August 2024 via Smart for the comments, recommendations and suggestions of Lenders and Lenders’ Environmental and Social Consultant (“LESC”) that is Ramboll Group A/S (hereinafter referred as “Ramboll”). An Environmental Social Due Diligence (“ESDD”) Report including an Environmental and Social Action Plan (“ESAP”) was prepared by Ramboll in November 2024 which evaluates ESIA Report and Environmental and Social Management System (“ESMS”) documentation suggested and prepared by WSP Türkiye and implemented by Smart.

For the reflection of the ESDD findings and ESAP items , this Environmental and Social Assessment (“ESA”) Report is prepared after re-evaluation of ESIA study and ESMS documentation in the light of lenders’ and LESC’s perspective and expectations regarding management of potential environmental and social aspects of the Project.

It should be noted that even though this ESA report is a stand-alone report, it should be considered together with the ESIA Report to assess full compliance to the Project Standards.

1.2 Purpose of this ESA

This ESA Report is prepared to re-assess environmental and social impacts of the Project by addressing the comments, recommendations and suggestions of the lenders and LESC.

Specific objectives of this ESA Report are the followings;

- Incorporation of recent information from Smart regarding organizational structure and site activities of the Project,
- Identification of any new potential impacts by taking into consideration of lenders’ and LESC’s comments, recommendations and suggestions,
- Preparation of revisions or enhancements to mitigate identified environmental or social impacts, and
- Confirmation of adherence to any new or revised environmental or social regulatory framework.

1.3 Key Steps in the ESA Process

1.3.1 Scoping of ESA

The scope of this ESA Report includes the following ESAP items with their ID numbers and other comments, recommendations and suggestion given by Ramboll in the ESDD Report dated November 2024:

This ESA Report will provide the followings:

- Updated Physical CCRA (ESAP ID:APP 6)
- Supplementary Cumulative Impacts Assessment (ESAP ID:APP 7)
- Cumulative Impact Mitigation Strategy (ESAP ID:APP 7)
- Updated HRIA (ESAP ID:APP 8)
- Revision of GHG emissions for the Project (ESAP ID:APP 14)
- Information on site selection minimising economic displacement (ESAP ID:APP 14)
- Assessment of livestock breeder households and settlements along the ETL(ESAP ID:APP 14)
- Updated Biodiversity Assessment including the Critical Habitat Assessment (ESAP ID:APP 14)
- High-level Ecosystem Services Screening Assessment (ESAP ID:APP 14)
- A Net Loss / Net Gain Assessment (ESAP ID:APP 15)
- Statement regarding assessment of indigenous people (ESAP ID:APP 16), and
- Supplementary Cultural Heritage Assessment (ESAP ID:APP 17).

1.3.2 Revisions of Environmental and Social Management System

In the scope of this ESA Study, following plans additional to the current ESMS defined in the ESIA report of the Project, will be prepared as **separate documentation** for the implementation on site by integrating to the other ESMPs:

Following additional plans have been developed:

- Interface Management Plan construction and operations phases (ESAP ID:APP 1)
- ESMS Manual for construction and operations phases (ESAP ID:APP 2)
- Management of Change Procedure (including E&S Aspects) construction and operations phases (ESAP ID:APP 3)
- E&S Monitoring Plan for construction and operation phases (ESAP ID:APP 11)
- Air Quality Management Plan (including a monitoring programme) for construction phase (ESAP ID:APP 5)
- Noise and Vibration Management Plan (including a monitoring programme) for construction phase (ESAP ID:APP 5)
- Water Management Plan (“WMP”) for construction phase (ESAP ID:APP 5)
- Retrenchment and Demobilisation Plan for construction phase (ESAP ID:APP 5)
- Project Environmental and Social Policy (ESAP ID:APP 3)

It was also suggested by LESC that a Livelihood Restoration Plan (“LRP”) should be developed for the Project (ESAP ID:APP 5) including consideration of ETL route. This ESA Report is aimed to provide the information below that was defined in ESDD Report of LESC:

- Identification of the livestock breeder households, including vulnerable members if any, affected by the Project;
- Reflection of consultations with the livestock breeder households and elaborate on the economic displacement impacts and describe how the Project’s direct impacts, as well as the cumulative impacts within the Energy Specialized Industrial Zone (“ESIZ”), will be managed with regard to local livestock breeding activities in Seslikaya, Emen, and Badak villages (including vulnerable or disadvantaged groups);
- Clarification of privately-owned parcels affected by ETL (Associated Facility) expropriation and identify the compensation status of the private owners; and
- Identification and assessment of the formal or informal use of state-owned parcels affected by the ETL (Associated Facility) construction by local communities.

This evaluation is presented in Section 5.3.2 of this ESA Report. The need to an LRP will be decided after the consideration of this ESA Report by LESC.

Supply Chain Due Diligence Procedure (required in the ESAP ID:APP 8) will be provided by Smart that provides information on the traceability and supply chain due diligence process which is carried out by the Project for raw materials (including providing information on the due diligence done for higher risk suppliers, particularly to demonstrate the efforts made to ensure no connection with high risk suppliers from Xinjiang region).

Following Policies will be developed/updated by Smart to address the comments from LESC:

- Updated HR Policy (ESAP ID:APP 13)
- Updated Code of Conduct (ESAP ID:APP 13)

In addition, following plans will be updated as per the comments, recommendations, and suggestions of LESC presented in ESDD report as separate documentation for the implementation on site integrated to the ESMS:

<u>Updated ESMPs for construction phase:</u>

- Updated SEP including External Grievance Mechanism (ESAP ID:APP 10&12)
- Updated Labour Management Procedure (ESAP ID:APP 13)
- Updated Pollution Prevention Management Plan (ESAP ID:APP 13)
- Updated Soil Management Plan (ESAP ID:APP 13)
- Updated Waste Management Plan (ESAP ID:APP 13)
- Updated Hazardous Materials Management Plan (ESAP ID:APP 13)
- Updated Community Health and Safety Management Plan (ESAP ID:APP 13)
- Updated Emergency Preparedness and Response Management Plan (ESAP ID:APP 13)
- Updated Traffic Management Plan (ESAP ID:APP 13)
- Updated Resource Efficiency Management Plan (ESAP ID:APP 13)
- Updated Biodiversity Management Plan (ESAP ID:APP 13)

- Updated Cultural Heritage Management Plan (ESAP ID:APP 13) and
- Updated Accommodation Management Plan (ESAP ID:APP 13).

Updated ESMPs for operation phase:

- Air Quality Management Plan (ESAP ID:APP 13)
- Noise and Vibration Management Plan (ESAP ID:APP 13)
- Water Management Plan (ESAP ID:APP 13)
- Waste Management Plan (ESAP ID:APP 13)
- Hazardous Materials Management Plan (ESAP ID:APP 13)
- Community Health and Safety Management Plan (ESAP ID:APP 13)
- Emergency Preparedness and Response Management Plan (ESAP ID:APP 13)
- Resource Efficiency Management Plan (ESAP ID:APP 13) and
- Biodiversity Management Plan (ESAP ID:APP 13).

1.3.3 Documents Reviewed

Following documents were reviewed and evaluated in the scope of this ESA Report:

- Updated organizational structure of Smart for construction and operation phases
- Municipality protocols regarding water supply and wastewater management
- Connection Contract with TEİAŞ
- Public Interest Decision for ETL route from TEİAŞ
- Expropriation Plan for ETL Route
- Minutes of Expropriation Payment
- Sustainable Supply Chain System Summary
- Information document regarding working hours, overtime payments, retrenchment, and contract cancellation processes
- Stakeholder engagement activities conducted by Smart
- Drill Plan and Registers regarding drill conducted by Smart
- Information regarding Ethical codes of Smart for Child and Forced Labor
- Electricity and fuel consumption data
- Contracts with waste transportation and disposal facilities
- Photographical evidences of chemical storage area
- Information acquired from Mukhtar interviews conducted in January 2025
- Traffic measures taken during the peak time of the delivery of the construction materials and equipment, and

- Biodiversity monitoring reports for the conducted studies in 2024 after ESIA report.

1.3.4 Limitations

Following limitations are defined during the scoping phase of this ESA report:

- A Livelihood Restoration Plan ("LRP") is requested to be developed for the Project (ESAP ID:APP 5) including consideration of ETL route. This ESA Report is aimed to provide the information below that was defined in ESDD Report of LESC:
  - Identification of the livestock breeder households, including vulnerable members if any, affected by the Project;
  - Reflection of consultations with the livestock breeder households and elaborate on the economic displacement impacts and describe how the Project's direct impacts, as well as the cumulative impacts within the ESIZ, will be managed with regard to local livestock breeding activities in Seslikaya, Emen, and Badak villages (including vulnerable or disadvantaged groups);
  - Clarification of privately-owned parcels affected by ETL (Associated Facility) expropriation and identify the compensation status of the private owners; and
  - Identification and assessment of the formal or informal use of state-owned parcels affected by the ETL (Associated Facility) construction by local communities.

  This evaluation is presented in Section 5.3.2 of this ESA Report. The need to an LRP will be decided after the consideration of this ESA Report by LESC.
- Supply Chain Due Diligence Procedure (ESAP ID:APP 8) will be provided by Smart that provides information on the traceability and supply chain due diligence process which is carried out by the Project for raw materials (including providing information on the due diligence done for higher risk suppliers, particularly to demonstrate the efforts made to ensure no connection with high risk suppliers from Xinjiang region).
- Online disclosure of the documentation is under Responsibility of Smart.
- Proof of requirements training employment is under Responsibility of Smart.
- Following E&S Policies will be developed/updated by Smart to reflect comments from LESC:
  - Updated HR Policy (ESAP ID:APP 13)
  - Updated Code of Conduct (ESAP ID:APP 13)
  - Project Environmental and Social Policy (ESAP ID:APP 3)

1.3.5 Structure of the ESA Report

In the scope of this ESA Report, prepared in compliance with the national and international requirements, following sections are being presented:

- Introduction
- Regulatory Framework
- Project Description
- Stakeholder Engagement

- Re-evaluation of Environmental and Social Impact Assessment
- Re-evaluation of Cumulative Impact Assessment
- Changes in Environmental and Social Management and Monitoring
- Conclusion
- Appendices

1.3.6 Other Deliverables

Following deliverables, as a separate documentation, were prepared in the scope of this ESA Study as per ESAP items and ESDD Report of Ramboll dated November 2024:

Additional Plans:

- Interface Management Plan construction and operations phases (ESAP ID:APP 1)
- ESMS Manual for construction and operations phases (ESAP ID:APP 2)
- Management of Change Procedure (including E&S Aspects and Impacts Register) construction and operations phases (ESAP ID:APP 3)
- E&S Monitoring Plan for construction and operation phases (ESAP ID:APP 11)
- Air Quality Management Plan (including a monitoring programme) for construction phase (ESAP ID:APP 5)
- Noise and Vibration Management Plan (including a monitoring programme) for construction phase (ESAP ID:APP 5)
- Water Management Plan (“WMP”) for construction phase (ESAP ID:APP 5)
- Retrenchment and Demobilisation Plan for construction phase (ESAP ID:APP 5)

Updated ESMPs for construction phase:

- Updated SEP including External Grievance Mechanism (ESAP ID:APP 10&12)
- Updated Labour Management Procedure (ESAP ID:APP 13)
- Updated Pollution Prevention Management Plan (ESAP ID:APP 13)
- Updated Soil Management Plan (ESAP ID:APP 13)
- Updated Waste Management Plan (ESAP ID:APP 13)
- Updated Hazardous Materials Management Plan (ESAP ID:APP 13)
- Updated Community Health and Safety Management Plan (ESAP ID:APP 13)
- Updated Emergency Preparedness and Response Management Plan (ESAP ID:APP 13)
- Updated Traffic Management Plan (ESAP ID:APP 13)
- Updated Resource Efficiency Management Plan (ESAP ID:APP 13)
- Updated Biodiversity Management Plan (ESAP ID:APP 13)
- Updated Cultural Heritage Management Plan (ESAP ID:APP 13) and

- Updated Accommodation Management Plan (ESAP ID:APP 13).

Updated ESMPs for operation phase:

- Air Quality Management Plan (ESAP ID:APP 13)
- Noise and Vibration Management Plan (ESAP ID:APP 13)
- Water Management Plan (ESAP ID:APP 13)
- Waste Management Plan (ESAP ID:APP 13)
- Hazardous Materials Management Plan (ESAP ID:APP 13)
- Community Health and Safety Management Plan (ESAP ID:APP 13)
- Emergency Preparedness and Response Management Plan (ESAP ID:APP 13)
- Resource Efficiency Management Plan (ESAP ID:APP 13) and
- Biodiversity Management Plan (ESAP ID:APP 13).

Limitations regarding the development of this deliverable list are explained in Section 1.3.6.

2.0 REGULATORY FRAMEWORK

A list of regulations currently in force and applicable to the context of the Project are presented in Appendix A, while a preliminary list of potentially applicable limits derived from the applicable requirements is presented in Appendix B for each environmental component. 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 Additional Project Information

As stated in the ESIA report of the Project, the Ministry of Energy and Natural Resources has allocated 2,539 hectares of land in the Bor District of Niğde Province on September 29th, 2018, where the Project is located. The legal status of the allocated land was changed to an industrial zone suitable for the development of solar power projects (i.e. Renewable Energy Resource Area (abbreviated as “YEKA” in Turkish)). In accordance with that, "Competition Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy" was launched on July 14th, 2021, and YEKA SPP-4 (Bor-1, Bor-2 and Bor-3) competitions were held by the Ministry of Energy and Natural Resources on April 8th, 2022, accordingly. As a result of the competition, Smart was awarded the YEKA Right of Use Agreement for the G4-Bor-1 region on May 16th, 2022.

Current development status of these projects above are presented in Figure 6-1 and because of the changes in the development of these project after the ESIA report has been written, current cumulative impacts of these projects to the region is re-evaluated in Section 6.0.

As a part of this YEKA area, Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San ve Tic A.Ş. (hereinafter referred as “Smart”) planned to invest a solar power plant project with a total installed capacity of 140 MWp / 100 Mwe in Seslikaya and Badak Villages in Bor District, Niğde Province, (see Figure 3-1) namely Niğde G4-Bor-1 Solar Power Plant Project (hereinafter referred as “the Project”). A national Environmental Impact

Assessment (“EIA”) report has been prepared for the Project in accordance with the requirements of Turkish EIA Regulation, and the “EIA Positive” decision has been obtained on October 27th, 2022, with the decision number of 6882.

The Project will be located on a 201.3 ha treasury land whose status was changed from pastureland by Niğde Governorship Revenue Office National Real Estate Directorate's letter dated June 1st, 2018, and numbered 7112. The Project Area has been classified as an "Industrial Zone" in the 1/100,000 scale Environmental Plan and located within the borders of the "Niğde-Bor Energy Specialized Industrial Zone".

Therefore, no expropriation process has been conducted in the scope of the Project.

As stated in the ESIA report of the Project, only associated facility of concern is determined as Energy Transmission Line (ETL). Approximately 29.5 km long 154 kV ETL was established by TEİAŞ to transmit the produced electrical energy to the Yaysun SPP Substation (see Figure 3-1). An EIA report has been prepared for the ETL project in accordance with the requirements of Turkish EIA Regulation, and the “EIA Positive” decision has been obtained on August 22nd, 2023, with decision number of 7217. During the EIA process, the connection agreement between Smart and TEİAŞ was signed on January 24th, 2023. According to the EIA report, along the 154 kV ETL, 14 some poles and 2 final poles will be established. Based on information provided by Smart and studies conducted by WSP, it has been determined that the establishment of the ETL will impact two privately owned lands. Despite efforts made during site visits to contact the landowners of these properties, they could not be reached.

However, Connection Contract with TEİAŞ, Public Interest Decision for ETL route from TEİAŞ, Expropriation Plan for ETL Route and Minutes of Expropriation Payment were reviewed in the scope of this ESA report and related evaluations regarding expropriation process are reflected in Section 5.3.2.

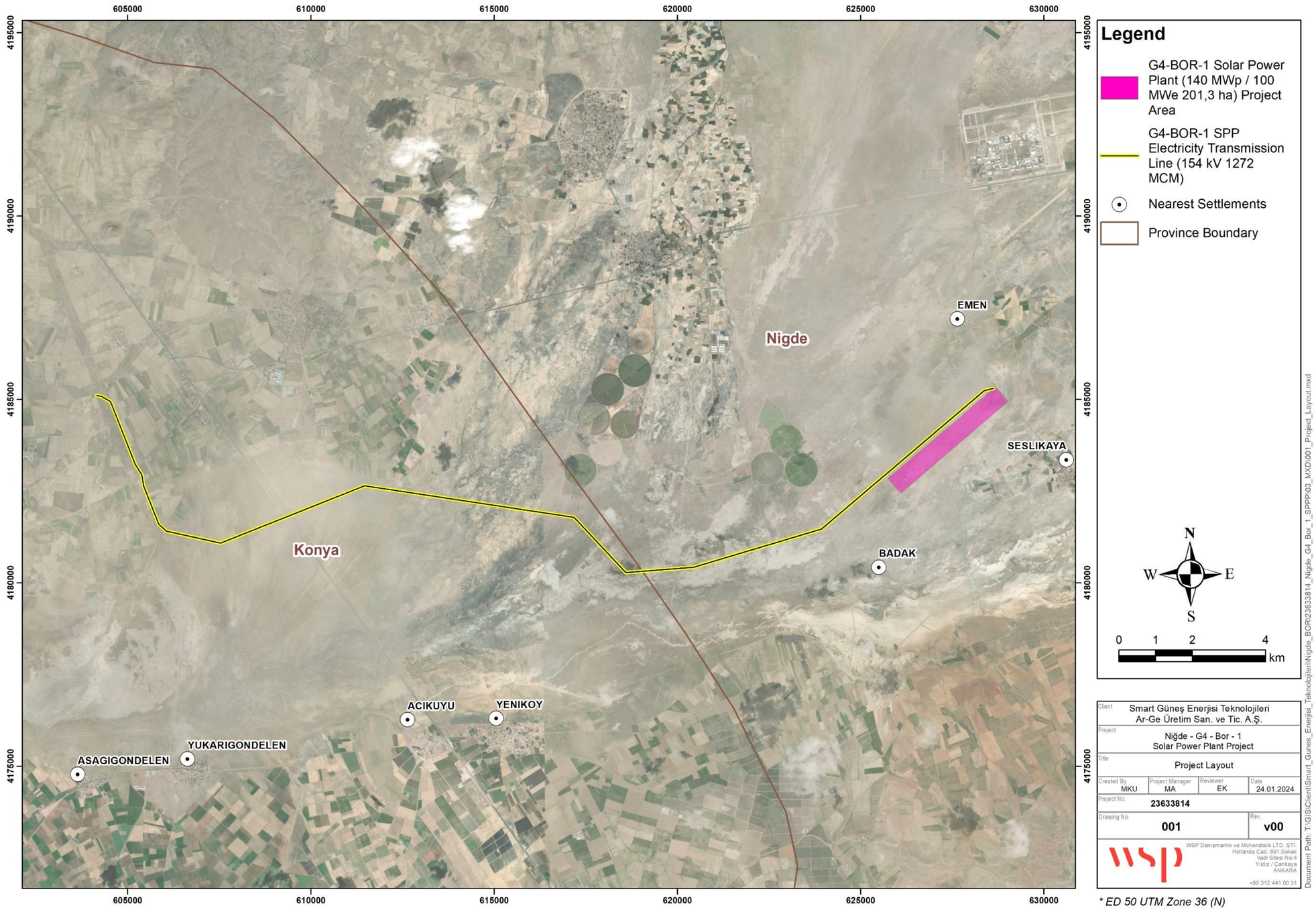

Figure 3-1: Project Layout with Energy Transmission Line

3.2 Site Selection

Since the Project is inside YEKA area determined by the Ministry of Energy and Natural Resources and no site alternative analysis could be conducted. However, for minimizing economic displacement at the project site, following criteria was followed:

- Collaboration with Local Communities and Shepherds:
  - to engage with local shepherds and communities to assess the current state and economic importance of grazing activities,
  - to address alternative grazing areas around the region,
  - to inform local communities about the environmental and economic benefits of the project with public participation meeting conducted in the scope of the ESIA studies and other stakeholder engagement activities.
- Fencing and Safety:
  - to implement secure fencing and protection measures to prevent harm to animals.
- Environmental and Social Measures:
  - to take necessary steps to preserve vegetation and prevent soil erosion as per the mitigation measures defined in the ESIA report of the Project.
  - to ensure the preservation of vegetation and local ecosystems as per the mitigation measures defined in the ESIA report of the Project.

4.0 STAKEHOLDER ENGAGEMENT

4.1 Additional Stakeholder Engagement Management Activities

The Project's engagement activities and corporate social responsibility (CSR) initiatives are designed to identify and support vulnerable groups, provide tailored assistance, and address specific issues raised by community members. Regular communication with mukhtars and other stakeholders is a key part of this process, ensuring inclusivity and responsiveness to local priorities. To maintain transparency and accountability, minutes of meetings with mukhtars and records of all assistance activities are documented by Smart.

Engagement topics cover a range of social and economic issues, including employment opportunities, infrastructure improvements, and assistance to vulnerable groups. Infrastructure-related actions, such as cleaning and widening water channels, drilling wells, and implementing dust suppression measures, are related to reducing Project impacts and supporting local development.

The stakeholder engagement list, requests received by the Project and conducted CSR initiatives are presented in Table 4-1.

Table 4-1: Stakeholder Engagement and CSR Initiatives of the Project

Date	Settlement	Number of people engaged	Topic	Engagement Method	Status
16.10.2023	Seslikaya	2	Engagement for employment of a local woman whose child has	Verbal	Completed

Date	Settlement	Number of people engaged	Topic	Engagement Method	Status
			disability upon the mukhtar's request		
25.01.2024	Emen	1	Cleaning and widening of the water channel	Phone call	Completed
19.02.2024	Emen	2	Drilling well opening	Written	Completed
09.03.2024	Seslikaya	-	Grave digging in the village cemetery for a funeral	Verbal	Completed
05.04.2024	-	2	Recruitment of security personnel upon the mukhtar's request	Written	No additional security needs at the site and therefore not evaluated
17.04.2024	Emen	5	Dust suppression due to damage to the village road caused by vehicle traffic	Verbal	Completed
19.07.2024	Seslikaya	2	Engagement regarding the problem that the imam's house in the village is in poor condition, resulting in the absence of an imam for the mosque	Written	Completed
Between 06.08.2024 and 08.08.2024	Emen Seslikaya Badak	7 (Emen) 25 (Seslikaya) 12 (Badak)	Determining vulnerable groups for distributing food vouchers and food box assistance	Written	Completed
04.09.2024	Emen Seslikaya Badak	3 (separate meetings)	Discussion of requests, suggestions, and complaints with the mukhtar	Written	Completed
Between 05.09.2024 and 19.09.2024	Emen Seslikaya Badak	3 (Emen) 6 (Seslikaya) 3 (Badak)	Distribution of fuel aid	Written	Completed
09.08.2024	Emen Seslikaya Badak	8 (Emen) 2 (Seslikaya) 3 (Badak)	Identifying vulnerable groups	Written	Completed

Date	Settlement	Number of people engaged	Topic	Engagement Method	Status
			for stationery assistance		
23.09.2024	Emen Seslikaya	6 (Emen) 3 (Seslikaya)	Distribution of shopping card assistance	Written	Completed

One significant impact of the Project is increase in vehicle traffic in affected settlements, especially in Emen village. In order to minimize Project impacts for the affected stakeholders:

- The planned number of shipments during the construction phase is 1,500 trucks. Traffic and road safety assessments are continuously conducted to ensure safe and efficient operations. A Traffic Management Plan has been developed to address traffic safety concerns and mitigate risks linked to Project activities.
- To minimize congestion on local roads, traffic volumes and peak hours are carefully considered during the transportation of equipment and materials. Appropriate traffic signs, signals, lights, and markings have been placed in critical areas, particularly along Emen Village Road, to prevent accidents. These signs are regularly inspected to ensure their effectiveness.

In addition, shipment schedules are carefully planned to avoid disturbances to local communities, with particular attention given to not scheduling shipments during early or late hours. Flagging personnel are stationed at blind spots, particularly in Emen Village, once shipments begin, to further enhance safety.

4.2 Changes in Grievance Mechanism

4.2.1 Worker Grievance Mechanism

With this supplementary E&S Assessment Study, key features of the Worker Grievance Mechanism are redefined as stated below:

- Workers can submit grievances via forms, emails, or dedicated hotlines, with name or anonymously. These channels will be clearly communicated during recruitment and orientation sessions. All workers, including contractor and subcontractor employees, will receive regular training on the grievance mechanism.
- Grievances will be categorized based on their nature (e.g., workplace conditions, GBVH, safety concerns) and assigned to specific managers or personnel with the expertise to address the issue promptly.
- All grievances will be logged, acknowledged within seven days, and resolved within 30 business days wherever possible.
- In case requested, all grievance holders will have the right to remain anonymous and maintain their confidentiality. Any credentials of the grievance holder will not be disclosed by Smart without first ensuring their consent. If consent is provided, only the managers and personnel related to the specific grievance will be informed.

The mechanism will provide a safe and confidential platform for workers to report concerns related to GBVH in the workplace, including sexual harassment, abuse, and discrimination. grievance-handling personnel will be specifically trained to identify, handle, and address GBVH complaints appropriately. Smart will enforce a zero-tolerance policy for GBVH, with appropriate disciplinary measures for perpetrators and support services for affected workers, including counselling and referral to external resources if necessary.

4.2.2 Community Grievance Mechanism

This mechanism is improved to be responsive to any concerns and complaints, particularly from affected stakeholders and communities, including those experiencing economic displacement or impacts on livelihoods due to restrictions on land use. Special attention will be given to training the designated staff involved in managing the grievance mechanism. The overarching aim of this grievance mechanism is to provide all stakeholders with the opportunity to obtain information about Smart's activities and facilities, deliver their complaints and requests in a structured and formal manner, and receive prompt, fair, and effective responses.

Smart will enhance the capacity to detect grievances by training all relevant personnel, including the CLOs and Project Site Chief, to actively identify community concerns during formal and informal engagements. Proactive outreach will be conducted to gather feedback from affected communities, including vulnerable groups and economically displaced individuals.

Multiple channels will be established for submitting grievances, including:

- Grievance forms available on the Project website, at the Project site, and at Mukhtars' offices in affected settlements.
- Dedicated phone lines and email addresses disclosed in this SEP and at the Project website and shared with local communities.
- Informal channels, such as direct communication during community meetings or engagement activities, with staff trained to record verbal grievances accurately.

All grievances will be documented in a Grievance Log, including the stakeholder's name (if provided), contact details, grievance details, submission method, acknowledgment date, and resolution status.

Grievances will be categorized and allocated to the appropriate responsible entities for resolution. Affected stakeholders will receive timely responses, with acknowledgment within seven days and resolution (or updates on progress) within 30 business days. However, it is ideal for complaints of hams and damages to be resolved within a few days to avoid loss of livelihood. Grievances involving significant issues like property damage or injury should be addressed promptly, typically within seven days.

Grievances related to economic displacement, including those from livestock breeder households, will be specifically categorized and allocated to the appropriate responsible entities for resolution.

The resolution process will prioritize fairness and transparency, with periodic updates provided to the grievance holder if the resolution requires additional time. Specifically, nominated and trained members of staff will record grievance information in a grievance register.

The grievance mechanism will be widely announced to the public. Stakeholder meetings and information sessions will be organized to educate affected communities on how to use the grievance mechanism. Special sessions will target women and vulnerable groups to ensure accessibility and inclusion. The Project CLOs will act as a local point of contact to provide assistance with grievance submissions and offer information about the process, particularly in areas where literacy levels may be lower or internet access is limited. Additionally, these meetings will serve as a platform to update stakeholders on the progress of mitigation measures for land use restrictions and economic displacement.

The Project will organize quarterly grievance review meetings with affected communities to share trends in grievances, explain how issues were resolved, and gather feedback on the grievance mechanism's effectiveness to make continuous improvements.

5.0 RE-EVALUATION OF ENVIRONMENTAL AND SOCIAL IMPACTS

5.1 Physical Components

No changes occurred on physical components' impacts during the re-evaluation of environmental and social baseline conditions. Impact re-assessment of the physical components defined in Section 1.3.1 are presented in the subsections below.

5.1.1 Recalculation of GHG Emissions

According to ESDD report prepared by Ramboll in November 2024, it was recommended to assess the construction GHG emissions based on the actual consumption information once available. In this ESA report, actual GHG emissions originated from the construction activities are re-calculated with the consumption data provided by Smart.

5.1.1.1 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 since the activities at the closure phase yet to be clear right now.

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. During the construction phase, according to the information provided by the Client, electricity was utilized from off grid system with a daily electricity production capacity of 66 kW. Therefore, the plant would not need to purchase electricity from external sources, and thus, there is no Scope 2 greenhouse gas emissions expected due to electricity consumption from external sources. Given the nature of the Project operations, the most significant emissions are in 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 actual schedules and information provided by Client regarding to annual consumed amounts of fuel and number of actual equipment/vehicles used.

Scientifically accepted and well documented emission factors from the Türkiye's National Inventory Report (NIR) released in 2023 under UNFCCC[1] are used. Where local guidance is not available then emission factors from the Intergovernmental Panel on Climate Change (IPCC), are also used. A discussion of the global warming potentials is provided by Section 5.1.1.2 below. Table 5-1 provides a summary of the activities for which GHG emissions are calculated.

Table 5-1: GHG Emission Sources of the Project

Phase	Source	GHG Emissions
Construction	Generators - Combustion of Diesel Oil	Emissions from the generator
	Vehicles - Combustion of Diesel Oil Mobile Heaters – Combustion of Diesel Oil	On-site vehicle emissions, due to diesel combustion
	Loss of Carbon Sink	Reduction of carbon sink due to loss of vegetation
Operation	Generators - Combustion of Diesel Oil	Emissions from the generator

5.1.1.2 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 5-2 provides the GWPs used in the GHG calculations.

Table 5-2: Global Warming Potentials from the Intergovernmental Panel on Climate Change

GHG Compound	GWP
CO_2	1
CH_4	25
N_2O	298

5.1.1.3 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

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

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.

5.1.1.3.1 Stationary Combustion

Stationary combustion sources for the Project include diesel generators. GHG emissions from Project is determined based on annual consumed fuel during the construction activities as provided by Smart.

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 5-3 below.

Table 5-3: 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 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	3.0	0.6	IPCC 2006 guidelines, Chapter 2 – Stationary Combustion Table 2.2
Operation	Use of Generators - Combustion of Diesel Oil	40.4		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.

5.1.1.3.2 Mobile Fuel Consumption

The GHG emissions from mobile equipment to be used during the construction phase of the Project, are calculated based on annual 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 5-4 below.

Table 5-4: 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	74,100	4.15	28.6	IPCC 2006 guidelines, Chapter 3 –	832

Phase	Source	Net Calorific Value (TJ/Gg)	Reference	Emission Factor (kg GHG/TJ)			Reference	Fuel Density (kg/m³)*
				CO_2	CH_4	N_2O		
			Emissions (Official Gazette Date/Number: 22.07.2014/29068), Table 5.1				Mobile Combustion Table 3.3.1	

* 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:

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

Total CO_2 Emissions from Mobile Equipment:

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

5.1.1.4 Emissions Not Included in Scope 1 or Scope 2

5.1.1.4.1 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 5-5: Carbon Stock Change Values

Parameter	Values			Unit	Reference
	Forestland	Grassland	Cropland		
Annual area of Land Converted to Other Land	0.82	50.64	579.81	ha	IPCC 2006 IPCC Guidelines for National Greenhouse Gas Inventories V4 Chapter 4 -Table 4.12, Chapter 5 - Table 5.9, Chapter 6 - Table 6.4.
Biomass stocks before the conversion	100.0	13.5	2.1	tonnes dm ha^{-1}	
Biomass stocks after the conversion	0	0	0	tonnes dm ha^{-1}	
Carbon fraction of dry matter	0.5	0.5	0.5	tonnes C (tonne dm)$^{-1}$	

5.1.1.5 Impact Analysis

5.1.1.5.1 Construction Phase

Stationary Combustion Emissions

During the construction phase of the Project, GHG emissions due to Stationary Combustion will be generated from:

- Combustion of diesel fuel during the use of generators in 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 actual diesel consumption due to the use of generators during the construction period is provided by the Client as approximately 32,532 liters.

Then the total Stationary Combustion GHG Emissions were calculated using the equations given in this Section. . The annual GHG emissions due to Stationary Combustion were calculated as 28.8 tonne CO^2.

Mobile Combustion Emissions

During the construction phase of the Project, GHG emissions occur due to mobile combustion during the use of on-road and off-road vehicles, machinery, and equipment. The primary fuel that will be used for machinery, vehicles and equipment was diesel. The total actual diesel consumption due to use of mobile vehicles for all the construction activities is provided by the Client as 93,466 liters/year. Then the total GHG Emissions from Mobile Combustion were calculated using the equations given in this section. The annual GHG emissions due to Mobile Combustion were calculated as 261.35 tonne CO_2/year.

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 is set to be developed on a 201.3 ha of former grassland. Designated as an "Industrial

Zone" in the 1/100,000 Scale Environmental Plan, the Project site falls within the borders of the "Niğde-Bor Energy Specialized Industrial Zone. "Using the equation given in this section, the total indirect GHG emissions due to land use change is calculated as 1,358.7 tonne CO_2/year.

Total GHG Emissions in Construction Phase

The annual GHG emissions for construction phase of the Project are presented in Table 5-6. These annual emissions are calculated for the actual annual consumption data provided by Smart. Since the estimations regarding GHG emissions for construction phase defined in the ESIA report looks similar with the actual annual GHG emissions no additional mitigation measures are required in the scope of this ESA report.

Table 5-6: Annual Project GHG Emissions for Construction Phase

Source	Calculated GHG (as t CO_2e/y)			Total GHG amount	
	t CO_2/y	t CH_4/y	t N_2O/y	t CO_2e/year	Percentage (%)
Stationary Sources (Generators) - Combustion of Diesel Oil	28.8	0.0012	0.0002	28.80	1.75%
Vehicles - Combustion of Diesel Oil	261.35	0.015	0.1	261.46	15.85%
Loss of Carbon Sink	1,358.7	-	-	1,358.7	82.39%
TOTAL				1,648.96	100.00

The table above presents the annual emissions from the construction phase, with contribution of each source to the overall GHG emissions of the Project. Tonnes of CO_2e are calculated using the GWPs from Section 5.1.1.2 above.

Table 5-7: Comparison of Project GHG Emissions to National and Global Emissions for Construction

Source	Data
Project GHG Emissions (tonnes CO_2e/year)	1,648.96
Comparison to Türkiye-wide Total (%)	0.0003%
Comparison to Global Total (%)	0.0000089%
Türkiye-wide GHG Emissions (2021)[2] (tonnes CO_2e/year)	564,389,750
UNFCCC Annex-I 2021 GHG Emissions[3] (tonnes CO_2e/year)	19,207,285,450

Table 5-7 summarizes the annual overall emissions in tonnes of CO_2e for the Project construction phase. Data for Türkiye's GHG releases are obtained from Türkiye's latest National Inventory Report (NIR for the year 2021) for UNFCCC and total of Annex-I countries GHG releases are obtained from UNFCCC GHG database for the last inventory year 2021. 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.

[2] Obtained from UNFCCC, Türkiye NIR for the year 2021, https://unfccc.int/documents/627786

[3] 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 annual emissions from the construction phase of the Project are about **1,648.96 t CO_2e per annum**. This annual value is below the 25,000 t CO2e threshold defined in IFC PS3 and Equator Principles IV. Therefore, no additional monitoring will be required.

5.1.1.5.2 Operation Phase

During the operation phase, no greenhouse gas emissions is expected except the combustion of diesel fuel due to use of generators in case of emergency. It was assumed that annual emissions from combustion of diesel fuel due to use of generators will be at the same amount with annual construction emissions originated from the generators as a worst-case scenario.

With the consideration of this assumption, annual emissions from the operation phase of the Project are about **28.80 t CO_2e per annum**. This annual value is well below the 25,000 t CO2e threshold defined in IFC PS3 and Equator Principles IV. Therefore, no additional monitoring will be required.

5.1.1.5.3 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.

5.1.2 Climate Change Risk Assessment

According to ESDD report prepared by Ramboll in November 2024, it was recommended to re-assess Climate Change Risk Assessment by following the criteria defined below:

- the approach used to assess the actual and future risk material to the Project;
- details on chronic hazards which could become material to the Project;
- current conditions and projections on climate variables;
- exposure and vulnerability for the Project components and the personnel; and the climate hazards are not aligned with the categories advised by the Taskforce for Climate-Related Financial Disclosures (TCFD); and
- an assessment of the Project specific risks and clear presentation of the adaptation and mitigation measures applicable to the Project per each of identified material risks.

With the consideration of this criteria, CCRA was updated and presented in Appendix C of this ESA Report.

5.2 Biological Components

5.2.1 Baseline Conditions

5.2.1.1 Study areas

The assessment identified two separate types of study areas. In the initial literature review, an expanded Regional Study Area was identified and taken into account to assess the potential presence of species and habitats in the vicinity of the Project Area. In parallel, a more specific Local Study Area was determined to guide subsequent comprehensive research within the Project Area. The descriptions of these areas are as follows.

5.2.1.1.1 Regional Study Area (RSA)

The biodiversity Regional Study Area (RSA) includes an extensive territory and contains a geographically distinct variety of species, ecosystems, and habitats. The RSA permits the utilisation of a literature review as

the foundational method for ascertaining the potential species and habitats that may inhabit the area surrounding the project.

In this project, the terrestrial RSA has been recognized by aligning with bio-geographic characteristics that correspond to the terrestrial ecoregion known as **"Central Anatolian Steppes and Woodlands - PA0410."** This ecoregion is classified within the broader category of "Temperate Broadleaf & Mixed Forests" (Olson et al., 2001[4]) (see Figure 5-1).

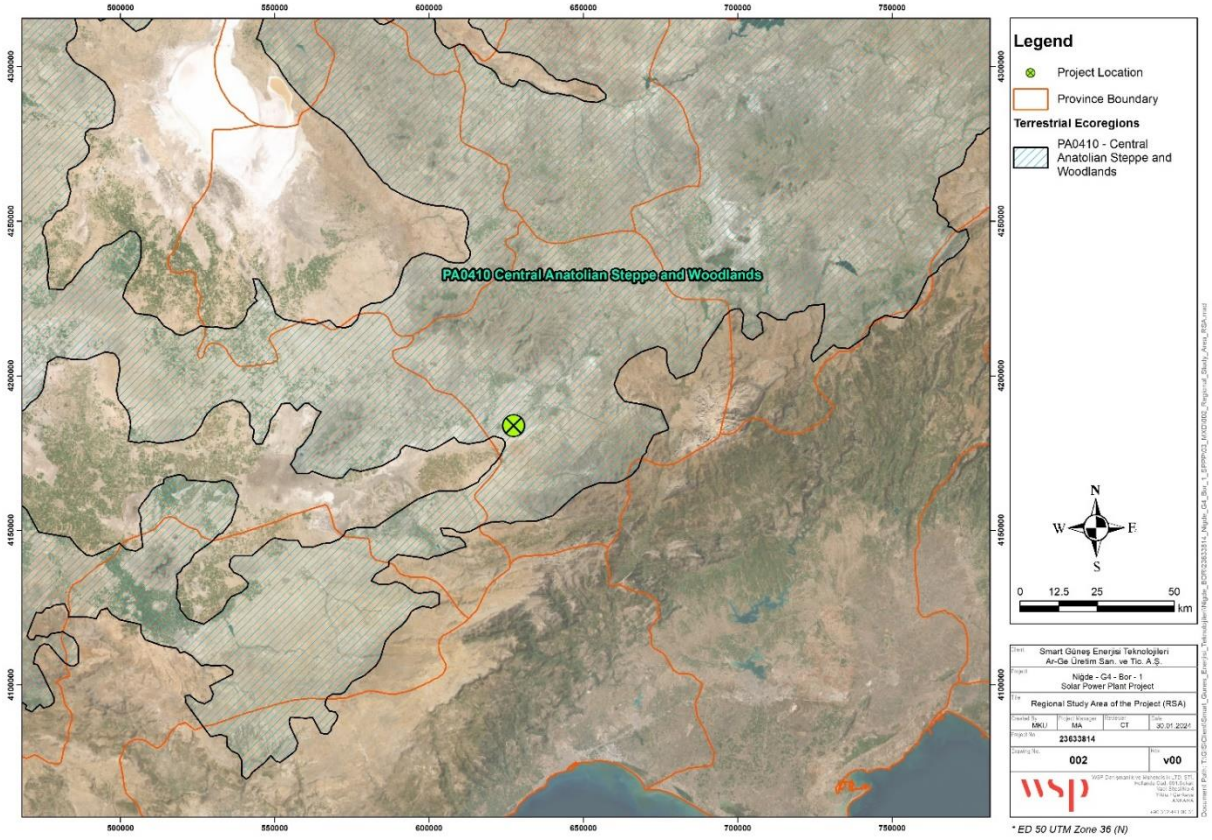

Figure 5-1: Regional Study Area of the Project (RSA)

5.2.1.1.2 Local Study Area (LSA)

The Local Study Area (LSA) was identified for terrestrial and freshwater habitats to include all the Project components, including associated facilities, both permanent and temporary, as well as the expected Area of Influence of the Project (i.e. the area beyond which no detectable effects on biodiversity are expected) and also include an appropriate ecological unit to support the design of a Biodiversity Management Plan. Biodiversity LSA is included in the wider RSA.

The LSA was configured as a 1 km buffer surrounding all sides of the project including ETL, as illustrated in Figure 5-2. This buffer serves as the boundary beyond which no discernible effects on biodiversity are anticipated. The LSA is located at elevations between 1043 m and 1065 m, reaching an extension of SPP about 201.3 ha.

[4] Olson, D. M., Dinerstein, E., Wikramanayake, E. D., Burgess, N. D., Powell, G. V. N., Underwood, E. C., D'Amico, J. A., Itoua, I., Strand, H. E., Morrison, J. C., Loucks, C. J., Allnutt, T. F., Ricketts, T. H., Kura, Y., Lamoreux, J. F., Wettengel, W. W., Hedao, P., Kassem, K. R. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. Bioscience 51(11):933-938.

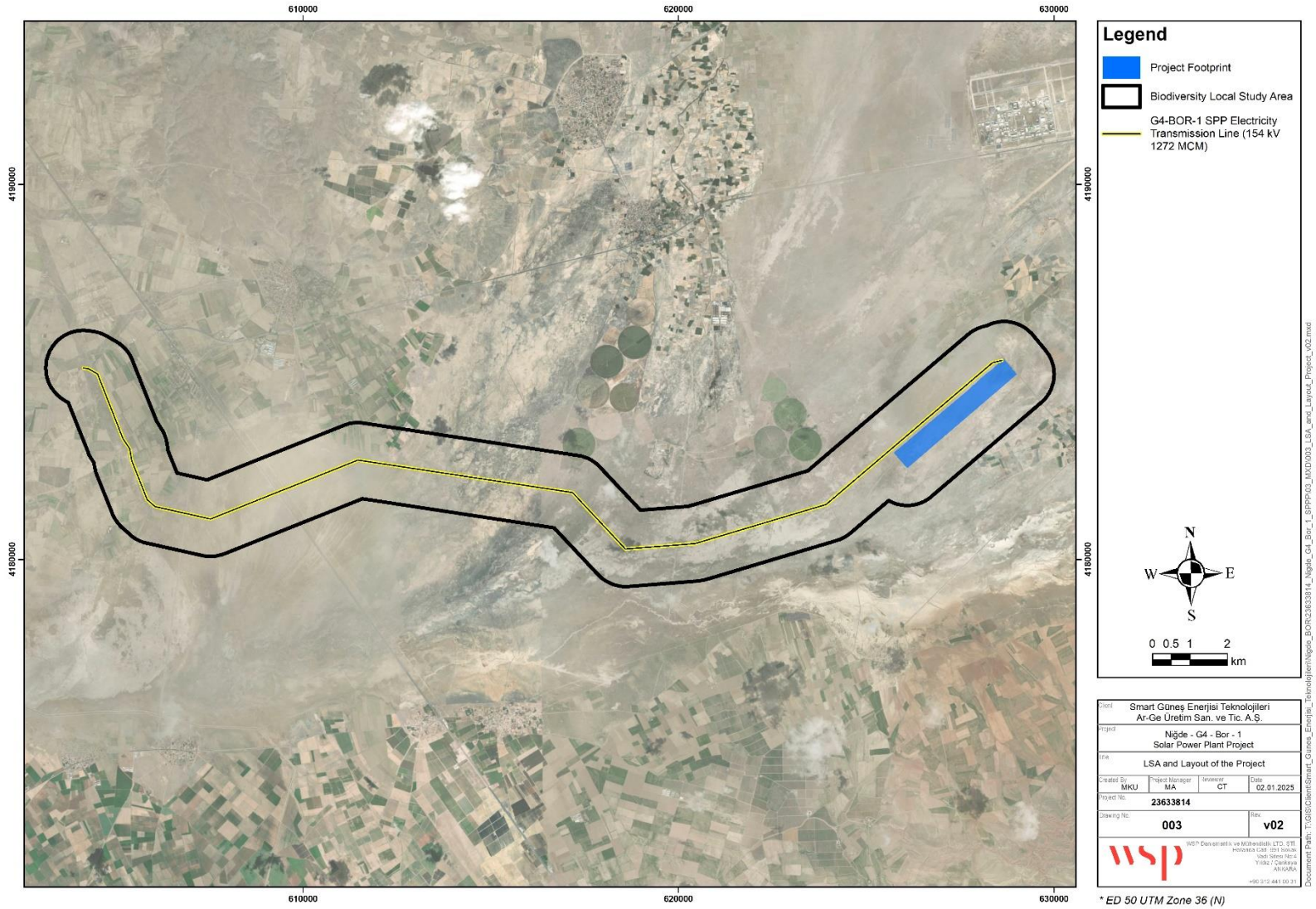

Figure 5-2: LSA and layout of the Project

5.2.1.2 Methodology

5.2.1.2.1 Desktop studies

The literature review concentrated on the terrestrial RSA, aiming to compile existing data on species and habitats of conservation significance. This included information on local and global distribution, conservation status, ecological niche, phenology, life cycle, etc. To provide an overview of potentially sensitive biodiversity elements in the area, scientific literature and official websites were consulted. Moreover, prior reports prepared for the Project were also taken into account.

To compile available data on terrestrial species and habitats of conservation concern, including local and global distribution, conservation status, ecological niche, phenology, life cycle, and so forth, the literature review centred on the terrestrial RSA. An examination was conducted on scientific literature and official websites to provide a comprehensive overview of the biodiversity-sensitive elements that may be present in the area. Furthermore, prior reports that had been generated for the undertaking were duly considered.

A chronological inventory of the literature review, prior studies, and web sources that were taken into account is provided below.

- **Previous studies**
  - G4-BOR-1 Solar Power Plant (140 MWp /100 MWe, 201,3 ha) Project – Local EIA report (include Ecosystem Assessment Report), 2022
  - G4-BOR-1 Electrical Transmission Line (154 kV 1272 MCM 154 kV) Project – Local EIA report (include Ecosystem Assessment Report), 2023
  - Smart Solar Power Plant Project. Flora Monitoring Report. September 2024.
  - Smart Solar Power Plant Project. Fauna Monitoring Report. September 2024.
  - Smart Solar Power Plant Project. Bird Monitoring Report. September 2024.
  - Smart Solar Power Plant Project. Biodiversity Monitoring Forms. April, October. 2024.
- **Scientific publications and other official publications used for desktop analysis.**
  - Abell, Robin, et al. "Freshwater ecoregions of the world: a new map of biogeographic units for freshwater biodiversity conservation." *BioScience* 58.5 (2008): 403-414.
  - Atasoy, M., & Çorbacı, Ö. L. (2018). The invasive alien plants of Turkey a checklist and environmental hazards. J. Appl. Environ. Biol. Sci, 8(5), 1-8.
  - Baytop, T. (1994). Turkiye Bitki Adları Sozlugu (Turkish Dictionary for Plant Names). Ataturk Kultur, Dil ve Tarih Yuksek Kurumu, Turkiye Dil Kurumu Yayınları: 578: Ankara.
  - Byfield A. Ataay S. Ozhatay N., 2010. Important Plant Areas in Turkey: 122 Key Turkish Botanical Sites. WWF Türkiye, Istanbul.
  - Davis, P.H. (ed.). (1965-1988) Flora of Turkey 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. (hardback). Edinburgh Journal of Botany, 59(3), 459-466.

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- Kirwan, G.M, K.A. Boyla, P. Castell, B. Demirci, M. Ozen, H. Welch and T. Marlow., 2008. The birds of Turkey: a study of the distribution, taxonomy and breeding of Turkish birds. Christopher Helm. London.
- Minister of Environment, Urbanisation and Climate Change, 2023. 2022 Environmental Status Report for Konya Province. Department Responsible for EIA and Environmental Licenses.
- Minister of Environment, Urbanisation and Climate Change, 2024. 2023 Environmental Status Report for Niğde Province. Department Responsible for EIA and Environmental Licenses.
- 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.
- 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.
- Zohary, M. (1973) Geobotanical foundations of the Middle East, 2 vols. Gustav Fischer Verlag, Stuttgart.

- **Web sources:**
  - Birdlife International (http://www.birdlife.org/)
  - Bizimbitkiller.org.tr, Nezahat Gokyigit Botanical Garden Service (https://bizimbitkiler.org.tr/yeni/demos/technical/)
  - 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**)
  - Global Register of Introduced and Invasive Species - Turkey (https://www.gbif.org/dataset/acaa145f-7944-4bc8-a4cc-4e3410c41e99)
  - IUCN Red List of Threatened Species (https://www.iucnredlist.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)

- Nuh'un Gemisi National Biodiversity Database (https://nuhungemisi2.tarimorman.gov.tr/) (Ministry of Agriculture and Forestry)
- Turkish Plants Data Service (TÜBİVES) - Version 2.0 BETA (http://194.27.225.161/yasin/tubives/index.php)
- 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/)

5.2.1.2.2 Field studies

On October 18, 2023, field surveys were undertaken in accordance with the work instructions developed after the gap analysis in the scoping report. The primary aim of these surveys was to provide a comprehensive description of the biodiversity status in the designated area of interest for the project. Therefore, the subsequent elements were the focus of the field research: terrestrial fauna; terrestrial flora and habitats.

The following section describes the field methodology for each of these components.

In addition, EIA studies have been carried out for both ETL and SPP in accordance with local legislation.

SPP-EIA studies were carried out in 2022. Within the scope of EIA studies, flora studies and fauna components such as herpetofauna, mammals, and aves were identified. Flora studies were conducted by local experts. The studies are presented both in the EIA report and in Annex-5 of the same report as Ecosystem Assessment Report.

ETL-EIA studies were carried out in 2023. Within the scope of EIA studies, flora studies and fauna components were identified. Flora studies were conducted by local expert. The studies are presented both in the EIA report and in Annex-5 of the same report as Ecosystem Assessment Report.

The results of these studies were additionally included in the preparation of a species inventory that is either present or potentially present and work instructions for ESIA within the LSA.

Additionally, a literature review was conducted for the 29.4 km ETL study.

5.2.1.2.2.1 Terrestrial Flora and Habitat survey

Field survey was carried out at 9 Sampling Points (SPs) determined in order to identify the flora characteristics of the LSA. It was conducted 18 October 2023 by the expert botanist Prof. Hayri Duman of University of Gazi, Türkiye.

Each SP was selected in order to include diverse habitats, aiming, to identify the flora and vegetation structure of the Project Area and potential critical species or habitats. Priority was given to selecting sampling points in areas that include natural habitats and are to critical species.

The width of each SP was determined as approximately 500 x 400 meters in detail to directly identify flora species and habitats. Field notes, GPS coordinates (WGS84 UTM Zone 36S), and photographic documentation were also gathered. Table 5-8 provides the relative coordinates of the nine sampling stations, whereas Figure 5-3 illustrates their precise locations.

A list of flora species observed and identified was compiled at each SP. If a global assessment by the IUCN was absent (e.g., Not Evaluated NE or Data Deficient DD), the species status was determined using the threat categories outlined in local assessments (e.g., Red Data Book for Turkish Plants). The local expert (Prof. Hayri

Duman), utilising the most recent information on the species distribution and IUCN 2001 criteria, reassessed these threat categories. The key habitat categories were identified and classified in accordance with the EUNIS classification system, as per the Natural Habitats and Modified Habitats definitions[5].

Previous field studies were also conducted in October 2022 and May 2023 for the preparation of the Local EIAs SPP and ETL respectively. Flora species and habitats were recognized both directly in the field and through the collection of some specimen. For the identification of the flora species, the main literature data such as Flora of Türkiye and the East Aegean Islands[6,7,8], Flora Europaea[9], Botanical Latin[10], Dictionary of Plant Science Terms[11] and List of Plants of Türkiye[12] were used.

Table 5-8: Terrestrial flora and habitats, sampling points and coordinates

Sampling Points (SPs)	Survey Date	Coordinates		
SP1	18.11.2023	36 S	628813 E	4184750 N
SP2	18.11.2023	36 S	628402 E	4185100 N
SP3	18.11.2023	36 S	628615 E	41856647 N
SP4	18.11.2023	36 S	627963 E	4184218 N
SP5	18.11.2023	36 S	627300 E	4183623 N
SP6	18.11.2023	36 S	626083 E	4182448 N
SP7	18.11.2023	36 S	625591 E	4182038 N
SP8	18.11.2023	36 S	625602 E	4183218 N
SP9	18.11.2023	36 S	627549 E	4184359 N

[5] https://www.ifc.org/content/dam/ifc/doc/2010/2012-ifc-performance-standard-6-en.pdf

[6] Güner, A., Özhatay, N., Ekim, T. and Başer, K.H.C. 2000. Flora of Turkey and the East Aegean Islands. Vol: 11, Edinburgh Univ. Pres., Edinburgh.

[7] Davıs, P.H., Mill, R.R. and Tan, K. 1988. Flora of Turkey and the East Aegean Islands. Vol: 10, Edinburgh Univ. Press., Edinburgh.

[8] Davıs, P.H. 1965-1985. Flora of Turkey and the East Aegean Islands. Vol: 1-9, Edinburgh Univ. Press., Edinburgh.

[9] Tutın, T.G., Heywood, V.H., Burges, N.A., Valentına, D.H., Walters, S.M. and Webb, D.A. (eds). 1964-1980. Flora Europaea. Vol:1-5, Cambridge: Cambridge Univ. Pres.

[10] Stearn, T.W. 1966. Botanical Latin. 566 pp, Edinburgh.

[11] Altınayar, G. 1987. Bitki Bilimi Terimleri Sözlüğü. Devlet Su İşleri Basım ve Foto-Film İşletme Müdürlüğü Matbaası, 308 ss, Ankara.

[12] Güner A., 2012. Türkiye Bitkileri Listesi. ANG Vakfı/Nezahat Gökyiğit

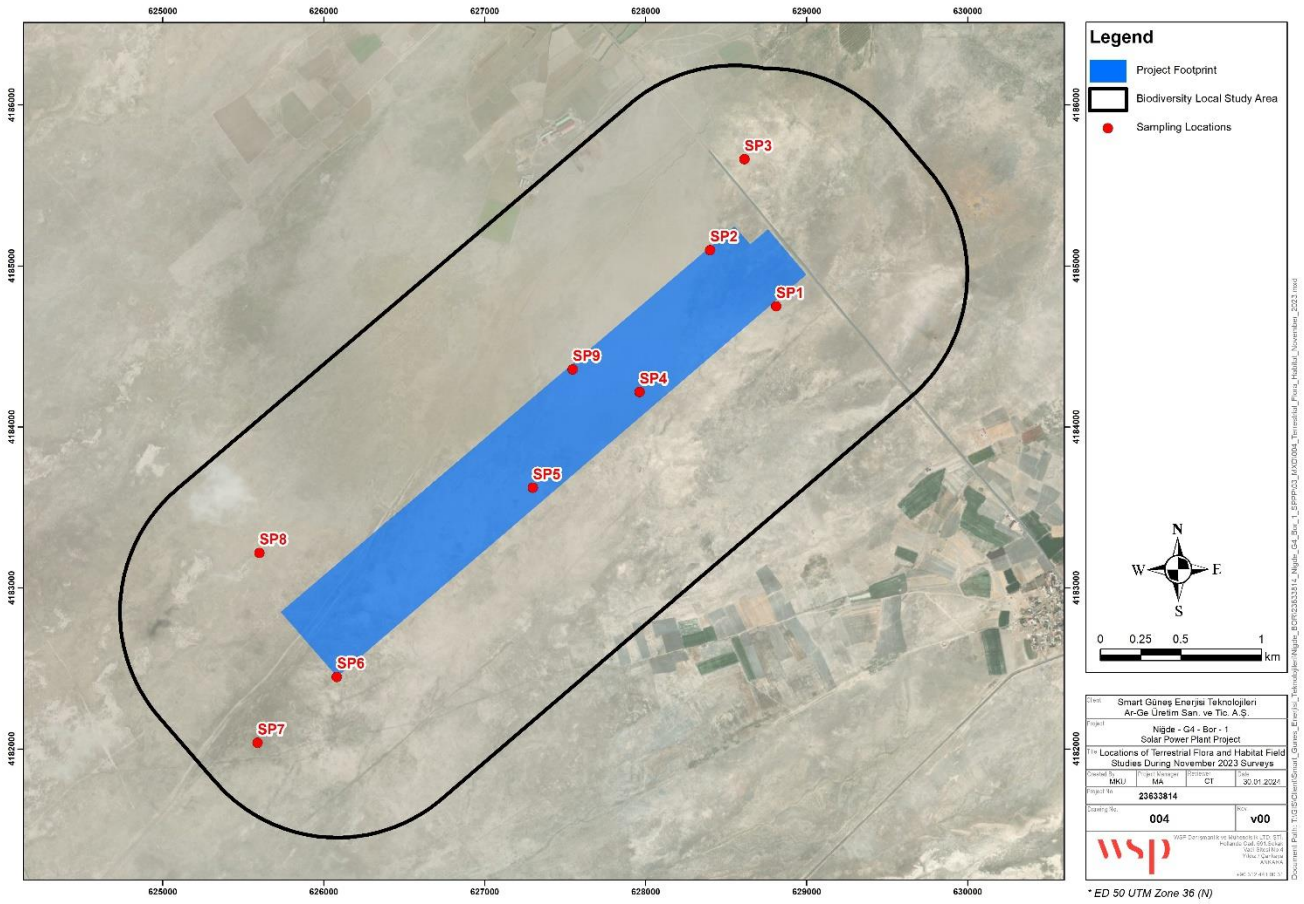


Figure 5-3: Locations of terrestrial flora and habitat field studies during October 2023 surveys

5.2.1.2.2.2 Terrestrial fauna survey

Field study on terrestrial fauna were carried out within the LSA by fauna expert Şafak Bulut PhD, on 18 October 2023.

Walk over surveys were conducted in the vicinity of all sampling points and along linear transects targeting all habitat types within the project site for the presence of any endemic or globally/locally threatened terrestrial fauna species (Herpetofauna, Aves, and Mammals).

Throughout the field investigation, every sampling point and transect were examined using direct observations and indirect indicators, including tracks, burrows, scats, droppings, calls and sings. The observations were conducted using a Nikon Aculon 16x50 binocular and a Sony A7RIV camera body with a Sony 200-600 mm lens.

A compilation of identified fauna species and/or evidence of their presence was made. The GPS coordinates were documented for every sampling point and linear transect, and their precise locations are indicated in Figure 5-3.

5.2.1.2.2.3 Ecosystem services

The baseline on ecosystem services derives both from information collected during biodiversity field studies and during social field studies. The biodiversity field studies are described in the previous sections. With regards to social field studies, data on ecosystem services were collected from primary sources by interviewing a sample

of population potentially impacted by Project activities. Social field surveys were undertaken between March 6th and March 8th, 2024, where institutions, households, and village heads were interviewed. In particular, information on ecosystem services was collected through a total of 37 Household Level Surveys (HLS) which were successfully completed during the field visit. These surveys encompassed households from the villages of Seslikaya, Badak, and Emen. Surveyed households represent approximately 17% of the total households.

Further information on the methodology used for the collection of social field information can be found in the social baseline section of the ESIA report.

5.2.1.2.3 Habitat mapping

The entire LSA was thoroughly surveyed, and habitat types were accurately recognised and mapped at a scale of 1:10,000 using the EUNIS classification approach. This categorization was based on satellite imagery and information from literature sources, including the Corine Land Cover dataset.

The following main steps were used for the habitat mapping procedure:

1. A comprehensive land cover map was generated utilizing the Corine Land Cover 2018 v.2020_20u1 dataset accessible on the Copernicus website;
2. The CORINE Land Cover classes were meticulously transformed into EUNIS Habitat categories, employing the highest achievable definition level (at least level 3) that was based on the analysis of relevant satellite imagery and consideration of pertinent previous studies conducted in the area;
3. The outcomes of flora and habitat surveys conducted in October 2023 were utilized to validate the EUNIS habitat mapping;
4. Subsequently, the EUNIS habitat types were classified into either modified or natural habitats, adhering to the criteria outlined in PS6 of IFC (2019).

5.2.1.3 Results

5.2.1.3.1 Landscape overview

The Project LSA's elevation is between 1043 and 1065 m a.s.l. within the "**Central Anatolian Steppes and Woodlands**" **(PA0410)** terrestrial ecoregion (Olson et al., 2001)[13], which is part of the broader biome category "Temperate Broadleaf and Mixed Forests". This ecoregion covers Central Türkiye, bounded by the Pontic Mountains in the north and the Taurus Mountains in the south (see Figure 5-1). Its vegetation is characterized by natural and semi-natural steppes and grasslands.

The characteristic landscape features of Central Anatolia (Türkiye) include large basins, which are naturally bare of forests and woodlands, but were formerly occupied by steppe vegetation. These steppes evolve under a pronounced continental climate, which is extremely cold in winter and dry and hot during summer. Rainfall is less than 300 mm/year, favouring treeless steppe vegetation dominated by well-adapted dwarf-shrubs, a few herbs, and a larger number of geophytes and annuals. We review the present knowledge on Central Anatolian steppe vegetation (*Onobrychido armenae*-Thymetalia leucostomi, Astragalo-Brometea) and provide insight into the complex structure and species composition of today's primary and secondary steppes and their replacement communities. In addition, the changes in vegetation due to the long-lasting human impact such as grazing and

[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

agricultural activities (ca. one-third of Türkiye's grain production concentrates in the former steppe area) are shown, which generally led to a loss of species and a massive decline of the diversity in the area[14].

The Project LSA is not covered within the boundaries of a legally protected area. However, the LSA falls within the boundaries of the Ereğli Plain Key Biodiversity Area (KBA) and Important Bird Area (IBA). Another internationally recognized areas of importance for biodiversity situated within 13 km from the LSA is Hasan Dağı KBA, Important Plant Area (IPA) and an IBA (see Figure 5-4). Akkaya Pond KBA is also situated at about 17 km northeastern of the LSA.

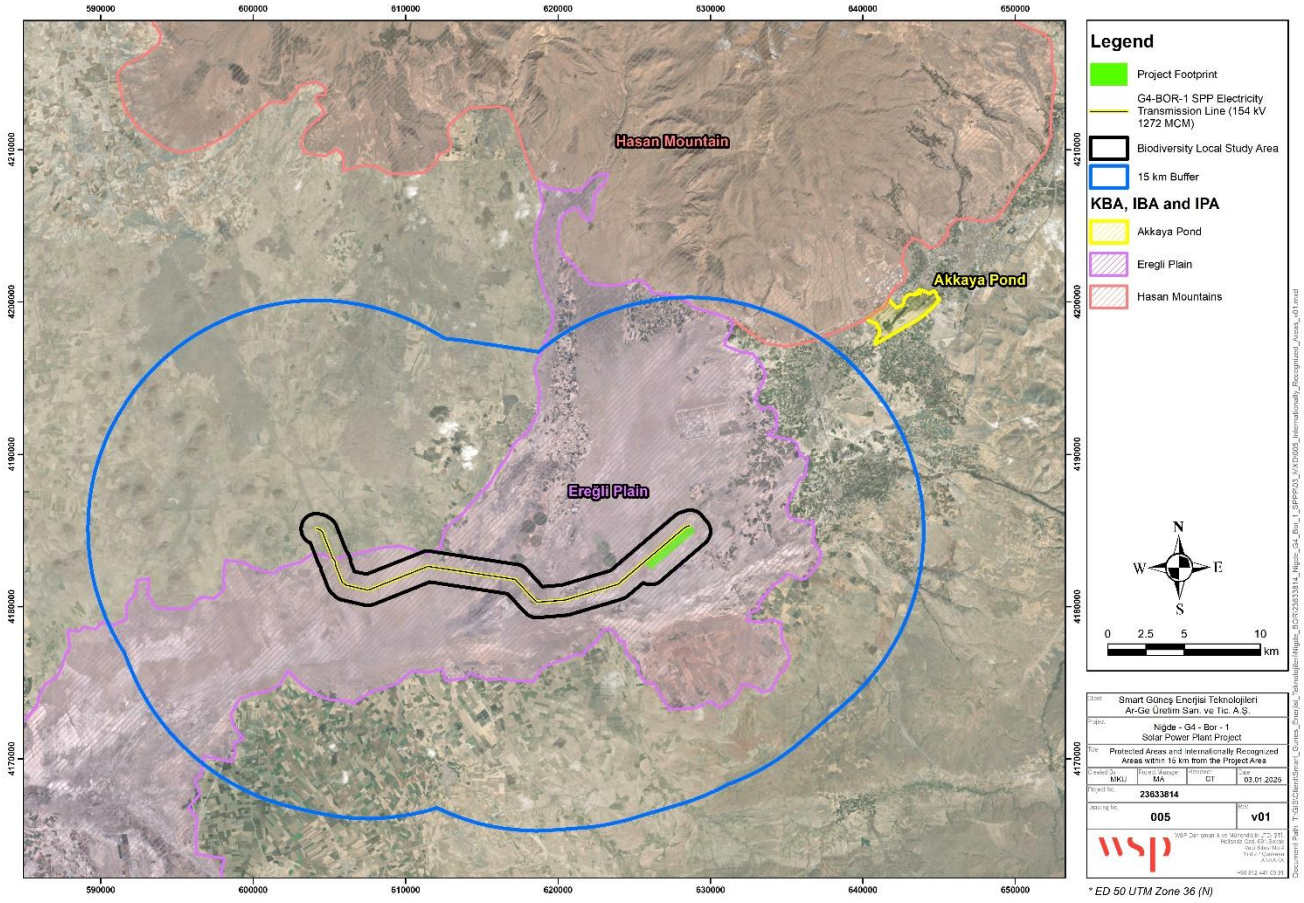


Figure 5-4: Protected areas and Internationally Recognized Areas within 15 km from the Project LSA

Ereğli Plain KBA and IBA

It is a large plain located in the southeast of Central Anatolia, north of the Bolkar Mountains. The area consists of shallow marshes, reeds, freshwater lakes, and wide lowland steppes, most of which are saline (see Figure 5-5). Akgöl in the west of the KBA has largely dried up since the second half of the 1990s. Towards the east, especially in the Zengen region, there are vast and untouched lowland steppes rich in rare plants. Once the largest reed beds in Central Anatolia, these areas have almost completely disappeared due to the dams constructed by the State Hydraulic Works (DSİ) and the illegal use of groundwater. The wetland zone of

[14] Kürschner, H., & Parolly, G. (2012). The central Anatolian steppe. In Eurasian steppes. Ecological problems and livelihoods in a changing world (pp. 149-171). Dordrecht: Springer Netherlands.

KBA consists of lakes, reeds, and marshy areas. The rest of the area consists of saline lowland steppes and Yavşan plains.

The steppes in the area harbour many endangered and narrowly distributed endemic plant species. *Chrgsocamela elliptica* is the rarest and most vulnerable among them. KBA has been the centre of attention of local and foreign birdwatchers and researchers for many years, and therefore many bird data on the wetland ecosystem have been collected. Among the birds that are still known to breed in the area are the lesser kestrel (*Falco naumanni*), the White-headed duck (*Oxyura leucocephala*), the Black-winged stilt (*Himantopus himantopus*), and many other waterfowl. In addition, many birds in the area are extinct or their numbers have decreased significantly. Ereğli Reeds are important for inland fish as well as birds and fulfil the KBA criteria for five fish species. The world distribution of *Barbatula eregliensis*, a single-point endemic, is limited to Ereğli Reedbeds. It is believed that the species is completely extinct in the area due to drying.

The habitats inside the G4-Bor-1 SPP installation region and ETL route consist of flat grasslands and lack any aquatic species.

Animal husbandry is intensively practised in KBA. Cattle breeding is the main source of livelihood in reedbed areas and ovine breeding in other areas. Dry agriculture is also partially practised in the area. In the areas just outside the KBA, irrigated agriculture, especially fruit growing, is intensively practised. Reed farming, which was once intensive in the lake, continues in small amounts today. Threats: The dams built on the rivers feeding the area in the past and the groundwater.

Due to the dams built on the rivers feeding the area in the past and the excessive use of groundwater, serious drying has occurred in the area. A large part of Ereğli Reeds, once one of the largest and most productive reeds in our country, has disappeared. Although there is not enough water for agriculture, ploughing the steppes and opening them to agriculture is another factor threatening the area. Although domestic and industrial wastes cause pollution of the reeds, they are the only surface water sources in the area. Overgrazing poses a significant threat to plant species in the region, and the decrease in groundwater has led to wind erosion in the area.[15].

Akgöl Wetland

Konya Closed Basin (KCB), located in Central Anatolia, is one of the 25 river basins of Turkey. One of the internationally recognized wetlands of the basin is the Akgöl Wetland, which was known in previous years for its rich biodiversity. The operation of the Ayrancı, İvriz, and Gödet Dams in 1958, 1984, and 1988, respectively, began to cut off the water flow to Akgöl; this situation has caused a significant decrease in both the surface area and volume of the wetland. Until the 1960s, the surface area of Akgöl was approximately 21,500 hectares; since then, most of it has been lost due to water drainage, water cuts, and water withdrawals for agricultural irrigation purposes. The main reasons for this significant decrease in water level were primarily the cutting of water inflow to the wetland due to river diversions during the operation of the dams and, secondly, the widespread practice of drying lakes at that time as part of efforts to combat malaria. Malaria control efforts accelerated the drying process of the wetland.

This situation has also been supported by scientific research. In studies conducted, the temporal land use/land cover change of surface water bodies in the Akgöl Wetland was evaluated using Landsat satellite images over the past 30 years. According to these assessments, it has been determined that the Akgöl Wetland has lost approximately 96% of its water surface and is under threat of extinction. Additionally, the semi-arid character of

[15] https://dogadernegi.org/en/turkeys-kbas/# Key Biodiversity Areas of Turkey Book

the region is another limiting factor for the wetland, as precipitation is the only water source of the area, and rainfall amounts are expected to decrease in the near future due to the effects of climate change[16].

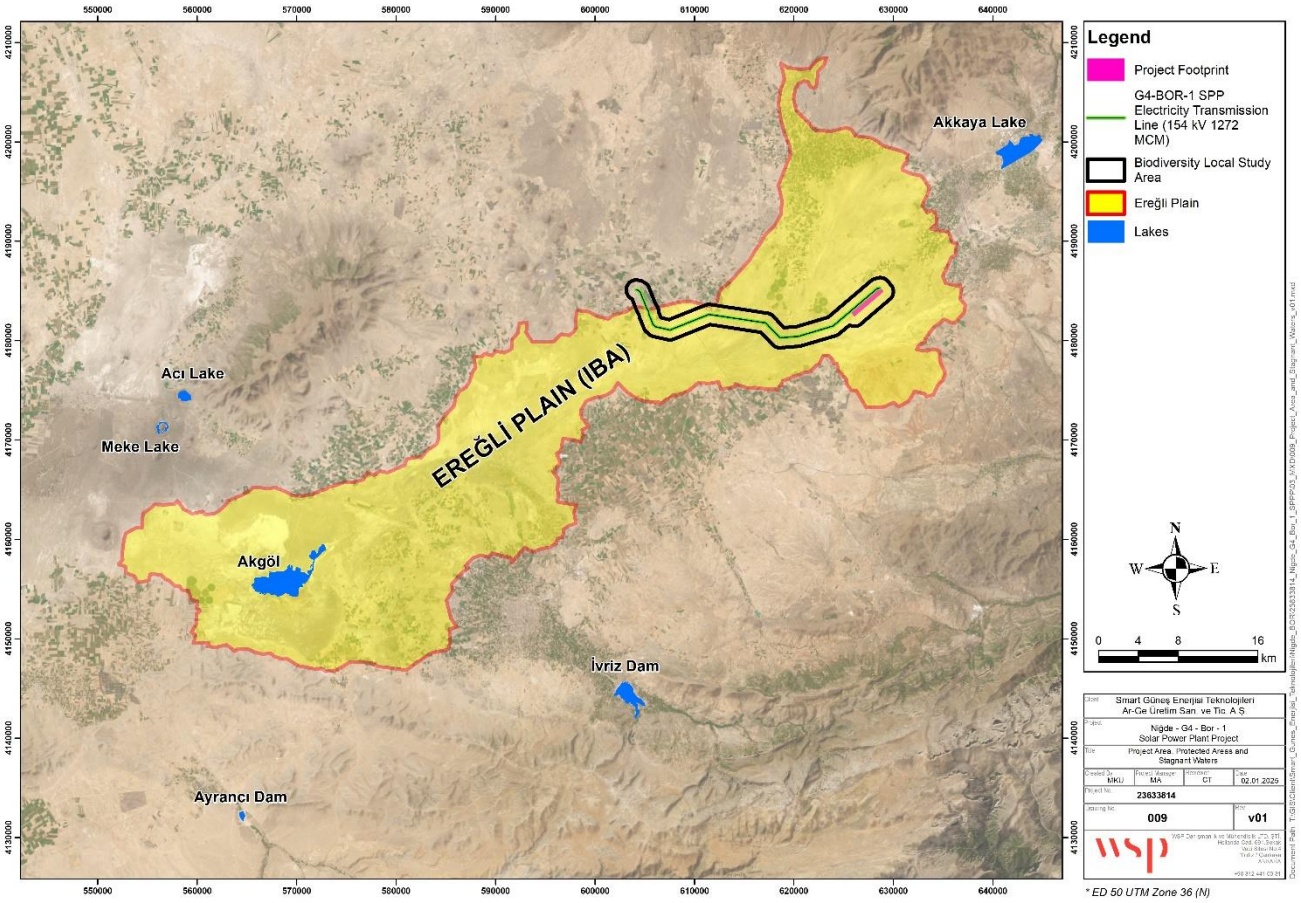


Figure 5-5: Map showing the Project Area, protected areas and stagnant waters.

5.2.1.3.2 Natural and Modified habitats

The Natural and Modified habitats within the terrestrial LSA were identified based on the literature review, the analysis of satellite images on Google Earth, and field surveys conducted in October 2023 during flora field studies.

The largest percentage of habitats in the LSA consist of modified habitats, specifically mixed crops of market gardens and horticulture (19.77%), as well as rural industrial and commercial sites that are still in use (5.6% and 0.3% respectively, categorised as J2.3 and J4.2).

The predominant natural habitats consisting of continental inland salt steppes comprise 74.24% of the LSA's natural habitats.

[16] Musaoglu, N., Tanik, A., Gumusay, M. U., Dervisoglu, A., Bilgilioglu, B. B., Yagmur, N., ... & Gokdag, M. F. (2018, June). Long-term Monitoring of Wetlands via Remote Sensing and GIS: A case study from Turkey. In *The Proceedings of The International Conference on Climate Change* (Vol. 2, No. 1, pp. 11-21).

The continental inland salt steppes (E 6.2) are defined by the existence of a limited number of endemic species (plants and animals) and are particularly vulnerable to anthropic disturbance. This habitat type is primarily found in the LSA.

Natural habitats in the LSA are marked by moderate to high levels of human disturbance, primarily as a result of pressure (grazing) on saline habitat and the subsequent ongoing habitat loss.

The habitat map of the LSA, based on the EUNIS habitat classification system, can be found in Table 5-9. The corresponding calculations are displayed in Figure 5-6. Below is a concise description of the EUNIS natural habitat that has been identified in the area.

Table 5-9: EUNIS habitat types present in the LSA

EUNIS Code	EUNIS Habitat Type	Total LSA	
		ha	%
Natural habitat			
E6.2	Continental Inland Salt Steppes	4,866.33	74.24
	Subtotal	4,866.33	74.24
Modified habitat			
I1.2	Mixed Crops of Market Gardens and Horticulture	1,295.13	19.77
J2.3	Rural Industrial and Commercial Sites Still in Active Use	373.07	5.69
J4.2	Road Networks	19.76	0.3
	Subtotal	1,688.26	25.76
	Total	6,554.6	100

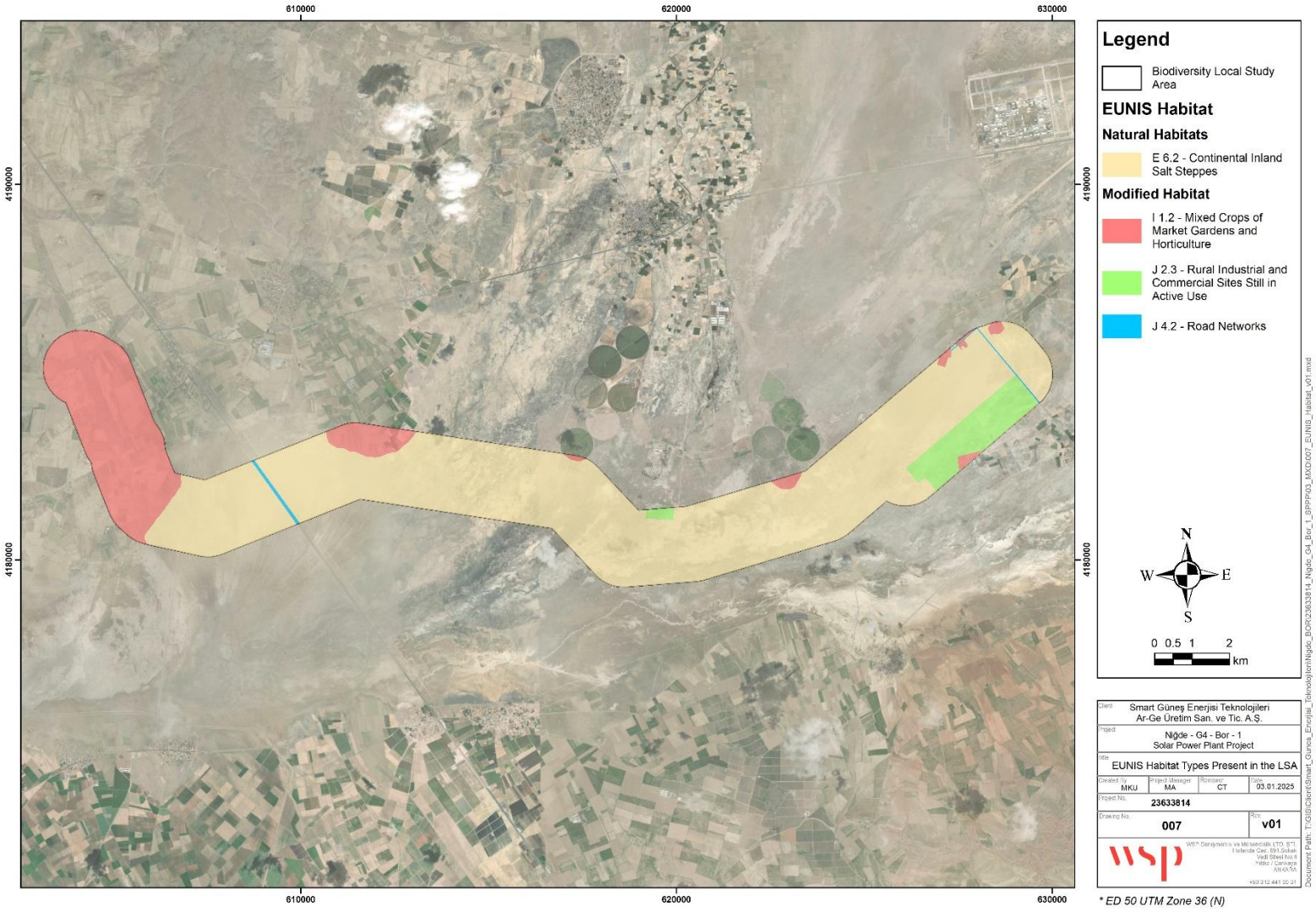


Figure 5-6: EUNIS habitat map of the LSA

E6.2 Continental inland salt steppes

Salt steppes (also called alkali steppes) occur on plains in the Eurasian steppe and forest-steppe zones from the Great Hungarian Plain and adjacent areas through the Danube Lowland in Romania and Bulgaria to Ukraine, Russia, Kazakhstan and Mongolia.

This ecoregion is comprised of five distinct areas in the Central Anatolian region of Türkiye. These lowlands host salt steppes, marshes, rivers, and saline lakes, and are typified by a continental climate of cold winters and hot, dry summers (see Figure 5-7). Annual precipitation ranges from 400 to 500 mm, decreasing to 300 mm in certain places depending on the micro-topography. There are no mountains or highlands here, and the average altitude is around 1,000 m.

The focal species of the habitat are *Camporosma monspeliaca, Bolboschoenus maritimus, Taraxacum farinosum, Frankenia hirsuta, Suaeda* sp., *Halimione verrucifera Puccinellia koeieana, Limonium lilacinum, Limonium iconicum, Aeluropus littoralis.*

Figure 5-7: Continental inland salt steppes (E6.2) identified in the LSA

5.2.1.3.3 Flora species

Prof. Hayri Duman conducted literature analysis and field study on October 18, 2023. Additionally, for the route of the operational ETL line, an EIA study, monitoring studies, stakeholder reports, and a literature review were conducted in 2024, resulting in an updated species list for flora. As a result of these studies, a total of 64 species were identified.

Finally, during the flora monitoring study[17] conducted in September 2024, the invasive alien species *Xanthium spinosum* was identified.

Additionally, potential invasive species that could be found in the area have been identified. These include: *Xanthium strumarium*, *Conyza canadensis*, and *Chenopodium botrys*.

[17] Smart Solar Power Plant Project. Flora Monitoring Report. September 2024.

A full list of flora species was not compiled due to the incomplete or unreliable nature of the information gathered from the literature. There are 11 species of conservation concern, which are mentioned in below.

The whole list of species can be viewed in Appendix D.

Table 5-10: Flora species of conservation concern present within the LSA.

Family	Species	Global IUCN Status	National IUCN status	End./ RR	Station code	Lit./ Obs.*
Asteraceae	*Onopordum davisii*	NE	NT	Regional Endemic	SP1, SP2, SP3, SP4, SP5, SP6, SP7	O 2023
Caryophyllaceae	*Gypsophila oblanceolate*	NE	VU	Regional Endemic	SP1, SP5, SP8	O 2023
Scrophulariaceae	*Verbascum helianthemoides*	NE	VU	Widespread endemic	SP8	O 2023
Plumbaginaceae	*Limonium tamaricoides*	NE	EN	Regional Endemic	SP2, SP4, SP5, SP6, SP7, SP8, SP9	O 2023
Amaranthaceae	*Salsola stenoptera*	NE	VU	Widespread endemic	SP1, SP2, SP3, SP4, SP5, SP6, SP7, SP9	O 2023
Amaryllidaceae	*Allium sieheanum*	NE	LC	Regional Endemic	-	L, H
Asteraceae	*Cousinia birandiana*	NE	LC	Regional Endemic	-	L, H
Asteraceae	*Cousinia iconica*	NE	LC	Regional Endemic	-	L, H
Brassicaceae	*Lepidium caespitosum*	NE	VU	Regional Endemic	-	L, H
Plumbaginaceae	*Limonium lilacinum*	NE	LC	Regional Endemic	-	L, H
Fabaceae	*Sphaerophysa kotschyana*	NE	LC	Regional Endemic	-	L, H
Asteraceae	*Xanthium spinosum*	-	-	Alien	-	O 2024

*L:Literature A: Interview with locals, O: Observation, H: Habitat Suitability

According to the National Red List (Turkish Red Data Book of Plants – T-RDB) re-evaluated by Prof. Hayri Duman (the local expert) based on the latest available information on the species distribution and IUCN 2001 criteria, *Gypsophila oblanceolata* (see Figure 5-8), *Verbascum helianthemoides* (see Figure 5-8), and *Salsola stenoptera* (see Figure 5-9) are classified as Vulnerable (VU), while *Onopordum davisii* (see Figure 5-10) is classified as Near Threatened (NT). *Limonium tamaricoides* (see Figure 5-10) is classified as Endangered (EN).

These three species (*Onopordum davisii, Gypsophila oblanceolate, Limonium tamaricoides*) are also considered as regional endemic species. All other species are classified as Least Concern (LC).

In addition to the field observations conducted in 2023, 222 plant taxa belonging to 41 families were identified. Among these, 6 species are regional endemic, with *Lepidium caespitosum* classified under the VU category, while the remaining species fall under the LC status.

Figure 5-8: *Gypsophila oblanceolata* (left side) and *Verbascum helianthemoides* (right side) within the LSA

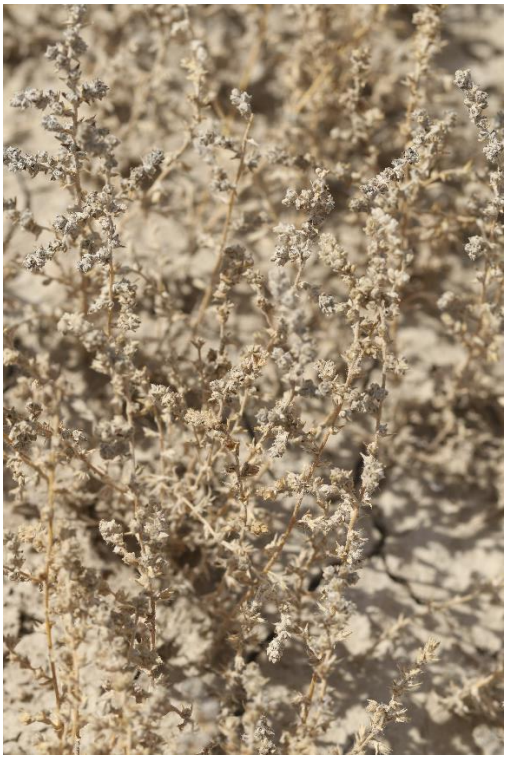


Figure 5-9: *Salsola stenoptera* within the within the LSA

Figure 5-10: *Onopordum davisii* (left side) and *Limonium tamaricoides* (right side) within the within the LSA

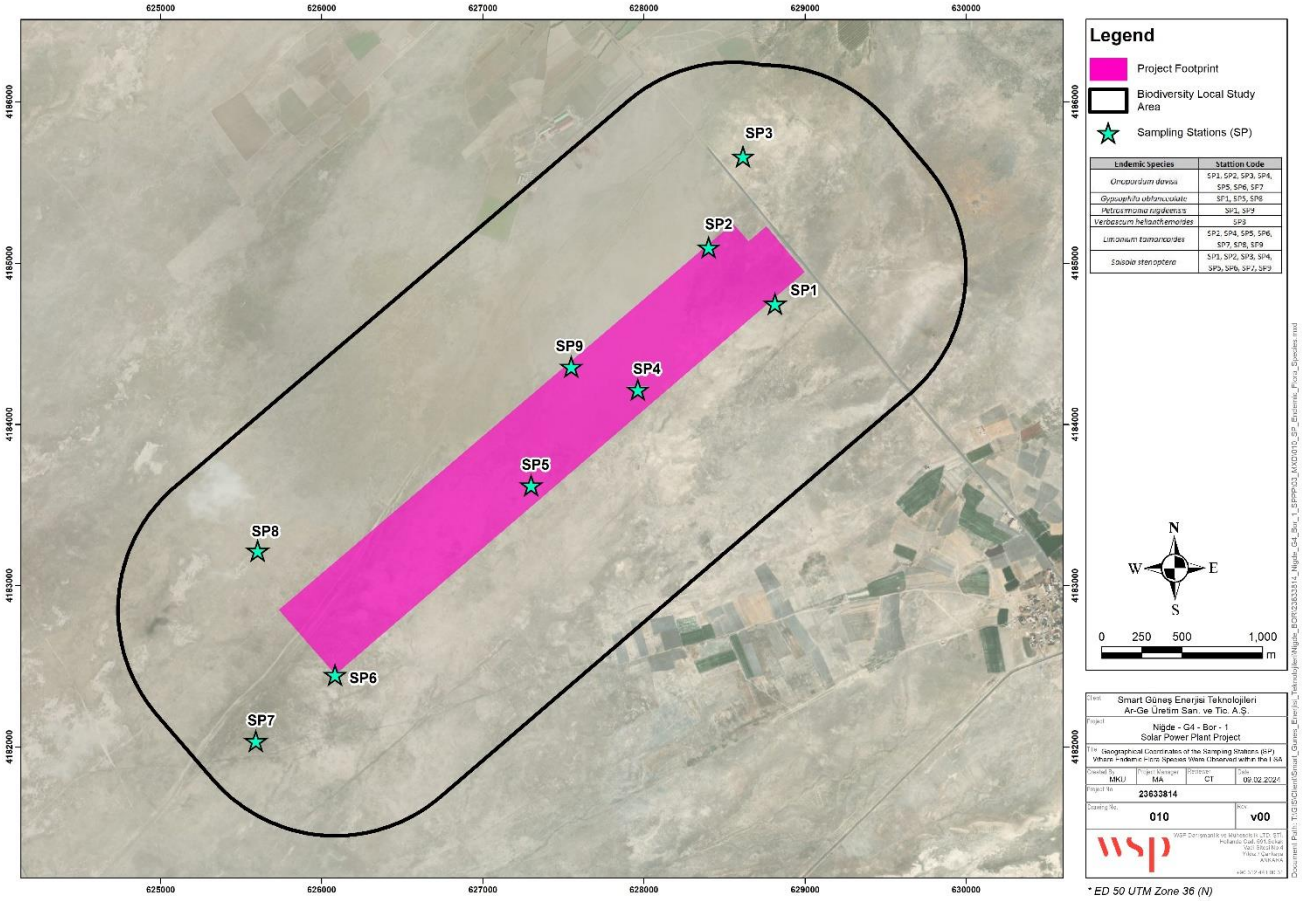


Figure 5-11: Geographical coordinates of the sampling stations (SP) where endemic flora species were observed within the SPP-LSA

5.2.1.3.4 Fauna species

23 mammal species, 84 bird species, 13 reptiles and 2 amphibians have been observed or potentially present in LSA. A total of 122 species were identified.

Within the LSA, there are several fauna species that have been identified as either present or potentially present. Among these species, one reptile species (*Testudo graeca*) is classified as Vulnerable (VU), while four bird species (*Aquila nipalensis, Otis tarda, Neophron percnopterus* and *Falco cherrug*) are classified as Endangered (EN). Additionally, one bird species (*Aquila heliaca*) is classified as Vulnerable (VU).

Furthermore, the Global IUCN Red List assessment classifies one mammal species (*Vormela peregusna*) as Vulnerable (VU), five mammal species (*Barbastella barbastellus, Mesocricetus brandti*, and *Spermophilus xanthoprymnus*) as Near Threatened (NT), and two species (*Microtus anatolicus and Nannospalax xanthodon*) as Data Deficient (DD).

5.2.1.3.4.1 Herpetofauna

Based on a comprehensive assessment of the literature and extensive field studies, it has been concluded that there are potentially three species of amphibians and 15 species of reptiles existing in the LSA.

Two species (*Bufotes variabilis* and *Bufotes sitibundus*) are classified as Data Deficient (DD), while the third one (*Pelophylax ridibundus*) is classified as Least Concern (LC) according to the Global IUCN Red List assessment. No endemic species were identified. The complete list of the amphibian species potentially present is reported in the Table 5-11 below and in Appendix D.

Testudo graeca is categorised as Vulnerable (VU) based on the IUCN Global Red List evaluation, whilst the remaining species are categorised as Least Concern (LC). No species that are native or limited to a certain geographic area were found.

Table 5-11: Herpetofauna species present or potentially present within the LSA

Order	Species	English Name	IUCN Global	Obs./Lit.*	Source
Anura	*Bufotes variabilis*	Varying Toad	DD	O-L	ESIA Baseline, EIA ETL, EIA SPP
Anura	*Pelophylax ridibundus*	Marsh Frog	LC	O-L	ESIA Baseline, EIA ETL, EIA SPP
Lacertidae	*Ophisops elegans*	Snake-eyed Lizard	LC	O-L	ESIA Baseline, EIA ETL, EIA SPP
Lacertidae	*Parvilacerta parva*	Dwarf Lizard	LC	O-L	ESIA Baseline, EIA ETL, EIA SPP
Agamidae	*Stellagama stellio*	Roughtail Rock Agama	LC	L	ESIA Baseline
Scincidae	*Heremites vittatus*	Bridled Mabuya	LC	L	ESIA Baseline
Gekkonidae	*Mediodactylus orientalis* **	Mediterranean Thin-toed gecko	LC	L	ESIA Baseline
Colubridae	*Natrix natrix*	Grass Snake	LC	O-L	ESIA Baseline
Colubridae	*Platyceps najadum*	Dahl's Whip Snake	LC	L	ESIA Baseline, EIA SPP
Colubridae	*Elaphe sauromates*	Eastern Four-Lined Ratsnake	LC	L	ESIA Baseline, EIA ETL
Testudinidae	*Testudo graeca*	Common Tortoise	VU	O*,**-L***	ESIA Baseline*, EIA ETL**,

Order	Species	English Name	IUCN Global	Obs./Lit.*	Source
					EIA SPP***
Viperidae	*Montivipera xanthina*	Ottoman Viper	LC	L	ESIA Baseline, EIA SPP
Lacertidae	*Ophisops elegans*	Snake-eyed Lizard	LC	O**, L*	ESIA Baseline*, EIA SPP**
Lacertidae	*Lacerta media*	Medium Lizard	LC	O**, L*	ESIA Baseline*, EIA ETL**
Typhlopidae	*Xerotyphlops vermicularis*	Eurasian Blind Snake	LC	L	ESIA Baseline, EIA ETL, EIA SPP

*L:Literature, O: Observation, H: Habitat, A: Interview with locals

** based on syn. *Mediodactylus kotschyi*

5.2.1.3.4.2 Aves

Türkiye is crossed by the “Karadeniz/Akdeniz” flyway, which is a significant worldwide route for migratory terrestrial and aquatic birds. Türkiye is separated into three major migratory pathways for this significant flyway. The Project Area is situated to the north of the primary migration route and to the south of the secondary migration route (see Figure 5-12). The main migration route is used by cranes, pelicans, storks, and raptors. Certain aquatic avian species persist in their migratory by tracking the lakes region.

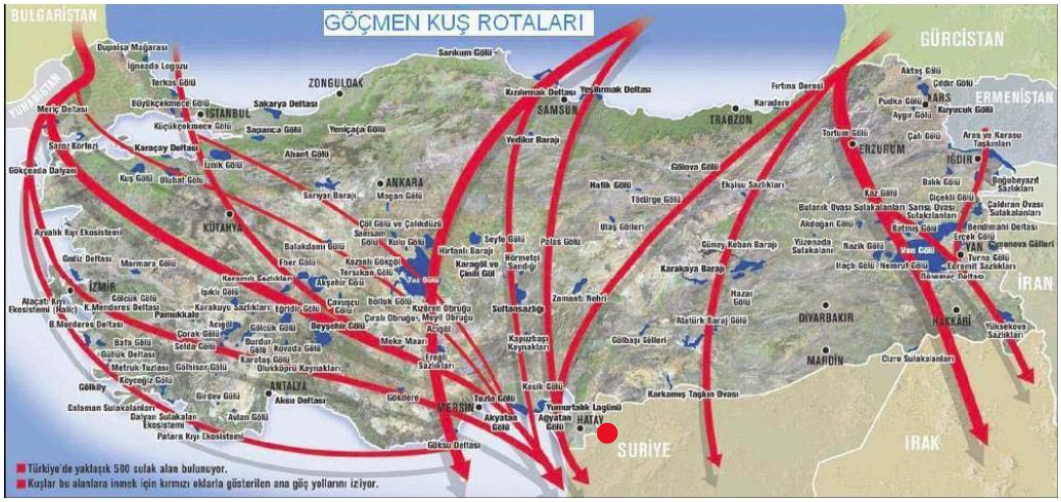


Figure 5-12: Bird Migratory Route in Türkiye and location of the project site[18]

[18] Anonim. 2020. http:www.floradergisi.org/getFileContent.aspx?op=html&ref

During the field surveys carried out on October 18th, no migratory birds were observed in the LSA, despite the migration period.

A total of 84 bird species were identified as potentially present within the LSA and its vicinity, while a total of 32 species were observed during the field survey.

Based on the Global IUCN Red List, there are 4 species (*Aquila nipalensis, Otis tarda, Neophron percnopterus* and *Falco cherrug*) categorised as Endangered (EN), one species (*Aquila heliaca*) categorised as Vulnerable (VU), and 4 species (*Aegypius monachus, Circus macrourus, Marmaronetta angustirostris* and *Vanellus vanellus*) categorised as Near Threatened (NT). All the remaining potentially present species are classified as Least Concern (LC).

No endemic species have been identified.

According to expert judgement, *Aquila nipalensis* breeds in a region near to the field. However, no breeding individuals were encountered during the monitoring studies conducted in 2024.

Additionally, *Marmaronetta angustirostris* is considered extinct as a breeding species in Türkiye since; however, it still reported as present in multiple IBA datasheets[19].Bird identified species of conservation interest are reported in the Table 5-12 below, while the complete list of the species is reported in Appendix D.

Table 5-12: Bird species present or potentially present within the LSA

Family	Species	English Name	IUCN Global	Phenology	Obs./ Lit.	Sources
Accipitridae	*Aegypius monachus*	Black Vulture	NT	Extant (non-breeding)	O	ESIA Baseline
Accipitridae	*Circus macrourus*	Pallid Harrier	NT	Extant (non-breeding)	H	ESIA Baseline
Accipitridae	*Aquila nipalensis*	Steppe Eagle	EN	Extant (non-breeding)	H	ESIA Baseline
Accipitridae	*Aquila heliaca*	Imperial Eagle	VU	Extant (non-breeding)	H	ESIA Baseline, EIA SPP
Falconidae	*Falco cherrug*	Saker Falcon	EN	Extant (non-breeding)	H	ESIA Baseline
Otididae	*Otis tarda*	Great Bustard	EN	Native resident	A	ESIA Baseline
Charadriidae	*Vanellus vanellus*	Lapwing	NT	Extant (non-breeding)	H	ESIA Baseline, EIA SPP
Accipitridae	*Neophron percnopterus*	Egyptian Vulture	EN	Extant (non-breeding)	O*,**, L***, A*	EIA SPP** EIA ETL***, Monitoring Studies-2024*
Accipitridae	*Clanga clanga*	Greater Spotted Eagle	VU	Extant (non-breeding)	L	EIA SPP EIA ETL
Anatidae	*Marmaronetta angustirostris*	Marbled Duck	NT	Breeding Extinct	H	Literature

*L:Literature, A: Interview with locals, O: Observation, H: Habitat Suitability

[19] Boyla, K.A., Sinav, L. ve Dizdaroğlu D.E. 2019. Türkiye Üreyen Kuş Atlası. WWF-Türkiye, Doğal Hayatı Koruma Vakfı. İstanbul

Collision Risk Assessment

The ongoing monitoring studies are continuing, and no quantitative data have yet been obtained by the local ornithologist for the Collision Risk Assessment. For this purpose, a qualitative assessment has been conducted based on existing observations, literature review, expert opinion, the examination of species-specific migration routes and ecological behaviors, and the experience gained by the local expert both in this area and in the neighboring project site. Based on this assessment, no collision risk is expected for species with a wingspan of 90 cm or less.

For soaring migratory birds such as storks, pelicans, cranes, and eagles, satellite tracking studies have been conducted both in Türkiye and European countries. Organizations such as BirdLife International archive these transmitter tracking studies. The review indicates that while passages over the GES project area in Emen Plain and near the city center of Niğde to its east are rare, migration routes intensify toward the west, including Ereğli, Karapınar, and the central part of Konya. This situation is closely related to the geographical structure of the region and the Taurus Mountains to the south, as well as temperature and wind currents. The soaring birds mentioned rely on rising thermal air currents to gain altitude with minimal energy expenditure, which is why they are defined as "soaring migratory birds." According to satellite-tracked bird movement maps, the GES project area is not frequently used by soaring birds.

The Egyptian Vulture (*Neophron percnopterus*), classified as Endangered (EN), was not observed in the 2023 ESIA baseline, ETL-EIA, or 2024 monitoring studies but was reported by company employees in August 2023. When examining the ecological characteristics of the species, the project area is not a suitable breeding habitat for the Egyptian Vulture, which nests in steep rocky and canyon-like environments. Only a few breeding individuals from the mountainous regions of Niğde or migratory individuals passing between continents may be observed in the area during migration or hunting flights.

The Great Bustard (*Otis tarda*, EN) has not been recorded in either the project area or its surroundings according to literature records. However, the habitat type of the project area is suitable for the species.

The Egyptian Vulture (*Neophron percnopterus*, EN) has been previously recorded nesting within the borders of Nevşehir province. Based on the species' ecology, it is likely to be seen only during migration or while hunting, but it does not stop or reside in the area.

The Eastern Imperial Eagle (*Aquila heliaca*) has previously been observed in the Bolkar Mountains, approximately 100 km from the project area. It may be observed during migration.

The Cinereous Vulture (*Aegypius monachus*) typically inhabits mountainous regions, open forested areas, and wide valleys. This habitat type is found in the mountain range located south of Niğde. A few individuals may be observed in the area during migration.

5.2.1.3.4.3 Mammals

Based on a comprehensive analysis of existing literature and on-site investigations, a total of 23 species have been identified as either now existing or potentially existing in the terrestrial LSA. However, the existence of only 8 species was verified through indications of their presence (such as tracks, burrows, scats, droppings) or observations.

According to the Global IUCN Red List, one species (*Vormela peregusna*) is categorized as Vulnerable (VU), while five species (*Barbastella barbastellus, Lutra lutra, Mesocricetus brandti, Miniopterus pallidus, and Spermophilus xanthoprymnus*) fall under the classification of Near Threatened (NT). Two species (*Microtus anatolicus and Nannospalax xanthodon*) are designated as Data Deficient (DD). All remaining mammal species are classified as Least Concern (LC). Furthermore, *Microtus anatolicus* has been identified as a species restricted to Türkiye, with its distribution limited to central and southwest Anatolia.

Spermophilus xanthophyrmnus burrows were observed in abundance within the LSA during field studies (see Figure 5-13). The Project Area spans across all regions within a 200-hectare radius. Based on the literature and observation data, it is likely that there are approximately 10 individuals per acre.

The mammal species categorised as Near Threatened or Vulnerable can be found in Table 5-13, whereas the comprehensive list of mammal species considered potentially present is provided in Appendix D.

Table 5-13: Mammal species of conservation concern present or potentially present within the LSA.

Order	Species	English Name	IUCN Global Status	End./ RR.	Obs./ Lit.*	Sources
Chiroptera	*Barbastella barbastellus*	Western Barbastelle	NT	-	L	ESIA Baseline
Carnivora	*Lutra lutra*	Eurasian Otter	NT	-	L	ESIA Baseline
Rodentia	*Mesocricetus brandti*	Brandt's Hamster	NT	-	O*, L**	ESIA Baseline*, EIA ETL**
Rodentia	*Microtus anatolicus*	Anatolian Vole	DD	RR	O	ESIA Baseline
Chiroptera	*Nannospalax xanthodon*	Nehring's Blind Mole Rat	DD		O	ESIA Baseline
Chiroptera	*Miniopterus pallidus*	Pale Bent-wing Bat	NT	-	L	ESIA Baseline
Rodentia	*Spermophilus xanthophyrmnus*	Anatolian Ground Squirrel	NT	-	O	ESIA Baseline, EIA ETL, EIA SPP
Carnivora	*Vormela peregusna*	European Marbled Polecat	VU	-	O	ESIA Baseline

*L: Literature A: Interview with locals, O: Observation, H: Habitat Suitability

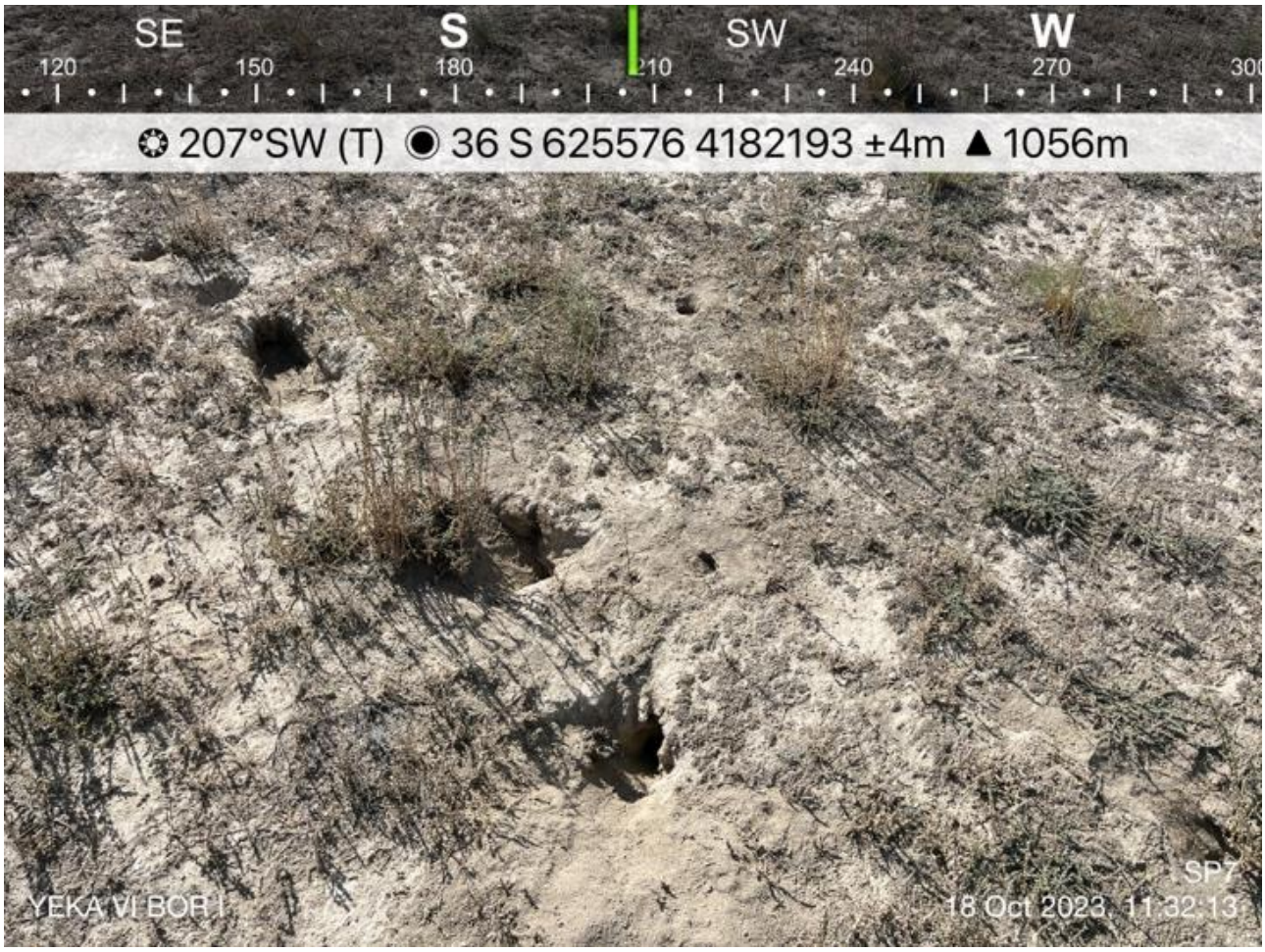


Figure 5-13: *Spermophilus xanthoprymnus* burrows observed within the LSA

5.2.1.3.5 Ecosystem Services

Ecosystem services (ES) are the direct and indirect contributions of ecosystems to human well-being, and they support directly or indirectly our survival and quality of life (Millennium Ecosystem Assessment, 2005).

Ecosystem services include provisioning (food, freshwater, medicine), regulating (erosion control, flood protection), and cultural services (sacred sites, tourism, recreation), all of which are underpinned by supporting services.

The analysis of ecosystem services helps to understand the relationship between ecosystems and humans, analysing how the interaction and relationship of the different ecosystem elements give rise to well-being conditions in people. Ecosystem services are organized into four major categories:

- Provisioning ecosystem services include, among others, (i) agricultural products, seafood and game, wild foods, and ethnobotanical plants; (ii) water for drinking, irrigation, and industrial purposes; and (iii) forest areas, which provide the basis for many biopharmaceuticals, construction materials, and biomass for renewable energy.
- Regulating ecosystem services include, among others, (i) climate regulation and carbon storage and sequestration; (ii) waste decomposition and detoxification; (iii) purification of water and air; (iv) control of pests, disease, and pollination; and (v) natural hazard mitigation.

- Cultural services include, among others, (i) spiritual and sacred sites; (ii) recreational purposes such as sport, hunting, fishing, and ecotourism; and(iii) scientific exploration and education.

Supporting services are the natural processes that maintain the other services, such as (i) nutrient capture and recycling, (ii) primary production, and (iii) pathways for genetic exchange.

The requirements defined in Performance Standard 6 for ecosystem services are applicable only when the client has “direct management control or significant influence” over such services. For the present Project these services are expected to be classified as Type I “Provisioning, regulating, cultural and supporting ecosystem services, over which the client has direct management control or significant influence, and where impacts on such services may adversely affect communities”.

The ecosystem services provided by the habitats present within the Project LSA have been investigated and are summarized in the table below (

Table 5-14), where an X indicates whether the ecosystem service is potentially provided by the habitat.

Table 5-14: Natural Habitats present in the LSA and their related potential provisioning ecosystem services

Provisioning Ecosystem Services	E 6.2: Continental Inland Salt Steppes
Pastures	X
Hunting	-
Wood and Timber	-
Non-wood forest resources	-
Drinkable water	-
Fishing	-
Biomass fuel	-
Sand and gravel	-
Medicinal resources	-
Beekeeping	-

The LSA is situated in an area characterized by Natural Habitats (72%). The Natural Habitats consist solely of the EUNIS habitat type "E6.2 - Continental Inland Salt Steppes". The ecosystem service provided by these habitats, which may potentially be used by local communities, has been identified as grazing (fodder for livestock).

The use of such ecosystem services within the settlements included in the LSA of the current ESIA has been investigated during social field studies in the Household Level Survey (HSL) and is detailed in the paragraphs below and presented in Table 6-31.

Food production (agricultural and husbandry activities): Based on the information collected through Household Level Surveys for the social baseline, only some livestock farming activities are being performed by local communities as a part of ecosystem services. In this context, not only private lands, but also common lands and treasury lands are used for grazing purposes, especially for animal husbandry.

Table 5-15: Livelihood activities related to provisioning ecosystem services. Source: HLS 2024

District	Settlement	Main source of livelihood	Project impacted pastures using for grazing animals
Bor	Emen	Agricultural Production/ Husbandry	Yes
	Seslikaya	Agricultural Production/ Husbandry	Yes
	Zengen	Agricultural Production/ Husbandry	Yes

Pastureland for the grazing of animals, which is provided by the following habitats present in the LSA: “E 6.2 Continental Inland Salt Steppes”.

5.2.2 Critical Habitat Assessment (CHA)

A screening was performed to determine if there are any Critical Habitats (CHs) inside the LSA, based on the information that is currently available. This screening was completed in accordance with IFC Performance Standard 6 (PS6).

5.2.2.1 Criterion 1: Habitat of significant importance to Critically Endangered and/or Endangered species

Species classified as Endangered (EN) or Critically Endangered (CR) by the global IUCN criteria were taken into account. In the absence of a global assessment by the International Union for Conservation of Nature (IUCN), such as "Not Evaluated" (NE) or "Data Deficient" (DD), the status of the species was determined by considering the threat categories outlined in the local assessments, such as the Red Data Book for Turkish Plants. These assessments were re-evaluated by the local expert, Prof. Hayri Duman, using the most up-to-date information on the species' distribution and the IUCN 2001 criteria.

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

- 1 flora species:
  - *Limonium tamaricoides* (EN, Regional Endemic);
- 4 bird species:
  - *Aquila nipalensis* Steppe Eagle (EN, Steppe Eagle);

- *Falco cherrug* (EN, Saker Falcon);
- *Neophron percnopterus* (*Egyptian Vulture,* EN);
- *Otis tarda* (EN, Great Bustard)

During the October 2023 field survey, only one flora species was observed within the LSA, out of the ones mentioned above. Based on a survey of the literature, it is considered that there is a possibility of the presence of three species of birds.

In order to assess the importance of the LSA for the selected species, the following thresholds were applied (Guidance Note 6, GN72, IFC 2019):

a) areas that support globally important concentrations of an IUCN Red-listed EN or CR species (> 0.5% of the global population AND >5 reproductive units of a CR or EN species);

b) areas that support globally important concentrations of an IUCN Red-listed VU species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN70(a);

c) as appropriate, areas containing nationally/regionally important concentrations of an IUCN Red-listed EN or CR species.

The Criterion 1a thresholds were applied on all fauna species having EN or CR conservation status according to global IUCN criteria or local assessments.

The Vulnerable species identified as potentially present show a significantly wide geographical distribution, thus 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 significant concentrations of endangered or critically endangered species designated by the IUCN were found in or near the study area. As a result, 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 was defined considering the Ereğli Plain KBA and IBA where the Project is located (see Figure 5-14). The EOO is identified as the floristic ecoregion "(4a) Yukarı Sakarya Section, (4b) Orta Kızılırmak Section, and (4ç) Konya Section" 131.744 km^2.
- for bird species the EAAA was identified as corresponding to Ereğli Plain KBA and IBA, in which the LSA completely falls within (see Figure 5-14). The extent of the thus defined EAAA is 1,294 km^2. The EOO was obtained from literature (BirdLife) for the two species.

The results of the CHA for Criterion 1 are detailed in (see Table 5-16) However, **no species triggering, or potentially triggering CH were identified based on this criterion.**

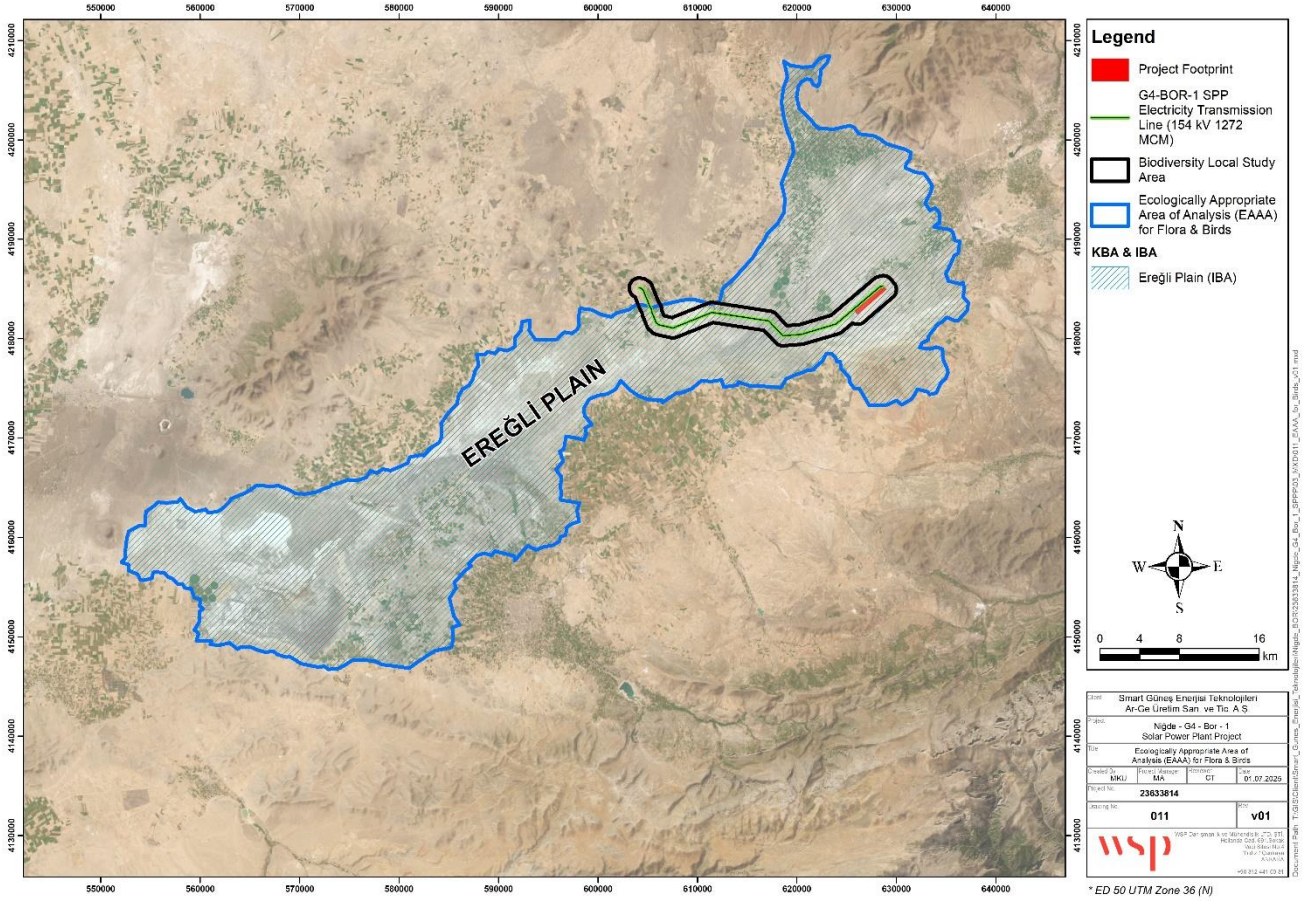


Figure 5-14: EAAA for flora and aves species

Table 5-16: Screening of flora and fauna species potentially triggering Critical Habitat according to Criterion 1 (IFC, 2019)

Taxon	Species	Common name	Global IUCN Status	National IUCN status	End./ RR	Lit./ Obs.	EOO (km²)	0.5% of EOO (km²)	EAAA (km²)	EAAA is ≥ 0.5% of EOO	Global Pop. (GP) individuals	0.5 % GP individuals	Local pop. data (BirdLife)	Local pop. estimate (experts)	Loc.pop. data >0.5% GP?	Local pop. Estimate >0.5% GP?	Critical Habitat
Flora	*Limonium tamaricoides*	-	NE	EN	End	O	131,744,000	658,720	1,294	No	-	-	-	-	-	-	-
Bird	*Aquila nipalensis*	Steppe Eagle	EN	-	-	L	47,500,000	237,500	1,294	No	50,000 - 75,000	25	-	4-6 ind.	-	No	-
	Falco cherrug	Saker Falcon	EN	-	-	L	43,200,000	216,000	1,294	No	12,200 - 29,800	61	-	0 ind.	-	No	-
	Neophron percnopterus	Egyptian Vulture	EN	-	-	L	50,100,000	11,128	1,294	No	12,400 - 36,000	62	-	2 ind.	-	No	-
	Oxyura leucocephala	White-headed Duck	EN	-	-	L	14,100,000	70,500	1,294	No	5,300	26,5	-	20 ind.	-	No	-
	Otis tarda	Great Bustard	EN	-	-	H	15,300,000	250,500	1,294	No	29,600 - 33,000	148	-	20 ind.	-	No	-

5.2.2.2 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.

According to Criterion 2, only one mammalian species was identified as potentially triggering CH.

- Anatolian Vole (*Microtus anatolicus*, DD, Restricted Range)

To evaluate the cruciality of the LSA 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.

A quantitative assessment of the species' worldwide population is not feasible; therefore, to ascertain the existence of critical habitat, EAAA has been designated. The EAAA has been determined to correspond to the Ereğli Plain KBA and IBA, where the LSA is entirely encompassed. The specified EAAA has an area of 1,294 square kilometres, which is also the same size as the area for birds and plants (see Figure 5-14).

According to literature[20], the EOO of *Microtus anatolicus* appeared to be entirely outside the LSA. Nevertheless, the species was sighted within the LSA during field investigations conducted on October 18, 2023, by local experts. As the LSA is completely contained inside the Ereğli Plain KBA, which is regarded as an ecologically uniform area, the species is therefore thought to have the potential to be found throughout the entire KBA. Hence, the species' EOO was determined by adding the known EOO from literature to the extent of the Ereğli Plain KBA and IBA. Therefore, the species results to have a fragmented distribution range, with a total area of 43,903 km^2 (see Figure 5-15).

The EAAA was subsequently juxtaposed with the computed EOO to assess its potential to meet the specified threshold: "a) areas that consistently hold ≥10% of the global population size AND ≥ 10 reproductive units of a species" as per Criterion 2a. The outcomes of the critical habitat screening are elaborated upon below.

Given that the EAAA falls below 10% of the calculated EOO, the species does not meet the criteria to initiate Critical Habitat (CH) designation according to Criterion 2. Consequently, **no species potentially triggering CH based on this criterion were identified.**

[20] The IUCN Red List of Threatened Species – Source: https://www.iucnredlist.org/species/136237/137237409.

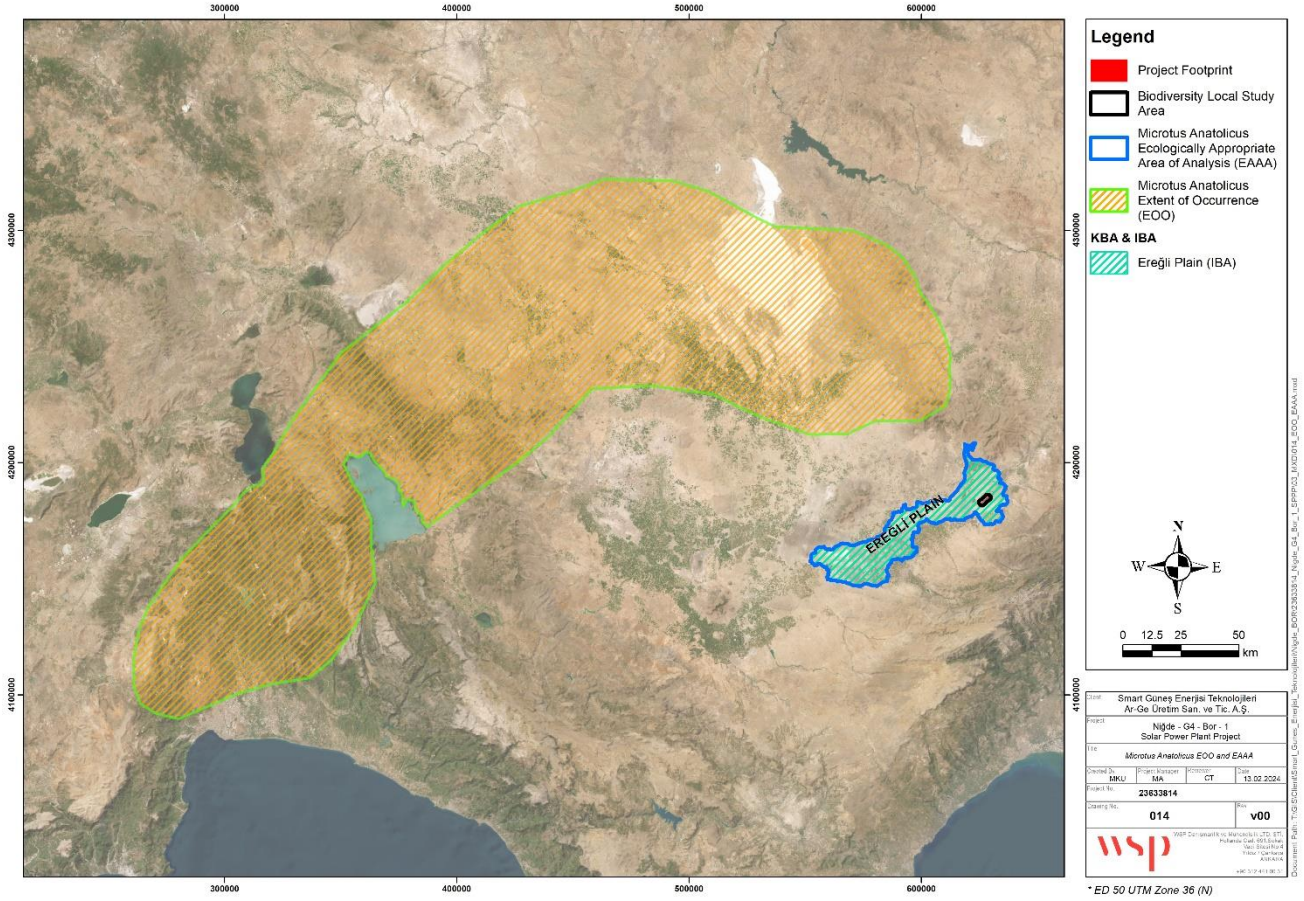


Figure 5-15: *Microtus anatolicus* EOO and EAAA

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

The evaluation took into account the existence of KBAs and IBAs that have been identified for congregatory species, as well as Wetlands of International Importance that have been designated under criterion 5 or 6 of the Ramsar Convention. Furthermore, the presence of migratory and congregatory species was also considered.

Criteria 3a threshold assessments were conducted on all migratory and congregatory bird species that triggered the Ereli Plain IBA: “areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregator species at any point of the species’ lifecycle”.

The literature data from BirdLife for the evaluated bird species’ global population estimates were obtained. Given that the worldwide population estimate is often supplied as a range with both a lower and upper limit, a cautious approach was taken by using only the lower limit for the calculation. For example, for *Charadrius leschenaultii* the global population is estimated at 150,000-340,000 individuals[21], therefore for the purpose of the CHA the lower limit of 150,000 was considered.

Population estimates of the bird inside the Ereğli Plain IBA (also EAAA) were collected from literature. In this case, although employing a cautious methodology, the highest value within the provided range of estimated

[21] BirdLife International (2024a). Species factsheet: *Charadrius leschenaultii*. Downloaded from http://datazone.birdlife.org/species/factsheet/greater-sandplover-charadrius-leschenaultii on 13/02/2024.

local population was taken into account. For example, for *Charadrius eschenaultia* the population at site is estimated to include 120-150 breeding pairs, therefore for the purpose of the CHA the upper limit of 150 breeding pairs was considered[22].

In addition to the species triggering IBA criteria, all the migratory and/or bird and bat species identified as potentially present within the Project LSA were considered as potentially triggering Critical Habitats based on this criterion. According to this approach, 36 bird species were considered. The 36 bird species identified are not among the species triggering critical habitat within the Ereğli Plain, which holds KBA and IBA status. Therefore, the evaluation of the species was conducted based on EOO/EAAA (Extent of Occurrence/Area of Analysis) rather than individual numbers.

It is crucial to emphasise that the estimations provided on BirdLife are significantly outdated (1986-1998). Given the significant level of danger and extremely unfavourable conservation status of the IBA resulting from water scarcity and diversion since the late 1990s, which led to the shrinking of wetland habitats, it is probable that the current population figures have significantly declined. Hence, the evaluation is exceedingly conservative.

Subsequently, the population estimates at the site were compared to the global population estimates to determine if the IBA could potentially satisfy the Criterion 3 threshold. If the population estimate at the site is equal to or greater than 1% of the global population estimate, then the area is considered to potentially qualify as Critical Habitat (GN78, IFC 2019). The findings of the CH screening are analysed and presented in Table 5-17.

When the surface area changes of Akgöl, the only wetland of the Ereğli Plain, is examined from past to present, a decrease of approximately 96% is observed. Considering this significant habitat loss, the current population estimates for three specific species have been calculated by proportionally reducing their population numbers by the same percentage.

When the surface area change of Akgöl, the only wetland of the Ereğli Plain, is examined from past to present, a decrease of approximately 96% is observed[23]. Considering this significant habitat loss, the current population estimates for three specific species have been calculated by proportionally reducing their past population numbers by the same percentage. For *Microcarbo pygmaeus*, while the IBA population estimate was 1,200 individuals, it has been calculated as 48 individuals; for *Oxyura leucocephala*, the breeding population estimate was 494 individuals, which has been calculated as 20 individuals; and for *Tadorna ferruginea*, the population estimate was 3,016 individuals, which has been calculated as 121 individuals. Through this approach, it has been concluded that these three species do not trigger critical habitat.

In addition, the size of the local populations of bird species considered in the Critical Habitat (CH) assessment based on criterion 3 within the EAAA has been estimated by the local ornithologists involved in the study. These ornithologists are professionals with extensive work experience in the natural areas where the Project will be developed. In these areas, these technicians have been involved in field monitoring of bird populations for several years. The coordination work of these experts for the collection of data related to the different study areas and for the development of estimates on the size of the local populations at the EAAA scale was ultimately carried out by Şafak Bulut, PhD.

It is crucial to emphasise that all of these species are aquatic species, and their occurrence as breeding, wintering, and/or passing species is closely linked to the existence of open water habitats. These habitats are

[22] BirdLife International (2024b) Important Bird Area factsheet: Ereğli Plain. Downloaded from **http://datazone.birdlife.org/site/factsheet/749** on 13/02/2024.

[23] Musaoglu, N., Tanik, A., Gumusay, M. U., Dervisoglu, A., Bilgilioglu, B. B., Yagmur, N., ... & Gokdag, M. F. (2018, June). Long-term Monitoring of Wetlands via Remote Sensing and GIS: A case study from Turkey. In *The Proceedings of The International Conference on Climate Change* (Vol. 2, No. 1, pp. 11-21).

absent in the LSA or its surrounding areas. However, they are only found in the south-western part of the Ereğli Plain IBA, approximately 60 km away from the Project LSA. These habitats are specifically located around the Akgol Lake (see Figure 5-14). Additionally, when the Project Area is assessed in terms of bird migration routes, it has been determined that neither primary nor secondary migration routes pass over it. Therefore, it has been concluded that bird flights originating from aquatic areas 60 km away occur in a south-westerly direction rather than over the Project Area.

The results of the CH screening are reported in Table 5-17. Local population estimates for bird species based on BirdLife data are reported in the column entitled ‘Local pop. data (BirdLife)’, while local population estimates based on the information coming from the local ornithologists are reported in the column entitled ‘Local pop. estimate (experts)’.

Therefore, it can be concluded that **no Critical Habitat is expected to be present in the LSA according to this criterion**.

Table 5-17: Screening of migratory and congregatory species potentially triggering Critical Habitat according to Criterion 3a (IFC, 2019)

Species	Global IUCN Status	Lit./ Obs.*	EOO (km2)	EAAA (km2)	1% EOO (CH3a)	EAAA > 1% EOO	Global population (individuals)	1% of the global pop. (individuals)	Estimated Ereğli Plain IBA pop. (individuals)	Status in the IBA	Congregatory/ Migratory	Local pop. estimate (expert)	IBA pop. is ≥ 1%of global pop.	Local pop. estimate >1%GP?	Critical Habitat
Apus apus	LC	L	13,300,000	1,294	133,000	no	95,000,000 - 164,999,999	95000	-	-	-	10,000	-	No	-
Aquila chrysaetos	LC	L	139.000.000	1,294	1,390,000	no	85,000 - 160,000	85	-	-	-	8-10	-	No	-
Aquila nipalensis	EN	L	47,500,000	1,294	475,000	no	50,000 - 75,000	50	-	-	-	4-6	-	No	-
Ardeola ralloides	LC	L	37,500,000	1,294	375,000	no	370,000- 780,000	3,700	100	Breeding	Congregatory/ Migrant	50-60	No	No	-
Buteo rufinus	LC	L	32,300,000	1,294	323,000	no	100,000 - 499,999	1000	-	-	-	30-40	-	No	-
Calandrella brachydactyla	LC	L	24,800,000	1,294	248,000	no	4,730,000- 9,050,000	47,300	-	-	-	10,000	-	No	-
Carduelis carduelis	LC	L	101,000,000	1,294	1,010,000	no	101,000,000 - 155,000,000	1,010,000	-	-	-	12,000	-	No	-
Charadrius leschenaultii	LC	O	9,590,000	1,294	95,900	no	150,000- 340,000	1,500	300	Breeding	Congregatory/ Migrant	400-500	No	No	-
Ciconia ciconia	LC	H	52,700,000	1,294	527,000	no	100,000 - 225,000	1000	-	-	-	200	-	No	-
Clanga clanga	VU	H	15,300,000	1,294	153,000	no	3,900 - 10,000	39	-	-	-	0	-	No	-
Clanga pomarina	LC	L	6,550,000	1,294	65,500	no	40,000 - 60,000	400	-	-	-	20	-	No	-
Curruca communis	LC	L	23,000,000	1,294	230,000	no	60,300,000 - 91,100,000	6,030,000	-	-	-	200	-	No	-
Curruca curruca	LC	L	23,800,000	1,294	238,000	no	27,900,000 - 47,700,000	279,000	-	-	-	200	-	No	-
Delichon urbicum	LC	L	30,800,000	1,294	308,000	no	38,300,000 - 80,200,000	383,000	-	-	-	10,000	-	No	-

Species	Global IUCN Status	Lit./ Obs.*	EOO (km2)	EAAA (km2)	1% EOO (CH3a)	EAAA > 1% EOO	Global population (individuals)	1% of the global pop. (individuals)	Estimated Ereğli Plain IBA pop. (individuals)	Status in the IBA	Congregatory/ Migratory	Local pop. estimate (expert)	IBA pop. is ≥ 1%of global pop.	Local pop. estimate >1%GP?	Critical Habitat
Emberiza hortulana	LC	L	8,250,000	1,294	82,500	no	8,000,000 - 17,999,999	80,000	-	-	-	30-40	-	No	-
Emberiza melanocephala	LC	L	723,000	1,294	7,230	no	7,600,000 - 27,500,000	76,000	-	-	-	200	-	No	-
Falco naumanni	LC	O	24,800,000	1,294	248,000	no	80,000-134,000	800	70	Breeding	Congregatory/ Migrant	8	No	No	-
Falco tinnunculus	LC	L	106,000,000	1,294	1,060,000	no	4,300,000 - 6,700,000	43,000	-	-	-	20	-	No	-
Galerida cristata	LC	L	172,000,000	1,294	1,720,000	no	172,000,000 - 238,000,000	17,200,000	-	-	-	10,000	-	No	-
Glareola pratincola	LC	L	21,300,000	1,294	213,000	no	160,000-600,000	1,600	100	Breeding	Congregatory/ Migrant	80	No	No	-
Grus grus	LC	L	25,600,000	1,294	256,000	no	491,000-503,000	4,910	6	Breeding	Congregatory/ Migrant	0	No	No	-
				1,294					253	Wintering		2000 (Passage)	No	No	-
Himantopus himantopus	LC	L	335,000,000	1,294	3,350,000	no	450,000-780,000	4,500	600	Breeding	Congregatory/ Migrant	200	No	No	-
Hirundo rustica	LC	L	251,000,000	1,294	2,510,000	no	290,000,000 - 487,000,000	2,900,000	-	-	-	30,000	-	No	-
Iduna pallida	LC	L	18,900,000	1,294	189,000	no	21,700,000 - 45,300,000	217,000	-	-	-	10,000	-	No	-
Irania gutturalis	LC	L	674,000	1,294	6,740	no	1,800,000 - 4,040,000	18,000	-	-	-	100	-	No	-
Lanius collurio	LC	L	15,700,000	1,294	157,000	no	21,900,000 - 34,700,000	219,000	-	-	-	5,000	-	No	-
Lanius minor	LC	L	2,400,000	1,294	24,000	no	1,200,000 - 3,299,999	12,000	-	-	-	100	-	No	-
Linaria cannabina	LC	L	27,300,000	1,294	273,000	no	50,000,000 - 99,999,999	500,000	-	-	-	20,000	-	No	-
Luscinia megarhynchos	LC	L	10,200,000	1,294	102,000	no	37,100,000 - 55,800,000	371,000	-	-	-	100	-	No	-
Mareca strepera	LC	L	73,100,000	1,294	731,000	no	4,300,000-4,900,000	43,000	40	Breeding	Congregatory/ Migrant	0	No	No	-

Species	Global IUCN Status	Lit./ Obs.*	EOO (km2)	EAAA (km2)	1% EOO (CH3a)	EAAA > 1% EOO	Global population (individuals)	1% of the global pop. (individuals)	Estimated Ereğli Plain IBA pop. (individuals)	Status in the IBA	Congregatory/ Migratory	Local pop. estimate (expert)	IBA pop. is ≥ 1%of global pop.	Local pop. estimate >1%GP?	Critical Habitat
Marmaronetta angustirostris	NT	L	13,500,000	1,294	135,000	no	10,000-42,000	100	10	Breeding	Congregatory/ Migrant	0	No	No	-
Melanocorypha bimaculata	LC	L	10,000,000	1,294	100,000	no	10,000,000 - 20,999,999	100,000	-	-	-	200	-	No	-
Melanocorypha calandra	LC	L	16,100,000	1,294	161,000	no	45,000,000 - 99,999,999	450,000	-	-	-	2,000	-	No	-
Merops apiaster	LC	L	13,600,000	1,294	136,000	no	18,400,000 - 28,000,000	184,000	-	-	-	20,000	-	No	-
Microcarbo pygmaeus	LC	L	3,700,000	1,294	37,000	no	48,000-137,000	480	48	Breeding	Congregatory/ Migrant	0	No	No	-
Neophron percnopterus	EN	L	50,100,000	1,294	501,000	no	12,400 - 36,000	124	-	-	-	2	-	No	-
Netta rufina	LC	L	19,600,000	1,294	196,000	no	420,000-600,000	4,200	1,000	Breeding	Congregatory/ Migrant	0	No	No	-
Oenanthe finschii	LC	L	4,320,000	1,294	43,200	no	816,000 - 2,470,000	8,160	-	-	-	40	-	No	-
Oenanthe isabellina	LC	L	16,000,000	1,294	160,000	no	30,800,000 - 88,000,000	308,000	-	-	-	2,000	-	No	-
Oenanthe oenanthe	LC	L	19,300,000	1,294	193,000	no	10,000,000 - 500,000,000	100,000	-	-	-	100	-	No	-
Oriolus oriolus	LC	L	11,500,000	1,294	115,000	no	13,400,000 - 22,500,000	134,000	-	-	-	30	-	No	-
Otis tarda	EN	A	15,300,000	1,294	153,000	no	29,600 - 33,000	296	-	-	-	20	-	No	-
Oxyura leucocephala	EN	L	14,100,000	1,294	141,000	no	5300-8700	53	20	Passage	Congregatory/ Migrant	20	No	No	-
									4	Breeding		0	No	No	
Pelecanus crispus	NT	L	12,600,000	1,294	126,000	no	11,400-13,400	114	62	Non-Breeding	Congregatory/ Migrant	0	No	No	-
Phalacrocorax pygmeus	LC	L	-	-	-	-	48,000-137,000	480	20	Breeding	Congregatory	0	No	No	-

Species	Global IUCN Status	Lit./ Obs.*	EOO (km2)	EAAA (km2)	1% EOO (CH3a)	EAAA > 1% EOO	Global population (individuals)	1% of the global pop. (individuals)	Estimated Ereğli Plain IBA pop. (individuals)	Status in the IBA	Congregatory/ Migratory	Local pop. estimate (expert)	IBA pop. is ≥ 1%of global pop.	Local pop. estimate >1%GP?	Critical Habitat
Phoenicopterus roseus	LC	L	2,310,000	1,294	23,100	no	550,000-680,000	5,500	600	Breeding	Congregatory/ Migrant	500	No	No	-
Plegadis falcinellus	LC	L	199,000,000	1,294	1,990,000	no	230,000-2,220,000	2,300	100	Breeding	Congregatory/ Migrant	Breeding "0" Feeding/Passage "500"	No	No	-
Pelecanus onocrotalus	LC	L	51,200,000	1,294	512,000	no	265,000-295,000	2,650	40	Breeding	Congregatory/ Migrant	0	No	No	-
									1,000	Passage		1,000	No	No	-
Platalea leucorodia	LC	L	60,400,000	1,294	604,000	no	63,000-65,000	630	40	Breeding	Congregatory/ Migrant	200	No	No	-
									250	Non-Breeding		0	No	No	-
Sternula albifrons	LC	L	152,000,000	1,294	1,520,000	no	190,000-410,000	1,900	120	Breeding	Congregatory/ Migrant	0	No	No	-
Sturnus vulgaris	LC	L	33,200,000	1,294	332,000	no	150,000,000	1,500,000	-	-	-	10,000	-	No	-
Tachymarptis melba	LC	L	39,200,000	1,294	392,000	no	2,160,000 - 4,870,000	21,600	-	-	-	10,000	-	No	-
Tadorna ferruginea	LC	L	37,900,000	1,294	379,000	no	170,000-220,000	1,700	121	Wintering	Congregatory/ Migrant	20	No	No	-
Turdus viscivorus	LC	L	12,200,000	1,294	122,000	no	12,200,000 - 22,700,000	122,000	-	-	-	40	-	No	-
Upupa epops	LC	L	78,300,000	1,294	783,000	no	5,000,000-10,000,000	50,000	-	-	-	1,000	-	No	-
Vanellus spinosus	LC	L	21,700,000	1,294	217,000	no	130,000-800,000	1,300	40	Breeding	Congregatory/ Migrant	100	No	No	-
Falco cherrug	EN	L	19100000	1294	191000	no	12,200 - 29,800	122	-	Resident, Non Breeding, Passage	-	0	No	No	-

*L:Literature A:Field, G: Interview with locals, O: Observation, H: Habitat

5.2.2.4 Criterion 4: Highly threatened and/or unique ecosystems

This criterion focused on ecosystems facing the imminent risk of substantial reduction in size or decline in quality, characterized by limited spatial coverage, and/or hosting significant concentrations of species restricted to a specific biome. The implementation of Criterion 4, as outlined in GN79 and IFC 2019, involves utilizing the "Red List of Ecosystems (RLE)," especially in cases where official IUCN assessments have been carried out. It is important to note, however, that there has been no evaluation conducted in Türkiye, as evidenced by the absence of assessments in the IUCN RLE Database[24]. Hence, the current unavailability of assessments in Türkiye renders the use of the "Red List of Ecosystems (RLE)" impractical. In lieu of this, the "European Red List of Habitats" was employed to pinpoint threatened ecosystems.

The "European Red List of Habitats" (European Union, 2016) is the outcome of a comprehensive and meticulous evaluation conducted by Alterra and IUCN, with the collaboration of numerous experts throughout Europe. The criteria and categories applied to the EUNIS habitat types in the European Red List of Habitats are derived from a protocol outlined in a feasibility study. [25], This protocol combines elements of the IUCN Red List of Ecosystems[26] approach for assessing the risk of ecosystems (2016). The categories assigned to the EUNIS habitat types closely mirror those utilized in the IUCN Red List of Threatened Species. Specifically, the CR (Critically Endangered) or EN (Endangered) designations encompass habitats facing the imminent threat of substantial reduction in quantity, be it in terms of area, distribution, or biotic/abiotic quality. These categories also encompass habitats with limited spatial coverage and those harbouring concentrations of species restricted to a particular biome, indicating a very high risk of collapse. Within the LSA, only one natural habitat type was recognized, namely the EUNIS habitat "E6.2 – Continental inland salt steppe." According to the European Red List of Habitats, this habitat has been categorized as Vulnerable (VU)[15].

No habitats classified as Endangered (EN) or Critically Endangered (CR) were identified. Therefore, **no Critical Habitat is expected to be present in the LSA according to this criterion.**

5.2.2.5 Criterion 5: Areas associated with key evolutionary processes

This criterion encompasses the examination of areas with landscape features potentially linked to evolutionary processes or notably distinct species populations, raising concerns for their special conservation. However, the LSA does not exhibit landscape features that are known to influence evolutionary processes, leading to distinctive regional configurations of species and ecological characteristics. Notably, there are no species or subpopulations within the area distinguished by a specific level of isolation, spatial heterogeneity, or an abundance of environmental gradients or edaphic interfaces. Additionally, the LSA is not acknowledged for its significance in climate change adaptation or as a biological corridor. Consequently, these considerations indicate that the study area does not support any pivotal evolutionary processes.

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

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

[25] 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.

[26] 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

5.2.3 Impact Assessment

5.2.3.1 Impact Factors

5.2.3.1.1 Construction Phase

The potential impact of Project activities on biodiversity components during the construction period is given in Table 5-18.

Table 5-18: Construction Phase Actions and Related Impact Factors

Project actions	Impact factors
• Vegetation clearing/soil removal (earthworks) • General engineering/construction works • Transportation of construction materials • Temporary stockpiling of material (storage) • Management of the workforce	▪ Vegetation disturbance ▪ Emission of noise and vibrations ▪ Emission of dust and particulate matter ▪ Increased and/or modified road traffic ▪ Accidental introduction of alien species

- In order to determine the Project footprint, the area covered by photovoltaic (PV) panels, permanent facilities (such as inverter stations, substations, administrative buildings, internal roads, etc.), and temporary facilities (such as campsites and administrative buildings) were considered. The following assessment describes and discusses all the impact factors identified above.

Vegetation disturbance

Construction activities will result in the disruption of vegetation, leading to the direct loss of habitat, particularly in the areas where permanent and temporary facilities are being built. Conversely, locations designated for the arrangement of PV panels will encounter less disruption to vegetation and soil. Also, all of the Project Area will experience the effects of heavy machinery passing through for the transportation of construction materials, equipment, workers, waste, and other materials. As the Project Area is situated next to an existing road, no supplementary access roads will be constructed.

Vegetation disruption during construction activities will directly affect the flora species present in the facility construction areas. Furthermore, the disturbance of vegetation will result in the destruction of habitats suitable for fauna species that use the vegetation for food or shelter.

The local fauna – and in particular the identified reptile species of conservation concern (*Testudo graeca*) and the identified mammal species of conservation concern (*Lutra lutra, Barbastella barbastellus*, *Mesocricetus brandti*, *Microtus anatolicus*, *Miniopterus pallidus*, *Spermophilus xanthoprymnus*, and *Vormela peregusna*) – could be directly impacted by the disturbance of vegetation and soil resulting from site preparation activities.

Species with limited mobility, such as reptiles, might not be able to relocate before construction begins. Similarly, species that rely on hiding to evade predators could also be unintentionally harmed or killed during construction operations.

- **Emission of noise and vibrations**

During the construction phase, medium to high intensity noise and vibration emissions are anticipated. Activities like surface levelling, transportation, and temporary stockpiling of materials, PV panels, are projected to contribute to noise generation.

Noise and vibration emission could indirectly lead to habitat degradation as sensitive fauna species may temporarily avoid the surrounding areas. Noise has a significant impact on wildlife species that heavily rely on auditory signals for survival, particularly birds and mammals.

Anthropogenic noise disturbance, for instance, has been observed to correlate with decreased densities of breeding birds[27,28]. Anthropogenic noise has been shown to cause significant decreases in species richness and abundances, affecting not only birds but also insect and amphibian species[29].

The effects of vibration emissions on wildlife are poorly studied in literature; however, an avoidance behaviour around the source of vibration is likely to exist for birds, reptiles and amphibians. Birds and reptiles are highly sensitive to vibration (e.g., Shen, 1983) because low-frequency noises can be a source of information about approaching predators and prey. Also, amphibians have exquisite sensitivity to vibration[30]: there are species that use low-frequency acoustic cues detected via ground vibrations to communicate, to time their emergence from burrows[31]. An impact is particularly anticipated during the breeding period of birds and mammals, as they may be startled by noise and vibration and could potentially abandon their nests or mating grounds.

Emission of dust and particulate matter

Construction activities such as surface levelling, temporary stockpiling of excess excavation materials, transportation of soil and construction materials, construction of facilities, pavement realization, and heavy truck crossings are anticipated to generate pollutants, dust, and particulate matter emissions.

Dust generated from construction activities could have adverse effects on surrounding vegetation and habitats due to continuous and substantial dust deposition. Specifically, dust emissions may impact vegetation by covering leaf surfaces and altering soil composition and structure[32]. Dust can obstruct stomata on leaf surfaces, thereby affecting processes such as photosynthesis, respiration, and transpiration, and may lead to symptoms of leaf injury. Consequently, plant productivity may decline, resulting in reduced vegetation growth, abundance, and loss of species.

There is no definitive standard for protecting vegetation against dust. Airborne soil dust is generally characterised by its large particle size, which limits its ability to stay suspended in the air for extended periods of time. Research conducted by the United States Environmental Protection Agency (US EPA) indicates that 90% of all airborne dust particles settle back onto the earth's surface within a distance of 100 metres from the point of emission, and over 98% settle within a distance of 250 metres. Nevertheless, in the presence of powerful wind conditions, these impacts may have extended further.

Fauna species relying on these habitats for food and shelter may also be indirectly impacted by habitat degradation caused by dust emissions into the atmosphere and subsequent deposition, leading to reduced

[27] 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.

[28] 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.

[29] 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.

[30] Lewis, E. R., & Narins, P. M. (1985). Do frogs communicate with seismic signals? *Science*, *227*(4683), 187-189.

[31] Dimmitt, M. A., & Ruibal, R. (1980). Environmental correlates of emergence in spadefoot toad (Scaphiopus). Journal of Herpetology, 21-29

[32] Farmer A. M., The effects of dust on vegetation — a review. (1993). Environmental Pollution, Volume 79, Issue 1, 1993, Pages 63-75, ISSN 0269-7491, https://doi.org/10.1016/0269-7491(93)90179-R. (https://www.sciencedirect.com/science/article/pii/026974919390179R)

habitat suitability for terrestrial wildlife. Additionally, direct effects on fauna species could occur through the inhalation or ingestion of vegetation or soil particles.

The dispersion of dust and particle matter, which occurs frequently but with low intensity, primarily affects the area surrounding the Project footprint. This impact is limited to a narrow geographic extent within a 100-metre buffer. The reversibility of this impact factor is seen as being of short- to mid-term duration.

Increased and/or modified road traffic

During the construction phase, there will be a rise in the number of vehicles travelling within the designated construction area and on the access roads. This is because construction materials, equipment, personnel, waste, and other materials need to be transported. Augmented vehicular traffic can lead to the direct death of wildlife species and the indirect deterioration of their habitats. Inadvertent collisions with animals and resulting deaths on roads can greatly affect certain wildlife populations, especially species that have limited ability to move around, such as the reptile species of conservation concern (*Testudo graeca*) and the small mammal species of conservation concern (*Mesocricetus brandti, Microtus anatolicus, Spermophilus xanthoprymnus, Nannospalax xanthodon* and *Vormela peregusna*) that have been identified.

More in general, traffic can have an important influence on the behaviour of wildlife and on its distribution, thus the use of the space, of local populations[33]: amphibians might be attracted by stagnant water that forms at roadside or within the construction area; reptiles and other ectotherms go there to bask in the sun; some birds use roadside gravel to aid their digestion of seeds; songbirds come to dust bathe on dirt roads, where they are vulnerable to vehicles as well as predators; vultures, crows, foxes and other scavengers seek out roadkill and often become roadkill themselves; mammals might be attracted by organic waste or to de-icing salts, browsing herbivores are attracted to the vegetation of roadside edge, rodents proliferate in the artificial grasslands of road verges, and many small mammals find roads to be efficient travel ways.

Accidental introduction of alien species --

The removal of natural vegetation cover and disturbance of soil could encourage the spread of alien (non-native) and/or invasive species, which are inadvertently introduced by vehicles such as cars, trucks, and other heavy machinery used in construction. In disturbed ecosystems, invasive alien species have a competitive edge [34]. Once they enter a habitat, they might possibly alter its functioning and the species there, particularly those that are considered a priority for biodiversity conservation[35].

For instance, the change in the community of plant species could pose a significant threat to the local plant species in the LSA. These species were identified by Prof. Hayri Duman, a local specialist, during a field study conducted on October 18, 2023. The species mentioned are *Gypsophila oblanceolata*, and *Onopordum davisii*.

Based on the monitoring studies conducted in September 2024, the local flora expert identified the presence of *Xanthium spinosum* in the field and initiated an eradication campaign for this species.

Additionally, potential invasive species that could be found in the area have been identified. These include: *Xanthium strumarium*, *Conyza canadensis*, and *Chenopodium botrys*. An Invasive Alien Species Management Plan (IASMP) has been prepared for both observed and potentially present invasive alien species. Local fauna

[33] Clair, C. S., & Forrest, A. (2009). Impacts of vehicle traffic on the distribution and behaviour of rutting elk, Cervus elaphus. *Behaviour*, *146*(3), 393-413.

[34] Rejmanek M. & Richardson D. (2013). Plant Invasions and Invasibility of Plant Communities. Vegetation Ecology: Second Edition. 10.1002/9781118452592.ch13.

[35] 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.

reliant on ecosystems impacted by invasive species may also be indirectly affected. The natural habitats within and around the Project footprint could see a reduction in biodiversity, potentially leading to the trivialization of the ecosystem, where more dominant species may emerge.

To account for potential impacts, a 100-metre buffer zone around the Project facilities is being implemented as a preventative measure.

The primary consequence resulting from disturbance of plants and soil will be the loss and degradation of habitat. Possible vegetation disruption caused by construction operations, such as the movement of vehicles, materials, and personnel, is likely to have a negative impact on the entire Project footprint and, to a lesser extent, the entire LSA. The plant and flora species, specifically the three species of conservation concern (*Gypsophila oblanceolata,* and *Onopordum davisii*), will be simultaneously impacted by multiple factors mentioned above, primarily by disturbances to vegetation and soil.

The construction impacts will primarily affect fauna species of conservation concern that have limited mobility and/or have strong ecological dependencies on the soil. Among the species of conservation concern are Tortoise (*Testudo graeca*, VU), the Brandt's Hamster (*Mesocricetus brandti*, NT), the Anatolian Vole (*Microtus anatolicus*, DD and Restricted Range), and the Anatolian Ground Squirrel (*Spermophilus xanthoprymnus*, NT). Bird species are less impacted during the construction phase because they have greater mobility, and the LSA is merely seen as a potential feeding or hunting ground for these species and not as a place for breeding.

It was quantified and discuss the possible impacts of the potential impact factors on biodiversity, and in particular on natural habitats, in the following paragraphs. The assessment of the direct impacts on Natural and Modified habitats was conducted within the boundaries of the Project footprint. On the other hand, the assessment of the indirect impacts was conducted within a 100 m buffer zone from the borders of the Project footprint, as well as within a 300 m buffer zone from the borders of the Project footprint. The possibly affected locations are illustrated in Figure 5-16, and their quantitative estimation is provided in Table 5-19.

Vegetation disturbance will directly affect 4.13% of the total LSA. The direct impacts will be focused on continental inland salt steppes, namely the E6.2 EUNIS habitat category. Given that the LSA has only one natural habitat, all direct impacts on natural habitats will be solely focused on it. These impacts will affect 3.07% of the habitat within the LSA, equivalent to 201.33 hectares. The Project is located next to an existing road and there are no plans to build additional access roads. As a result, there will be no further destruction/degradation of the habitat.

The construction activities cloud indirectly lead to the introduction of invasive alien species, which might potentially affect 4.4% of the LSA inside the 100 m buffer zone. The construction in the 100 m buffer zone will mostly affect continental inland salt steppes (E6.2, 256.23 ha), rural industrial and commercial sites (J2.3, 34.55 ha), and road networks (J4.2, 1.19 ha).

The emission of noise and vibrations resulting from construction activities could indirectly impact approximately 7.5% of the LSA inside the 300 m buffer zone. The indirect effects within the 300 m buffer zone will primarily affect continental inland salt steppes (E6.2, 378.99 ha) and rural industrial and commercial sites (J2.3, 111.27 ha).

Table 5-19: Calculation of direct and indirect impacts on EUNIS habitats within the LSA for the Construction Phase

EUNIS Habitat Type	Total LSA	Footprint impact		Impact on 100 m buffer		Impact on 300 m buffer	
	ha	ha	%	ha	%	ha	%
Natural habitat							
E6.2 - Continental Inland Salt Steppes	4,866.33	201.33	4.13	256.23	5.26	378.99	7.7
Subtotal	4.866,33	201.33	4.13	256.23	5.26	378.99	7.7
Modified habitat							
I1.2 - Mixed Crops of Market Gardens and Horticulture	1,295.13	0	0	0	0	0	0
J4.2 - Road Networks	19.76	0	0	1.19	6	1.85	9.3
J2.3 - Rural Industrial and Commercial Sites Still in Active Use	373.07	0	0	34.55	9.26	111.27	29.82
Subtotal	1,688.26	0	0	35.74	2.11	113.12	6.7
Total	**6,554.6**	**201.33**	**3.07**	**291.97**	**4.4**	**492.11**	**7.5**

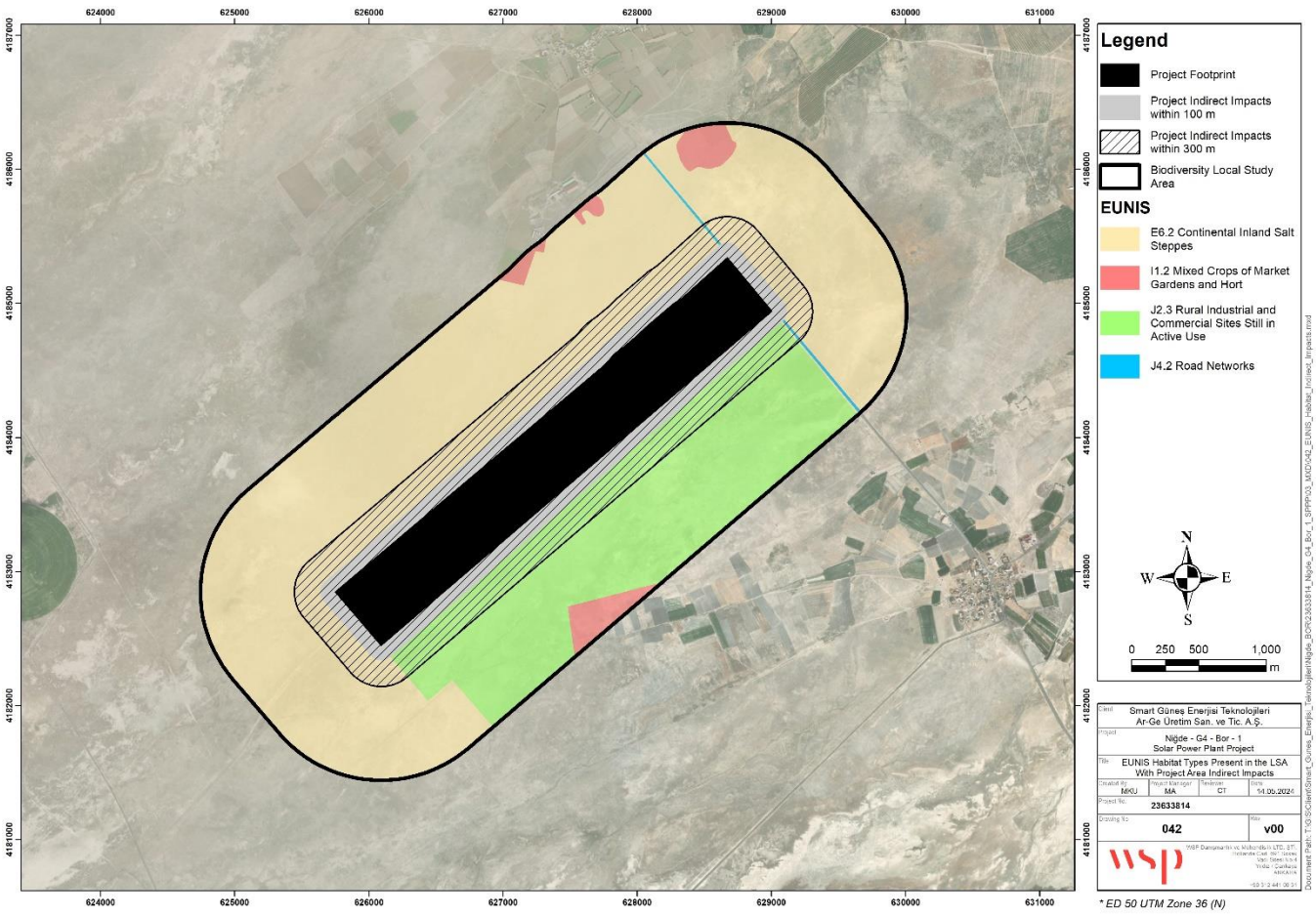


Figure 5-16: Map of the Construction Impacts on EUNIS Habitats within the LSA

5.2.3.1.1.1 Ecosystem services

Ecosystem services is a topic that intersects biodiversity aspects and social aspects. The impact assessment for this component is therefore performed in a qualitative form, building on the results of the assessment on biodiversity, and adding considerations from a social perspective, based on the outcomes of the social impact assessment.

As indicated in the baseline section on ecosystem services, in the LSA the most relevant ecosystem service potentially impacted by the Project is represented by pastureland, on which local herders rely for the grazing of animals. The only habitat providing this type of ecosystem service is E6.2 - Continental Inland Salt Steppes.

During the construction phase the main impact factors that can affect these habitats and consequently the ecosystem services offered are:

- **Vegetation disturbances:**

As indicated in ESIA report of the Project, the areas affected by this impact factor will be limited to the Project footprints, including ETL present during the construction phase.

Construction activities will result in the disruption of vegetation, leading to the direct loss of habitat, particularly in the areas where permanent and temporary facilities are being built. Conversely, locations designated for the arrangement of PV panels will encounter less disruption to vegetation and soil. Also, all of the Project Area will experience the effects of heavy machinery passing through for the transportation of construction materials, equipment, workers, waste, and other materials. As the Project Area is situated next to an existing road, no supplementary access roads will be constructed.

Flora species present in the area will be directly impacted by vegetation clearing at the beginning of construction during ground preparation works.

The assessment on biodiversity indicates that direct impacts will impact 3.07 % of the total LSA. The direct impacts will be mainly concentrated on natural habitats especially on steppes (E6.2, Continental Inland Salt Steppes, EUNIS habitat type). Indirect impacts in the 100 m buffer deriving from construction impact a total of 4.4 % of the LSA. The indirect impacts within the 100 m buffer will be mostly on salt steppes (E6.2). Indirect impacts in the 300 m buffer deriving from construction could impact a total of 7.5% of the LSA. Indirect impacts within the 300 m buffer will be mostly on salt steppe (E6.2).

Taking into account the mitigation measures identified for biodiversity, the residual impact due to vegetation and topsoil removal has been assessed to be **Medium**.

Impacts on herding activities has also been covered in social impact assessment section of the ESIA report of the Project considering the following impact factor:

- Passages to the lands and pastures.

The removal of vegetation and topsoil and the limitation of access to land during the construction phase will overall limit the availability of areas for pasture activities and animal herding. This means that the local communities will have to find alternative areas and may have to perform their activities further away from where they are normally performed. Construction activities may also limit the possibility of moving within the area, requiring using other and longer paths for animals to reach pasture areas. As indicated in the biodiversity assessment, it should be considered that construction activities will generate impacts on a limited portion of these habitats.

Specific mitigation measures have been identified both in the biodiversity and in the social section of the impact assessment. Mitigation measures identified include identifying crossing points that are regularly used by rural populations around the Project area.

In conclusion, based on the results of the assessment performed and on the mitigation measures identified, the overall impact during construction on the ecosystem services offered by pastureland and consequently on the animal herding activity is expected to be **Medium**.

5.2.3.1.2 Operation Phase

The possible impacts of the Project operations on biodiversity components throughout the operating phase are listed in Table 5-20.

Table 5-20: Project Actions and Related Impact Factors During Operation Phase

Project actions	Impact factors
Plant/infrastructure operation	Presence of permanent infrastructures (occupation of land) Emission of light (Presence of artificial lights) Emission of noise Accidental introduction of alien species (potential risk) Increase and modification of traffic

- For the operation phase, direct impacts deriving from the Project were assessed based on two types of Project footprints, the first of which corresponded to the areas covered by photovoltaic panels and the second of which corresponded to the areas occupied by permanent facilities (for example, inverter stations, substations, administrative buildings, internal roads). This assessment excluded temporary facilities since they will be rehabilitated following construction completion. Described and discussed in the following assessment are all the impact factors mentioned above.

Presence of permanent infrastructures (occupation of land)

The permanent infrastructure, including inverter stations, substations, administrative buildings, and internal roads, will lead to a reduction in natural habitat availability throughout the operational phase. This habitat loss will have direct and indirect effects on habitats, plant life, and animal species. It's worth noting that temporary facilities will not contribute to habitat loss, as they will be restored after the construction phase and during the operational phase. The construction of permanent infrastructures such as inverter stations, substations, administrative buildings, and internal roadways would result in the loss of natural habitat over the whole operational phase. This loss will have direct and indirect impacts on habitats, as well as flora and fauna species. The extent of habitat loss is quantified in Table 5-21. The temporary facilities, such as the campsite and administrative building, will not be impacted by habitat loss. This is because they will be restored and rehabilitated both during the construction phase and throughout the operation period.

There is an expectation that flora and vegetation will undergo at least partial recovery during the operational phase, attributed to the rehabilitation of temporary facilities and areas covered by PV panels. To ensure successful long-term management and restoration, it is crucial to implement an appropriate plan and conduct regular monitoring surveys to assess the effectiveness of restoration activities.

Another potential impact could arise from the reflection of sunlight by the photovoltaic panels, which might attract aquatic insects and possibly birds. These species could mistake the reflective surface of the panels for water

bodies, as sources of reflected polarized light, becoming ecological traps associated with reproductive failure and mortality. This phenomenon could lead to rapid population declines or collapse, especially for insects that lay eggs in water[36].

However, literature indicates that the construction of SPPs in desertic and steppe areas, frequently selected for their high insolation rates and significant potential for solar power generation, could yield positive effects for biodiversity. These benefits may manifest as increased plant diversity and biomass[37,38,39].

The favourable 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.

Certainly, although these regions might only obtain partial shade from the panels throughout the day, the biodiversity residing in them might still benefit[40]. For these reasons, it will be crucial to restore the areas cleared during construction and to establish long-term monitoring to evaluate the success of restoration activities. These efforts are anticipated to yield positive effects on local flora, fauna, and habitats.

- **Emission of noise**

Although solar panels themselves are often quiet, the permanent structures (i.e., tracking motors, inverters, high voltage transformers, energy storage devices) surrounding the solar power plant (SPP) could produce noise[41]. As it was evaluated in Section 7.1.2 of this ESIA report, since this noise to be generated by the Project is not expected to cause any increase at the background noise levels at the Project site and the closest sensitive receptors, no negative or adverse responses to animals are expected.

While the fauna species are foreseen to habituate to the disturbance originated from operation and maintenance activities, fauna disturbance due to the emission of noise connected to the operation phase is expected to be less than the emission of noise to be generated from the construction activities.

Emission of light (Presence of artificial lights)

This impact will result from the lighting integrated into the thermal cameras planned for installation within the project footprint. The LED lighting consists of 9 LEDs with 1000 lux power integrated into the camera systems. No additional environmental lighting is planned.

Lights can attract night-flying wildlife, leading them to be drawn towards permanent infrastructures, increasing the risk of collision and unexpected encounters with workers. Additionally, ecological light pollution can disrupt

[36] 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.

[37] Bai Z., Jia A., Bai Z., Qu S., Zhang M., Kong L., Sun R., Wang M. (2022). Photovoltaic panels have altered grassland plant biodiversity and soil microbial diversity. Front Microbiol. 2022 Dec 15;13:1065899. doi: 10.3389/fmicb.2022.1065899. PMID: 36590393; PMCID: PMC9797687.

[38] Graham M., Ates S., Melathopoulos A., Moldenke A., DeBano S., Best L. and Higgins C. (2021). Partial shading by solar panels delays bloom, increases floral abundance during the late-season for pollinators in a dryland, agrivoltaic ecosystem. Scientific Reports. 11. 7452. 10.1038/s41598-021-86756-4.

[39] Hassanpour E., Selker J. and Higgins C. (2018). Remarkable agrivoltaic influence on soil moisture, micrometeorology and water-use efficiency. PLOS ONE. 13. e0203256. 10.1371/journal.pone.0203256.

[40] Tanner K. E., K. A. Moore-O'Leary, I. M. Parker, B. M. Pavlik, and R. R. Hernandez. (2020). Simulated solar panels create altered microhabitats in desert landforms. Ecosphere 11(4):e03089. 10.1002/ecs2.3089.

[17] 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.

of fauna species' behaviour, including foraging and reproductive behaviour, biological clocks, predator-prey interactions, movement and dispersal patterns, community structure, and interactions among and within species [42].

The effects of light pollution are likely species-specific, influenced by the role ambient light plays in physiology and behaviour, and may also vary depending on the type of lighting employed. Taxa most susceptible to light pollution include bats, nocturnal birds, and insects. Depending on the species, bats may be either attracted to lights due to the presence of insects or they may avoid illuminated areas. Additionally, certain species of reptiles, amphibians, birds, bats, and spiders have been observed to wait around artificial lights for prey. Artificial lighting can enhance the foraging efficiency of many bat species, but it may also increase their vulnerability to predation. Voigt *et al.* (2018[43]) noted that the response of migratory bats to light was influenced by light color. Nocturnal and migratory bird species might be also adversely impacted by artificial lights[44]. During the night, nocturnal migratory animals may become disoriented and drawn towards the illumination of the sky. Fixed white lights attract more individuals than flashing or coloured ones. Insects are not only attracted to lights, but they are also more susceptible to predation around lighted areas. Artificial lighting might also undermine the evasive and defensive tactics normally used by insects.

- **Accidental introduction and dispersal of alien species** (potential risk)

Continuing maintenance activities during construction could make it easier for highly competitive invasive alien plant species to arrive and spread. Additionally, alien species that have already established during the construction phase could further spread by taking advantage of the new environmental conditions created by the modified shade caused by panels[40].

Invasive alien species have the potential to disrupt the functionality of ecosystems and alter the composition of the plant species community, including priority biodiversity species. The changes in the flora species community could pose a particular risk to regional endemic flora species, which were identified within the LSA by local expert Prof. Hayri Duman during a field survey conducted on October 18, 2023. These species include *Gypsophila oblanceolata,* and *Onopordum davisii.*

During the September 2024 monitoring studies, one invasive alien species (*Xanthium spinosum*) was observed, and an eradication campaign was organized for this species.

Additionally, potential IAS species (*Xanthium strumarium*, *Conyza canadensis*, and *Chenopodium botrys*) that have not yet been observed in the field were identified by the flora expert. To ensure that these species do not appear during the operation phase, the Invasive Alien Species Management Plan (IASMP) must be implemented diligently.

The existence of permanent infrastructures, such as PV panels, will have the most substantial impact on habitat loss and alteration. Nevertheless, it is anticipated that the flora and vegetation will experience some degree of restoration throughout the operational period, as a result of the rehabilitation of the temporary facilities, as well as in the vicinity of the photovoltaic (PV) panels. The altered temperature and soil conditions resulting from the presence of PV panels and the non-grazing have the potential to enhance local species richness, diversity, and biomass for the most prevalent and adaptable plant species, when compared to the surrounding overgrazed continental salt steppe habitat. (EUNIS habitat E6.2). The effect of grazing exclusion and PV panels on the three

[42] Longcore T. &Rich C. (2004). Ecological light pollution. Front. Ecol. Environ. 2004; 2[4]: 191– 198.

[43] 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.

[44] Rich C. & Longcore T. (2006). Ecological Consequences of Artificial Night Lighting. Island Press Washington, DC.

flora species classified as species of conservation concern (*Gypsophila oblanceolata,* and *Onopordum davisii*) is uncertain and will require monitoring throughout this period. For certain species of fauna, the presence of a fenced area with permanent facilities and PV panels may result in a loss of potential habitats. However, for other species, particularly those of conservation concern such as the Common Tortoise (*Testudo graeca*, VU), the Brandt's Hamster (*Mesocricetus brandti*, NT), the Anatolian Vole (*Microtus anatolicus*, DD and Restricted Range), and the Anatolian Ground Squirrel (*Spermophilus xanthoprymnus*, NT), the area could still be considered a suitable habitat. In fact, in some cases, the fence and PV panels could provide protection against grazing and predators. The emission of noise and the presence of artificial lights during the operation phase are not projected to significantly impact terrestrial fauna species, especially those of conservation importance. It is anticipated that land-dwelling animal species would adapt to these kinds of disruptions caused by operational and maintenance activities.

It was quantified and discuss the possible impacts of the potential impact factors on biodiversity, and in particular on natural habitats, in the following paragraphs. The assessment of the direct impacts on Natural and Modified habitats was conducted within the boundaries of the Project footprint. On the other hand, the assessment of the indirect impacts was conducted within a 100 m buffer zone from the borders of the Project footprint, as well as within a 300 m buffer zone from the borders of the Project footprint. The possibly affected locations are illustrated in Figure 5-17, and their quantitative estimation is provided in Table 5-21. As information on the distribution of the panels within the Project Area was not certain at the time of writing of this report, the panels have been placed based on a worst-case scenario.

The existence of other permanent infrastructures such as inverter stations, substations, administrative buildings, and internal roads will directly affect 0.09% of the total LSA. These impacts will be limited to continental inland salt steppes, namely the E6.2 EUNIS habitat type, covering an area of 4.44 hectares.

The operation activities could indirectly lead to the introduction of invasive alien species, which might potentially affect 31.05% of the LSA inside the 100 m buffer zone. The construction in the 100 m buffer zone will mostly affect continental inland salt steppes (E6.2, 460.21 ha), rural industrial and commercial sites (J2.3, 30.83 ha), and road networks (J4.2, 1.92 ha).

Indirect impacts in the 300 m buffer deriving from operation, such as noise and emission of light, could impact a total of 69.30% of the AoI. Indirect impacts within the 300 m buffer will be mainly on continental inland salt steppes (E6.2, 796.41 ha). Indirect impacts will affect also rural industrial and commercial sites (J2.3, 107.53 ha) and mixed crops of market gardens and horticulture (I1.2, 96.05 ha).

The emission of noise and vibrations resulting from operation activities could indirectly impact approximately 35.4% of the LSA inside the 300 m buffer zone. The indirect effects within the 300 m buffer zone will primarily affect continental inland salt steppes (E6.2, 382.53 ha), rural industrial and commercial sites (J2.3, 107.53 ha), and road networks (J4.2, 1.85 ha).

The direct impacts deriving from the presence of PV panels will impact 5% of the total AoI and will be entirely on continental inland salt steppes (E6.2 EUNIS habitat type, 50.76 ha).

Additionally, the **ETL works have been completed**, and a total of **16 pylons have been erected and are now operational**. Instead of excavating and concreting the entire area covered by each pylon, **only four pits were dug for the legs, and concreting was carried out in this manner**.

Table 5-21: Calculation of direct and indirect impacts on EUNIS habitats within the LSA for the Operation Phase

EUNIS Habitat Type	Total LSA	PV Panels Area		Direct Impact (Permanent facility)		Impact on 100 m buffer		Impact on 300 m buffer	
	ha	ha	%	ha	%	ha	%	ha	%
Natural habitat									
E6.2 - Continental Inland Salt Steppes	4,866.33	50.76	5.1	4.44	0.09	460.21	9.46	796.41	16.37
Subtotal	4,866.33	50.76	5.1	4.44	0.09	460.21	9.46	796.41	16.37
Modified habitat									
I1.2 - Mixed Crops of Market Gardens and Horticulture	1,295.42	0	0	0	0	46.73	3.61	96.05	7.41
J4.2 - Road Networks	19.76	0	0	0	0	1.92	9.72	3.3	16.70
J2.3 - Rural Industrial and Commercial Sites Still in Active Use	373.07	0	0	0	0	30.83	8.26	107.53	28.82
Subtotal	1,688.26	0	0	0	0	79.48	21.59	206.88	52.94
Total	**6,554.601**	**50.76**	**5.06**	**4.44**	**0.07**	**539.69**	**31.05**	**1,003.29**	**69.30**

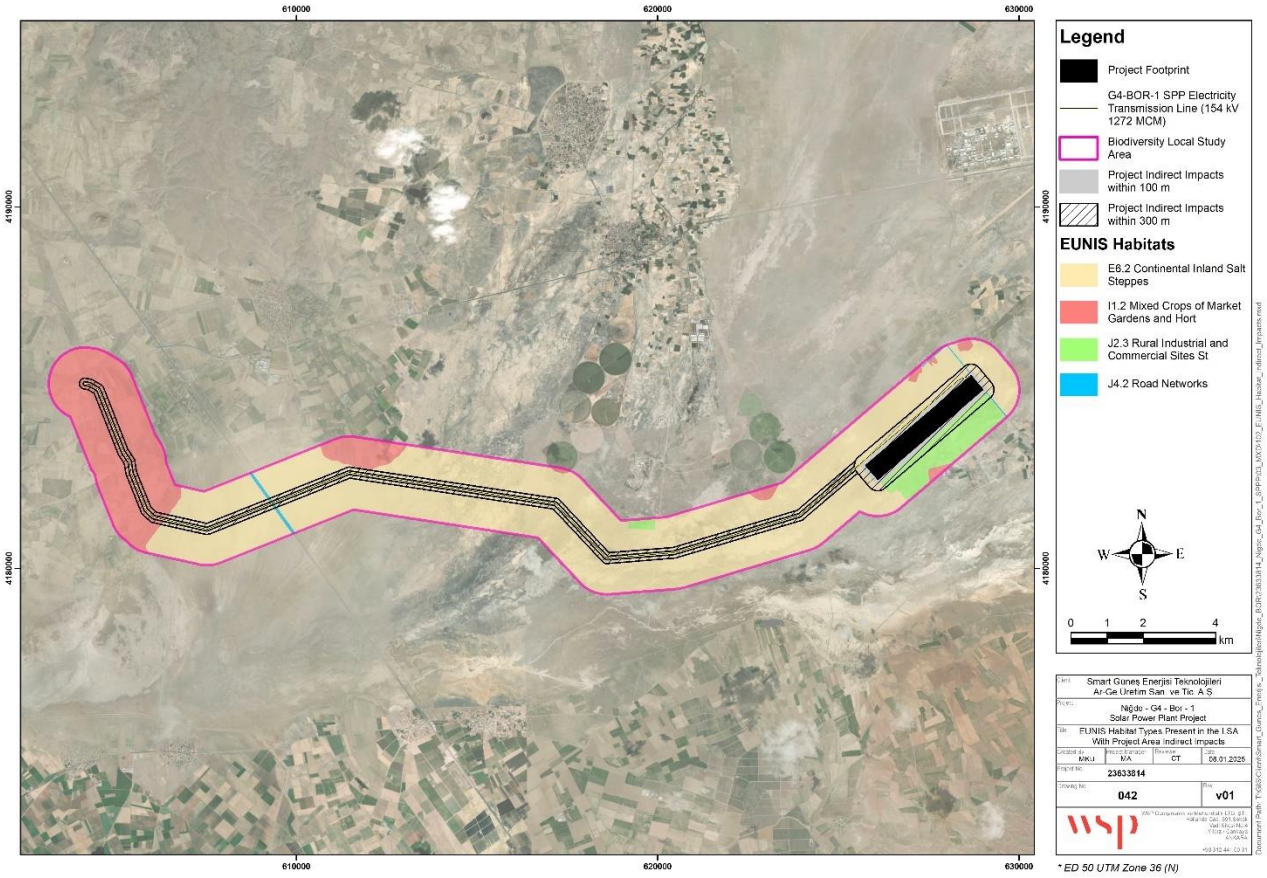


Figure 5-17: Map of the Operation Impacts on EUNIS Habitats within the LSA

5.2.3.1.2.1 Ecosystem services

During the operation phase, from a biodiversity perspective the following impact factors are expected to potentially impact the ecosystem services provided respectively by pasturelands:

- Presence of permanent infrastructures (occupation of land)

  The permanent infrastructure, including inverter stations, substations, administrative buildings, and internal roads, will lead to a reduction in natural habitat availability throughout the operational phase. This habitat loss will have direct and indirect effects on habitats, plant life, and animal species. It's worth noting that temporary facilities will not contribute to habitat loss, as they will be restored after the construction phase and during the operational phase. The construction of permanent infrastructures such as inverter stations, substations, administrative buildings, and internal roadways would result in the loss of natural habitat over the whole operational phase. This loss will have direct and indirect impacts on habitats, as well as flora and fauna species.

Direct impacts during operation phase will impact less than 1% (0.69%) of the total LSA. The direct impacts will be mostly on modified habitats (23.33 ha) especially on agricultural fields (I1.1, 19.49 ha EUNIS habitat types). The direct impacts during operation could potentially affect less than 1% (0.65%; 17.95 ha) of the total natural habitats in the LSA. They will be mostly concentrated on steppes (E1.2, 8.21 ha EUNIS habitat types) and shrublands (F3.1, 9.21 ha EUNIS habitat type). The Project will largely make use of existing access roads as such will minimize further habitat destruction/degradation. Indirect impacts in the 100 m buffer impact a total of 7% of the LSA. Indirect impacts during operation in the 100 m buffer will be greater on modified than natural habitats (245.48 ha and 170.85 ha respectively). Indirect impacts in the 300 m buffer during operation could impact a total of 21% of the LSA. Indirect impacts during operation in the 300 m buffer will be greater on modified than natural habitats (1267.87 ha and 500.24 ha respectively) and mostly on agricultural fields.

Taking into account the mitigation measures identified for biodiversity, the residual impact due the presence of new buildings/infrastructures has been assessed to be **Medium.**

Impacts on herding activities has also been covered in social impact assessment of ESIA report of the Project considering the following impact factor:

- Passages to the lands and pastures.

The Project Area is located between pastures and villages in rural areas. The presence of the project will affect animal herding activities due to the reduction of available pasturelands. The project will reduce the accessibility of pasturelands, requiring animal herders to find alternative areas to continue their activities, which may create additional pressure on existing habitats and lead to competition with other land uses

Specific mitigation measures have been identified both in the biodiversity and in the social section of the ESIA report of the Project. The location and design of passage points to be used by local communities in their agricultural and herding activities will have to be carefully discussed and agreed during specific consultation activities. Whenever reinstatement activities are necessary following the construction phase, it must be ensured that vegetation is fully re-established before animal herding activities are allowed in the area.

The residual impact value assessed for the passages to the lands and pastures is assessed to be **Low**.

Based on the results of the assessment performed and on the mitigation measures identified, the overall impact during construction on the ecosystem services offered by pastureland and on the animal herding activity is expected to be **Low**.

5.2.3.1.3 Decommissioning/Closure Phase

The Project is anticipated to be operational for a minimum of 30 years without being decommissioned. The impacts experienced throughout the decommissioning process are anticipated to be transient in nature. The extent of these impacts will be contingent upon the extent to which the infrastructure is dismantled.

The primary objective of the decommissioning and closure phase is to restore the disturbed lands to establish stable, non-polluting, and self-sustaining ecosystems that can be seamlessly integrated into the future landscape, aligning with the activities in the surrounding area. Due to the uncertainty surrounding the future land use of the region and the lack of precise information at this stage, it is not possible to provide a comprehensive discussion on the impact of this phase on the biodiversity component. This is further compounded by the fact that Decommissioning and Closure is expected to occur several years from now.

Nevertheless, the restoration of natural vegetation and the re-establishment of disturbed regions will have favourable effects, providing to the reclamation of most areas and an overall improvement in biodiversity compared to the operational phase.

5.2.4 Mitigation Measures

Throughout the construction phase of the Project, the listed mitigation measures adhere to the mitigation hierarchy and are suggested across the entire area affected by the Project:

- **Avoidance**

Avoidance measures have been taken into account, especially during the design phase of the facilities, and include:

- Reducing the footprint of individual facilities.
- Prioritizing the utilization of existing modified habitat for the placement of temporary facilities whenever feasible.

- **Minimization**

1) vegetation disturbance:

- Minimizing disturbance to natural vegetation to the extent necessary during construction activities. This involves clearly marking the boundaries of temporary and permanent facilities to mitigate the risk of footprint expansion.
- To minimize wildlife mortality, pre-construction biological surveys will be conducted to identify and potentially relocate fauna species. These surveys, performed by an expert wildlife ecologist, will focus on species with limited mobility, such as mammals and reptiles, within the areas designated for temporary and permanent facilities. If any of these species are found, they will be collected by the ecologist and translocated to undisturbed but similar sites within the designated LSA.
- Reptiles will be captured and relocated to a suitable receptor site, which is no smaller than the capture site and exhibits similar habitat characteristics and prey availability. The relocation will be conducted at a minimum distance of 50 meters from the Project footprint during the construction phase. In case essential works are necessary during winter when tortoises are hibernating, the works area will be thoroughly inspected for hibernation burrows. If a hibernating reptile is discovered during such works, it will be carefully moved to an alternative undisturbed part of the site. If relocation on-site is not feasible, the animal will be placed in care until it can be safely released the following spring.

- Monitoring of small mammal species identified as species of conservation concern, including the Brandt's Hamster (*Mesocricetus brandti*, NT), Anatolian Vole (*Microtus anatolicus*, DD and Restricted Range), and Anatolian Ground Squirrel (*Spermophilus xanthoprymnus*, NT), will be conducted using endoscopic cameras placed within their burrows. If any living specimen is observed and essential ground-breaking works are required in areas where burrows are present, a gradual increase in disturbance levels over several days (at least first 4 days) will be implemented. This approach allows the animals to autonomously leave their burrows before they are fully excavated. For instance, machinery and equipment will be brought to the working area on day 1, followed by manual excavation on day 2, and mechanical excavation in the vicinity of the burrow on day 3.
- Vehicle movement will be confined to the Project Site and existing roads connecting construction sites with surrounding areas. Off-road driving will be strictly prohibited to prevent any unnecessary disturbance of natural vegetation.

2) emission of noise and vibrations:

- Works will be made to minimise night works between the hours of 8 pm and 6 am in order to minimise the negative effects on nocturnal wildlife species.
- Restricting both the quantity and velocity of vehicular traffic on the current access routes.

3) emission of dust and particulate matter:

- Dust generated from construction material handling will be minimized by utilizing covers and/or control equipment such as water suppression, bag house, or cyclone systems. Additionally, moisture content will be increased through water spraying to mitigate dust dispersion. A speed limit will be enforced for all vehicles to prevent the generation of dust emissions, and all trucks will be regularly maintained to ensure proper functioning at all times. Internal roads will be appropriately compacted, maintained, and sprayed with water as necessary to minimize dust from vehicle movements. If water spraying is found to be insufficient, alternative surface treatment methods such as hygroscopic media like calcium chloride or natural-chemical binding agents for unpaved internal roads will be employed. This may involve using a sprinkler system or a "water-mist cannon.

4) "Increased and/or modified road traffic:

- Speed limits and animal crossing signs (If available) will be installed on the access roads. Efforts should be made to prevent the accumulation of stagnant water and organic waste within the construction site and on the roads to avoid attracting wildlife. If employees and contractors come across any fauna species, they will either wait for it to go away on its own or seek the help of the environmental technician to safely remove and relocate it to a suitable habitat. Training will be given to enhance the knowledge and understanding of employees and contractors regarding the presence of protected species and habitats in the area. This will enable continuous monitoring and facilitate appropriate responses in the event of animal encounters.

5) accidental introduction and spreading of alien species:

- During rehabilitation/restoration works, the use of non-native flora species, especially those classified as invasive alien species, must be avoided. If the proliferation of invasive species is detected, a suitable eradication plan will be devised and executed.

- **Rehabilitation/Restoration**

Temporary cleared areas resulting from construction will be expeditiously restored, with the objective of establishing a stable vegetative cover to mitigate erosion, dust accumulation, and the proliferation of invasive alien species. The ultimate goal is to restore the original habitat and positively impact biodiversity. Restoration and habitat rehabilitation will exclusively involve the use of native plant species from the region. Seeding and planting of grass and shrub species typical of the local flora will be carried out to achieve optimal ground cover. It will be crucial to prioritize the use of autochthonous adult plants and seeds collected from locations nearest to the restoration sites to maximize the success of translocation operations (Abeli & Dixon 2016)[45].

Throughout the operation phase of the Project, following mitigating measures, which adhere to the mitigation hierarchy, are recommended for implementation in the entirety of the affected area.

- **Avoidance**:
  - Avoidance measures have been taken into account, especially during the design of the facilities, and these measures include:
  - minimisation of the footprint of individual facilities.
  - using the already modified environment to accommodate temporary infrastructure.
- **Minimization**

1) Presence of permanent infrastructures (occupation of land):

- The new permanent infrastructures will be enclosed by fences, however the fencing will be modified to reduce its barrier impact. Modifications to fencing can include creating regular gaps along the fence line, with a frequency of one gap per 100 metres. These spaces are maintained between the base of the fence and the ground. Furthermore, each individual gap could have a height of 10 cm and a width of 1 m.
- Non-reflective coating will be used on the panels to reduce reflection.
- Vehicle travel will be limited to the current roads that link the operation locations with the nearby regions. Off-road driving will be banned to prevent any unwarranted disruption of the natural vegetation.

2) Emission of noise:

No further steps of minimization are considered essential in addition to those already provided in Chapter 7.1.2.

3) Emission of light (Presence of artificial lights):

- It is advisable to limit the number of light sources to a minimum;
- preferred types of light in exterior lighting (e.g.: lights on site due to security reasons) applications are:

[45] Abeli T. & Dixon K. (2016). Translocation ecology: the role of ecological sciences in plant translocation. Plant Ecology. 217. 10.1007/s11258-016-0575-z.

- It is advisable to limit the number of light sources to a minimum. The recommended types of light for exterior lighting applications, such as lights for security purposes, are low pressure sodium lamps (SOX) and light emitting diodes (LEDs). LEDs are the preferred choice as they emit light in a more focused direction and have warmer colour temperatures, closer to 3000°K. Additionally, it is recommended to use lights triggered by presence detectors and lights that are directed towards the ground.

- Avoid using these sorts of lights:
  - Mercury lamps (MBF) are bluish-white lights that attract insects and are tolerated by bat species. High pressure sodium lamps (SON) are brighter pinkish-yellow lamps that are commonly used for road illumination.

4) Accidental introduction of alien species (potential risk):

- Avoid using non-native flora species, particularly those classed as invasive alien species, during rehabilitation and restoration projects.
- If the proliferation of invasive species is detected, a suitable eradication programme will be devised and executed.

- **Rehabilitation/Restoration:**

The areas devoid of vegetation beneath the PV panels will be as soon as possible recovered, with the aim of reestablishing the original natural ecosystem and potentially augmenting the richness and diversity of plant species. The restoration studies will be implemented according to a comprehensive and enduring strategy, with the objective of establishing a consistent plant cover to reduce erosion, dust accumulation, and the proliferation of non-native species.

Restoration and habitat rehabilitation will exclusively employ local plant species. The implementation of seeding and planting of grass and shrub species local to the area will be carried out to guarantee the most favourable ground coverage. In order to optimise the success of the translocation operations, it is crucial to utilise mature plants or seeds that are native to the area or obtained from the closest practical distance to the restoration sites[45].

Research indicates that building Solar Power Plants (SPPs) in desert and steppe regions, primarily selected for their high sun exposure and significant solar power generation potential, can have beneficial impacts on biodiversity. These include an increase in plant diversity and plant biomass.[46,47,48]. The favourable impacts mostly result from the shading provided by the PV panels, leading to a reduction in temperature and an increase in soil moisture in the regions covered by the panels[49]. The fence and PV panels could provide safety for small-sized mammals, reptiles, and birds, offering good impacts for terrestrial fauna species by shielding them from predators.

[46] 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.

[47] 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.

[48] 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.

[49] 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.

5.2.5 Residual Impacts

Taking into account the implementation of the aforementioned mitigation measures, the impact on biodiversity components is anticipated to be Medium during construction phase, as indicated in Table 5-22.

- The primary residual impact on natural habitats may stem from vegetation disturbance and the introduction and spread of alien species, potentially leading to modification and potential impoverishment of the original plant species community. To monitor these impacts, the following monitoring measures are suggested in the subsequent section.

Table 5-22: Residual Impact Assessment Matrix for Biodiversity Component during Construction Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features - Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Vegetation disturbance	Duration:	Medium	Medium-high	Long term	**High**	Medium	**Medium**
	Frequency:	Frequent					
	Geo. Extent:	Project footprint					
	Intensity:	Medium					
Emission of noise and vibrations	Duration:	Medium	Medium-high	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	High					
Emission of dust and particulate matter	Duration:	Medium	Medium-high	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	High					
Increased and/or modified road traffic	Duration:	Medium	Medium-high	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Moderately frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Accidental introduction of alien species (potential risk)	Duration:	Medium	Medium-high	Long term	**High**	Medium-high	**Low**
	Frequency:	Sporadic					
	Geo. Extent:	Local					
	Intensity:	Medium					

During operation phase, the predicted impact on biodiversity components is presented in **Table 5-23** resulting from the implementation of the indicated mitigation measures, which is anticipated to be **Low.**

- The primary residual effects may include the destruction of natural habitats as a result of the construction of permanent infrastructure, as well as the introduction and proliferation of invasive alien species, which could significantly alter and potentially deplete the original plant species population.

Table 5-23: Residual Impact Assessment Matrix for Biodiversity Component during Operation Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Presence of permanent infrastructures (occupation of land)	Duration	Long	Medium-high	Mid-term	**Medium**	Medium-high	**Low**
	Frequency	Continuous					
	Geo. Extent	Project site					
	Intensity	Low					
Emission of noise	Duration	Long	Medium-high	Short-term	**Low**	Medium-low	**Low**
	Frequency	Highly frequent					
	Geo. Extent	Project site					
	Intensity	Negligible					
Emission of light (Presence of artificial lights)	Duration	Long	Medium-high	Short-term	**Low**	Medium-low	**Low**
	Frequency	Highly frequent					
	Geo. Extent	Project site					
	Intensity	Negligible					
Accidental introduction of alien species (potential risk)	Duration	Long	Medium-high	Long-term	**High**	Medium-high	**Low**
	Frequency	Concentrated					
	Geo. Extent	Local					
	Intensity	Medium					

5.2.6 Monitoring

During construction phase, to ensure the implementation and effectiveness of the proposed mitigation measures in natural habitats, the following monitoring activities are planned:

- The existence and proliferation of invasive plant species within and in the vicinity of the building site will be checked biannually during the period of plant growth by a specialist botanist. If deemed required, an extirpation campaign will be implemented to prevent the proliferation of the invasive species.
- Observations of fauna species, specifically the reptile species of conservation concern (*Testudo graeca*) and the terrestrial mammal species of conservation concern (*Mesocricetus brandti, Microtus anatolicus, Spermophilus xanthoprymnus*, and *Vormela peregusna*), within and around the LSA, must be recorded along with photographic evidence and reported to the on-site Site Chief.
- Incidents involving wildlife or the sighting of live animals or carcasses on the access road or construction site shall be documented. If necessary, further precautions will be implemented to deter wildlife from entering the site and prevent incidents of roadkill.

During operation phase, on the other hand following monitoring activities are proposed to ensure the execution and effectiveness of the mitigation measures:

- A floristic and vegetational monitoring will be conducted in the areas beneath the photovoltaic panels where plant translocation and restoration activities have taken place. This monitoring aims to evaluate the effectiveness of these activities in improving species richness and diversity and restoring the original

natural habitat. This monitoring will also assess the occurrence and population size of the flora species that have been classified as species of conservation concern, namely *Gypsophila oblanceolata,* and *Onopordum davisii*. An expert botanist will undertake this monitoring once per year during the vegetative season. The monitoring will continue for at least 3 years after the end of construction and during the operation phase.

- The existence and proliferation of invasive plant species in the regions covered by the photovoltaic panels will be evaluated biannually throughout the growing season by an expert botanist for a minimum of 3 years. If deemed required, an extirpation campaign will be implemented to prevent the proliferation of the invasive species.
- A monitoring programme will be conducted after construction to assess the impact of solar panels on the identified reptile species of conservation concern (*Testudo graeca*) and the identified terrestrial mammal species of conservation concern (*Mesocricetus brandti*, *Microtus anatolicus*, *Spermophilus xanthoprymnus*, and *Vormela peregusna*). This monitoring will focus on the areas located under the photovoltaic panels. The aim is to observe whether the panels provide protection and benefits to these animals from predators, hence a potential increase in local fauna species richness and abundance. This monitoring will be carried out annually for a minimum duration of 3 years by a specialist in terrestrial fauna.
- Incidents involving wildlife or the sighting of live animals or carcasses on the permanent access roads or in areas occupied by permanent infrastructure shall be recorded. If necessary, further precautions will be implemented to deter wildlife from entering the site and prevent incidents of roadkill.

5.2.7 Net Loss Assessment for Natural Habitats

The current analysis of net loss examines and explores the remaining and inevitable effects on natural habitats and species of conservation importance within the LSA. The assessment of residual impacts took into account the influence of interventions aimed at avoiding, mitigating, and monitoring the effects of construction and operation.

Critical Habitats weren’t identified within or around the LSA. For this reason, they are not discussed in the present assessment.

The primary effects on natural habitats are mostly linked to the loss of habitat within the permanent areas affected by the project.

Restoration activities will be carried out on all temporary facilities used during the construction phase (such as the campsite and administrative building). It is expected that the area will be restored by the temporary facilities during construction with the aim of returning the area to its former natural state of " E6.2- Continental inland salt steppes".

The measures presented for the construction and operation phases will mitigate the indirect impacts, such as the emission of noise, dust, and light, the increase in vehicular traffic, and the accidental introduction and dispersal of alien species. These measures are expected to have a negligible effect on the Natural Habitat and Species of Conservation Concern. Thus, the only residual effects will be those caused by the existence of permanent buildings and 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 calculated conservatively at the end of the operation phase corresponding to the areas permanently occupied by the presence of permanent buildings/infrastructures.

Additionally, ETL works have been completed, with a total of 16 pylons constructed and now operational. Instead of excavating and concreting the entire area covered by each pylon, concreting was done only for the four foundation legs.

Based on the assessment, habitat loss due to the Project is expected to be extremely limited (see Table 5-21**). Therefore, no significant permanent impact on Natural Habitats in the LSA is expected.**

Furthermore, PV panels cover an approximate area of 50.76 hectares, which is also part of the "E6.2 - Continental inland salt steppes" habitat. During the operation phase, it is anticipated that the flora and plants in this area would recover. In fact, SPPs have demonstrated the ability to contribute positively to biodiversity, as evidenced by several case studies and supported by the IUCN Guidelines. This is particularly true when a Project is followed by the deployment of long-term management and restoration measures.

The literature provides numerous instances of beneficial effects on biodiversity resulting from the establishment of SPPs, particularly in arid grassland ecosystems. These effects include enhanced diversity of plant species and soil microorganisms[50] increased diversity of plant species, plant biomass, and plant functional traits related to reproductive fitness[51], elevated aboveground biomass, soil moisture, and vegetation cover[52,53], as well as greater abundance of floral species and pollinators[54].

The specific edaphic conditions beneath the PV panels and the absence of grazing could potentially lead to an increase in the number of different species, the variety of species, and the amount of plant material for the most common and adaptable plant species[55] compared to the nearby overgrazed salt steppe habitat. However, the alteration may put specialist species, such as dry and salt tolerant endemic species, at a disadvantage because of the unique microenvironments created by the solar panels. Endemic species may face significant disadvantages due to their restricted geographical range, narrow tolerance to certain environmental conditions, or specialised patterns of life.

The previous chapters have outlined specific strategies to manage and restore the temporary facilities and PV panels in the long run. These measures aim to maximise the good benefits on biodiversity and ecosystem services while minimising the negative impacts. The impact of grazing exclusion and PV panels on the two flora

[50] 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

[51] 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

[52] 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.

[53] 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

[54] 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

[55] 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.

species listed as species of conservation concern (*Gypsophila oblanceolata, Onopordum davisii*) is uncertain and will require monitoring.

For certain fauna species, the presence of a fenced area with permanent facilities and PV panels may result in a loss of potential habitats. However, for other species, particularly those of conservation concern such as the Common Tortoise (*Testudo graeca*, VU), the Brandt's Hamster (*Mesocricetus brandti*, NT), the Anatolian Vole (*Microtus anatolicus*, DD and Restricted Range), and the Anatolian Ground Squirrel (*Spermophilus xanthoprymnus,* NT), the area could still be considered a suitable habitat. In some cases, the fence and PV panels could provide protection against grazing and predators.

The population and distribution of the most impacted flora and fauna species of conservation importance will be closely monitored inside the LSA. The Biodiversity Management Plan will include extensive monitoring measures for both flora and fauna species.

The results obtained from monitoring during the operational phase will be enabled to either confirm or modify the predicted net loss for the Natural Habitat. If non-conformances occur, remedial actions, including mitigation and offset measures, will be devised.

5.2.8 High-level No Net Loss (NNL) Strategy

A high-level No Net Loss (NNL) strategy has been developed to serve as a basis for the detailed restoration plan, which is scheduled to be prepared approximately five years prior to the project's decommissioning phase. This strategy outlines the fundamental principles, anticipated measures, and general considerations necessary to achieve NNL objectives.

The only area where habitat loss is expected as a result of the Project is the 4.4-hectare area occupied by permanent buildings. Based on calculations, it is anticipated that impacts will occur solely due to these permanent structures. The type of habitat affected by the permanent facilities is solely the "E6.2 – Continental Inland Salt Steppes."

This loss can be addressed through restoration efforts, and the rehabilitation of the habitat during the decommissioning phase will be possible. Therefore, this section has been prepared under the scope of a "High-Level No Net Loss Strategy" to provide a foundation for the rehabilitation plan that will be prepared approximately five years before closure.

One of the fundamental principles of restoration is to bring habitats back to their initial ecological state or to an even better condition. In this context, natural recovery processes will be prioritized and, where necessary, supported through targeted restoration interventions.

Throughout the process, the management of invasive alien species (IAS) is of significant importance. Accordingly, an IAS Plan will be implemented, taking into consideration the invasive species observed on-site and those that could potentially be present, and it will be monitored throughout the project lifecycle.

Additionally, reshaping and stabilizing the terrain in accordance with current conditions will also be ensured.

Prior to rehabilitation, soil improvement works should also be considered an important step. For this purpose, measures such as soil ripping, aeration, and top-soil application will be implemented to address soil compaction, erosion, or topsoil loss in areas impacted by project activities. Moreover, soil analyses should be conducted in the areas to be rehabilitated. If nutrient deficiencies (particularly nitrogen, phosphorus, and organic matter) are detected in the soil, ecosystem-compatible ameliorative practices (such as compost addition) will be undertaken. The use of chemical fertilizers will be evaluated only in a controlled and limited manner, ensuring that no adverse effects are caused to local flora and fauna.

During the operational phase, seed collection activities will be conducted from local plant species, selecting appropriate material based on germination success rates. In addition, seeds from species observed within the project area and with wide distribution, such as Gypsophila oblanceolata and Onopordum davisii, will also be collected.

The implementation of this seed collection strategy will provide a valuable ex situ conservation resource, ensuring the preservation and potential restoration of Gypsophila oblanceolata and Onopordum davisii populations in the face of environmental changes or unforeseen disturbances.

Throughout the operational phase, periodic monitoring activities will be conducted to improve restoration methods and assess the recovery process; based on the data collected, a detailed restoration plan will be prepared approximately five years prior to closure.

Responsibilities for the implementation, monitoring, reporting, and adaptive management of the plan will be clearly defined in the detailed plans to be prepared in the future.

5.3 Social Components

Impact re-assessment of the social components defined in Section 1.3.1 are presented in subsections below.

5.3.1 Indigenous People

IFC PS-7 on Indigenous Peoples is not applicable in Türkiye, as there are no recognized indigenous peoples under international or national frameworks within the country. Indigenous peoples, as defined by the IFC and other international bodies such as the United Nations, are groups with distinct cultural practices, languages, and traditions that are historically tied to specific territories and have a collective attachment to their ancestral lands and resources. Consequently, there is no land, cultural heritage, or settlements under the collective customary use of indigenous peoples that would be affected by the Project and PS-7 protections do not apply in this context.

5.3.2 Land Use and Land Based Livelihoods

During the ESIA studies, a social field study was conducted, including household surveys between March 6th and March 8th, 2024. While determining the sample, efforts were made to target households engaged in livestock breeding in the region, prioritizing the inclusion of livestock breeders in the surveys. Interviews were conducted with those present in the villages.

A total of 37 household surveys were conducted, covering households in Seslikaya, Badak, and Emen villages. These surveys represented approximately 17% of the total households in these villages. Among the surveyed households, 17 were engaged in livestock breeding, with 10 households breeding sheep, thus relying on pasturelands. Among the surveyed households engaged in sheep breeding, 4 were from Emen village, while 6 were from Badak village. Of these, one vulnerable individual is identified in one household in Badak village. The sole livelihood of this household is livestock breeding, with 18 cattle and 120 sheep and goats. The household consists of 5 members: the parents, two children, and the elderly mother. The mother is very old and illiterate.

The findings from social field study of the ESIA indicated that livestock breeding in the region has shifted over the years. Due to recurring droughts and the associated challenges of engaging in livestock breeding with age, most livestock breeders in the villages have transitioned from sheep to cattle farming. This transition has primarily been facilitated by feeding livestock in barns using stored feed, as pasture grazing has become increasingly difficult.

Some villagers continue to rely on pastures for grazing for sheep breeding. However, drought conditions in the region have significantly reduced the availability of pastureland, limiting its use for grazing activities.

Also, the Project occupies the pastureland of Seslikaya village, which is not utilized by Emen and Badak villages. However, the ESIA assessed the potential indirect impact of Seslikaya exhausting its remaining pasture areas, potentially forcing the village to utilise the pasturelands of Badak village. This could reduce the available pastureland for Badak and create the risk of social conflict between the two villages.

On January 22, 2025, an interview was conducted with the Mukhtar of Seslikaya to update and gather additional information regarding the land use status in the village. The village has a population of 120 people, consisting of 45 households. Among these, 10 households are actively engaged in sheep breeding, utilizing the pastureland, while 7 households are involved in cattle breeding within their barns. Although the exact number of livestock is uncertain, it is known that 4-5 households have approximately 500 sheep, and 3-4 households have fewer sheep.

There are no vulnerable individuals among the livestock breeders. However, the general population is older, with several elderly individuals living alone after the passing of their spouses.

One company within the ESIZ have provided feed support multiple times to the livestock breeders who use the pastureland in Seslikaya. Additionally, Smart has undertaken community development initiatives, such as supporting the Seslikaya village mosque and distributing food vouchers to vulnerable households in the village.

The mukhtar reported that while there is ongoing communication with Smart, there is an expectation for increased support. It was noted that since all villagers have rights to the village’s pastureland, all livestock breeders, including those with cattle, should receive support. The mukhtar suggested that since other companies in ESIZ have provided support to sheep breeders, Smart could extend similar support to cattle breeders. Furthermore, the support should be continuous rather than a one-time effort.

The mukhtar emphasized the need to enhance local employment and procurement opportunities, with a priority given to Seslikaya.

Within this context, it is important to note that the area occupied by the Project constitutes only 11.7% of the total grazing land available in the Seslikaya village. The Project covers 202.2 hectares of pastureland, and the remaining pastureland of Seslikaya is 1,516.47 hectares. Figure 5-18 represents the land use of the Project and the remaining pastureland of Seslikaya.

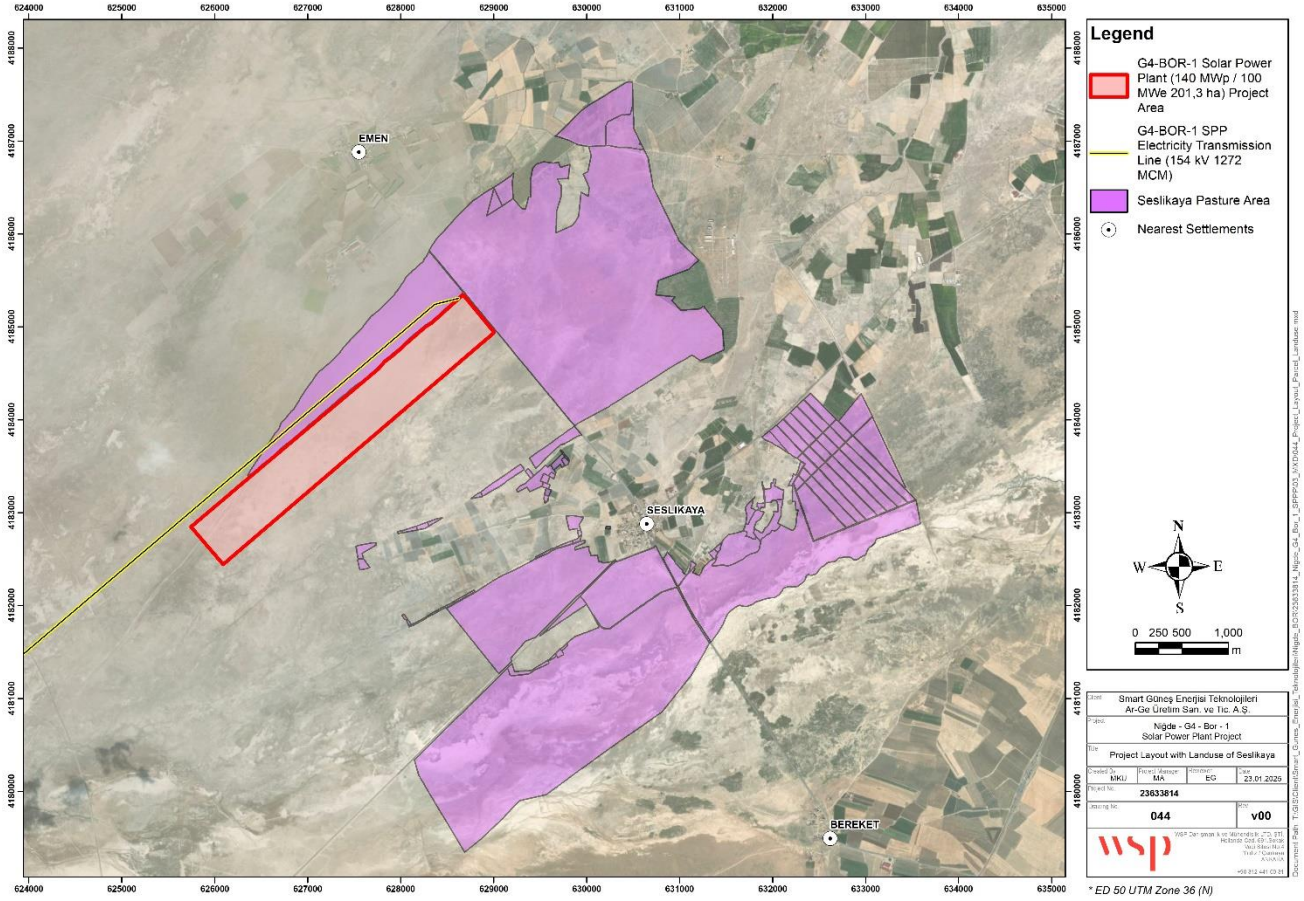


Figure 5-18: Project Layout with Land Use of Seslikaya Neighbourhood

Cumulative land use, including all activities in ESIZ and the remaining pasturelands in Seslikaya is presented in Figure 5-19.

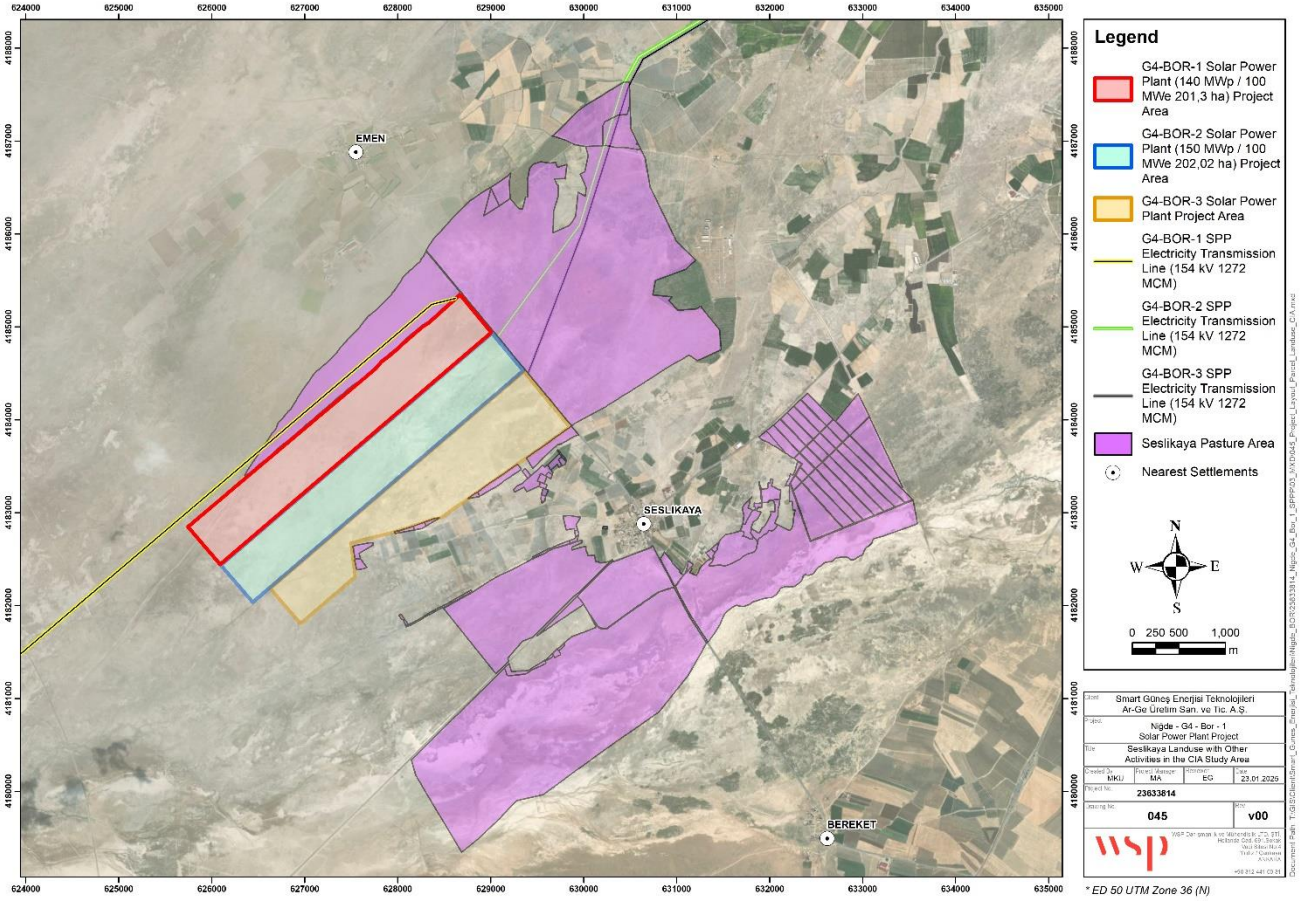


Figure 5-19: Cumulative Land Use in Seslikaya Neighbourhood

While the Project's use of pastureland does reduce the overall grazing area, this impact must be understood within the broader context of longstanding challenges in the region such as recurring droughts and the gradual decline in pasture quality. These factors have already significantly influenced the availability and usability of grazing land and shaped a big role in shifting the existing livestock breeding practices.

To ensure that the Project impacts on pastureland use and livelihoods are minimized and avoided, the following additional mitigation measures will be implemented by Smart throughout the Project's lifecycle:

- Smart has been in contact with vulnerable households in the villages and will continue to maintain communication while providing ongoing support, especially to the household identified in Badak village.
- Feed support will be provided to 10 households from Seslikaya who utilize pasturelands for sheep breeding and to 7 households who perform cattle breeding in barns, separately and on a regular basis.
- Degraded pastures outside the Project footprint can be rehabilitated through reseeding, controlled grazing practices, and water management strategies in collaboration with local authorities and agricultural experts.
- Assistance for efficient water use, such as the installation of water troughs and support for irrigation systems, can be provided to mitigate the effects of drought on farmers and livestock breeders.
- Households interested in transitioning away from livestock breeding can be supported by offering tailored counselling and training for alternative careers in different industries.

The following additional monitoring measures will be implemented to evaluate the impacts of the Project on land use and livelihoods and to assess the effectiveness of the implemented mitigation measures:

- Periodic surveys will be conducted to assess the perceptions of affected communities regarding changes in their livelihoods and land use specifically due to the Project.
- The condition and rehabilitation progress of grazing lands outside the Project area will be monitored, including reseeding and pasture improvement efforts.
- Changes in livestock numbers and productivity among affected households will be tracked, along with shifts in grazing practices.
- The outcomes of community-led livelihood restoration projects will be documented, including participation levels and income generation.
- Data on participation and outcomes of alternative livelihood training programs will be collected and their alignment with community needs will be evaluated.
- The implementation and success of water resources management initiatives, such as water troughs or irrigation system improvements, will be tracked to address drought impacts.
- Environmental conditions in the Project Area will be monitored to identify any indirect effects on pasture quality or availability.

For the areas along the ETL route, a consultation process has been carried out with the landowner of one private parcel. During the construction phase, compensation for any crops affected by the installation of the poles was provided to the landowner, ensuring fair reimbursement for the loss incurred. Following this, the remaining portions of the land continue to be used by the owner without any restrictions or disruption caused by the Project. This approach allows the landowner to maintain their agricultural activities on the land that was not directly impacted by the installation of the poles.

For the treasury lands along the ETL route, the Project has also taken steps to minimize its impact on land use. The land surrounding the poles on these parcels remains available for use by local communities. Specifically, of the total 40 poles along the ETL route, 10 poles are located on treasury lands. Despite these poles being installed in the area, the use of the surrounding land is not restricted.

For the treasury lands along the ETL route, the Project has also taken steps to minimize its impact on land use. The land surrounding the poles on these parcels remains available for use by local communities. Specifically, of the total 19 land is affected along the ETL route, 17 of them public land . Despite these poles being installed in the area, the use of the surrounding land is not restricted.

Table 5-24: List of parcels affected from ETL

No	Settlement	Parcel No	Owner of the Land	Note
1	Konya Province Ereğli District Yeniköy Neighbourhood	106_1	Public Land	-
2	Konya Province Ereğli District Zengen Neighbourhood	308_58	Public Land	-

No	Settlement	Parcel No	Owner of the Land	Note
3	Konya Province Ereğli District Zengen Neighbourhood	308_58	Public Land	
4	Konya Province Ereğli District Zengen Neighbourhood	308_46	Public Land	
5	Konya Province Ereğli District Zengen Neighbourhood	308_9	Public Land	
6	Konya Province Ereğli District Zengen Neighbourhood	360_1	Public Land	
7	Konya Province Ereğli District Zengen Neighbourhood	320_737	Public Land	
8	Konya Province Ereğli District Zengen Neighbourhood	320_716	Public Land	
9	Konya Province Ereğli District Zengen Neighbourhood	320_718	Public Land	
10	Konya Province Ereğli District Zengen Neighbourhood	320_682	Public Land	
11	Konya Province Ereğli District Zengen Neighbourhood	102_106	Private Land	
12	Konya Province Ereğli District Zengen Neighbourhood	102_107	Public Land	
13	Konya Province Ereğli District Zengen Neighbourhood	102_108	Public Land	
14	Konya Province Ereğli District Zengen Neighbourhood	320_622	Public Land	
15	Konya Province Ereğli District Zengen Neighbourhood	320_620	Private Company	Only easement right is acquired for 4 m² area- no expropriation is conducted- company have right to use this 4 m² land (with certain restrictions

No	Settlement	Parcel No	Owner of the Land	Note
				regarding the height of the operations)
16	Konya Province Ereğli District Zengen Neighbourhood	320_621	Public Land	
17	Konya Province Ereğli District Zengen Neighbourhood	320_584	Public Land	
18	Konya Province Ereğli District Zengen Neighbourhood	329_81	Public Land	
19	Konya Province Ereğli District Zengen Neighbourhood	329_37	Public Land	

The following monitoring measures will be implemented to assess the impacts of the Project on land use in the ETL areas, including private and treasury lands:

- Land use in the private parcel and treasury lands will be monitored to ensure that the areas surrounding the poles can be used and that the users are not facing any restrictions on their activities.
- Access to land surrounding the poles will be verified to ensure that the remaining areas are accessible and usable for their intended purposes.
- Periodic consultations will be conducted by the Project CLOs with the landowners of private lands and relevant authorities including mukhtars to address any concerns regarding land use.
- Grievance mechanisms will be followed to document any complaints or concerns raised regarding the use of land, crop losses, or other issues related to the Project's impact on land use.
- Restoration of land where poles are installed will be tracked to ensure that any construction-related damage is repaired, and the land is restored to a condition suitable for use.
- Ongoing engagement with local authorities and stakeholders will be maintained to ensure that treasury lands are managed in accordance with the Project's commitments, and that there are no adverse impacts on community use or access.

5.3.3 Human Rights

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)[56] [57]:

[56] https://bangkok.ohchr.org/what-are-human-rights/

[57] 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)*

The Human Rights Impact Assessment (HRIA) study for the Project was prepared by WSP Türkiye and conducted to support requirements and Good Industry Practices (GIP) in line with the specifications of Equator Principles IV (dated July 2020) and IFC Performance Standards. As part of the Environmental and Social Impact Assessment (ESIA) studies, a Human Rights Impact Assessment for the Project was carried out to identify measures for mitigating potential impacts on local communities and both direct and indirect workers. This assessment was undertaken in accordance with international standards, which mandate the inclusion of evaluations of potential adverse human rights impacts within the ESIA or other assessments.

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.

5.3.3.1 Legal Framework for Human Rights

National Requirements

National requirements and law concerning human rights in Türkiye include:

- Constitution of the Republic of Türkiye
- The Law on the Human Rights and Equality Institution of Türkiye (TIHEK) (Law No. 6701, 2016)
- Labor Law (Law No. 4857, 2003) and related regulations
- Occupational Health and Safety Law (Law No. 6331, 2012) and related regulations
- Regulation on the Implementation of the Law Concerning Private Security Services

Various international human rights standards and treaties has been ratified by Türkiye. Some of the key human rights standards applicable in Türkiye include:

- Universal Declaration of Human Rights (UDHR): Turkey is a member of the United Nations and is thus bound by the principles outlined in the UDHR, which covers a wide range of civil, political, economic, social, and cultural rights.
- European Convention on Human Rights (ECHR): Turkey is a member of the Council of Europe and thus a party to the ECHR, which protects fundamental rights and freedoms, including the right to life, prohibition of torture, right to a fair trial, freedom of expression, and others.
- Turkish Constitution: The Turkish Constitution guarantees various fundamental rights and freedoms to its citizens, including but not limited to the right to life, equality before the law, freedom of expression, freedom of assembly and association, freedom of religion, and the right to privacy.
- Turkish Penal Code (TCK): The penal code of Turkey also includes provisions related to the protection of human rights, such as prohibitions against torture, discrimination, and arbitrary detention.
- International Covenant on Civil and Political Rights (ICCPR): Turkey is a signatory to the ICCPR, which covers rights such as the right to life, freedom of speech, freedom of assembly, and the right to a fair trial.

- International Covenant on Economic, Social and Cultural Rights (ICESCR): Turkey is also a signatory to the ICESCR, which outlines rights related to education, healthcare, work, and an adequate standard of living.
- Convention on the Elimination of All Forms of Discrimination against Women (CEDAW): Turkey has ratified CEDAW, which aims to eliminate discrimination against women and promote gender equality.
- Convention on the Rights of the Child (CRC): Turkey is a party to the CRC, which sets out the civil, political, economic, social, and cultural rights of children.

It is important to note that while Türkiye has ratified these international treaties and has provisions in its constitution and legal framework to protect human rights, there have been concerns raised by human rights organizations and international bodies regarding the implementation and enforcement of these rights in Türkiye. Political, social, and legal challenges have sometimes impacted the full realization of human rights in the country.

International Requirements

The following international standards will be applicable to the Project:

- International Labor Organization (ILO) conventions ratified by Türkiye
- EP Guidance on Implementation of Human Rights Assessments under The Equator Principles (2020) IFC Performance Standards (2012)
- The UN Guiding Principles (UNGPs) on Business and Human Rights by the UN Human Rights Council (2011)
- Guidance Note on Implementation of Human Rights Assessments under EPs (2020)
- The International Bill of Human Rights
- International Labor Organization's Declaration on Fundamental Principles and Rights at Work
- IFC Good Practice Note on Managing Contractors' E&S Performance (2017)
- IFC Good Practice Handbook on Use of Security Forces: Assessing and Managing Risks and Impacts (2017)
- IFC/European Bank for Reconstruction and Development (EBRD) Worker's Accommodation: Processes and Standards (2009)
- IFC Handbook for Addressing Project-Induced In-Migration (2009)
- IFC Good Practice Note on Addressing Grievances from Project-Affected Communities (2009)
- IFC Introduction to Health Impact Assessment (2009)
- IFC Stakeholder Engagement Handbook: A Good Practice Handbook for Companies Doing Business in Emerging Markets (2007)
- World Group Bank (WBG) General and Sector Specific Environmental, Health and Safety (EHS) Guidelines (2007)

Project Standards

- Human Rights Policy
- Human Resources Policy
- Supply Chain Policy
- Supplier Code of Conduct
- Workers Code of Conduct
- Polysilicon Traceability Requirements
- Sustainable Supply Chain System
- Ethics Complaint Evaluation Instruction
- Suggestions and Complaint Evaluation Procedure
- Labor Management Regulation
- Recruitment and Placement Instruction

5.3.3.2 Human Rights Context in Türkiye

In Türkiye, various human rights issues have been noted in recent years, particularly regarding freedom of expression, assembly, and association. Legal proceedings and restrictions affecting journalists, civil society actors, and political figures have been main issues regarding human rights. Issues related to the rights of certain groups, including refugees, LGBTI+ individuals, and ethnic minorities, have also been observed. These topics are regularly monitored by international human rights organizations such as Human Rights Watch ((World Report 2024 – Turkey)).

5.3.3.3 Methodology

The Human Rights impacts of the Project may be various, and they vary according to the context, type, and scale of the Project. The content shall be tailored to the local conditions and the nature and characteristics of the Project and shall address potential risks and impacts in at least the following areas:

- **Civil and Political Rights**
  - Freedom of thought and opinion
  - Right to information
- **Labour Rights**
  - Working conditions and working hours
  - Wages
  - Non-discrimination
  - Right to form and join trade unions and the right to strike
  - Right not to be subjected to slavery, servitude or forced labour
  - Right to abstain from work

- Right of protection for the children
- Right to social security, including social insurance
- Labour standards in supply chains
- Migrant workers
- Women employment
- Grievance Mechanism

- **Social rights**
  - Right to an adequate standard of living and housing
  - Right to health, food, water, and sanitation
  - Right to take part in cultural life
- **Vulnerability**
  - The rights of minorities
- **Community health and safety**
  - Environmental issues
  - Security issues

The **impact factors** identified during the analysis of the Project and through the definition of the Project phases and Project actions are assessed in their relevance, using a scoring system. The impact factors consist of **Duration (D)**, **Frequency (F), Geographic extent (G),** and **Intensity (I),** which are assessed in detail in Chapter 5 of ESIA Report. The following risk classification is used in the human rights impact assessment for the pre-mitigation conditions. With the implementation of the proposed mitigation measures, the risks of the human rights aspects are reduced.

Table 5-25: Human Rights Impact Assessment 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

5.3.3.4 Human Rights Risks Concerning Forced Labour in Polysilicon Sourcing

The solar industry is associated with risks pertaining to human rights violations, particularly in the sourcing of polysilicon from regions with documented cases of forced labour. It has found that many polysilicon manufacturers operating in the Xinjiang Uyghur Autonomous Region (XUAR) in China has taken part in forced

labour in the production of polysilicon or is linked to raw material suppliers who have engaged in such activities (Murphy & Elimä, 2021). As per the data from the 2023 Global Slavery Index (Walk Free, 2023):

- Modern slavery refers to the situations of exploitation that a person cannot refuse or leave because of threats, violence, coercion, deception, or abuses of power; taking many forms such as forced labour, forced marriage, debt bondage, sexual exploitation, human trafficking, slavery-like practices, forced or servile marriage, and the sale and exploitation of children.
- There are five high-value products that Türkiye imports which are at risk of being produced under conditions of modern slavery. Among these products, solar panels stand out with an import value of 0.4 billion US dollars, primarily originating from China. This information underscores the human rights risks associated with Türkiye's supply chain when importing solar panels from China, especially from XUAR. It highlights the importance of monitoring the production processes and supply chains to ensure that ethical and fair labour practices are upheld in the manufacturing of these critical components, given the concerns regarding modern slavery in certain industries and source countries.

In order to ensure whether the Project is associated with any human rights violations, an assessment has been conducted in this section regarding the labour standards in the Project's supply chain.

Smart has developed and is dedicated to implementing a comprehensive set of policies and strategies aimed at eliminating human rights risks and fostering sustainable labour practices throughout its operations. These policies and strategies include:

- **Sustainable Supply Chain System including Polysilicon Traceability Requirements:** Smart investigates first-tier supplier compliance with its code of conduct based on fundamental labour principles outlined by the International Labour Organization (ILO) and the Ten Principles of the UN Global Compact. The code emphasizes providing safe working conditions, protecting children's rights, preventing human rights violations, and environmental protection. Awareness sessions are conducted with first-tier suppliers to introduce Smart's strategy and requirements, and physical gap assessments will be performed to evaluate compliance with Smart Supplier Code of Conduct. Additionally, Smart supports suppliers with training and projects to improve conditions in the supply chain. Regular audits conducted by Smart or assigned third-party auditors will verify compliance.

  To ensure transparency and traceability in its polysilicon supply chain, Smart contractually requires suppliers to disclose the entire supply chain, from solar panels to raw material extraction. Traceability requirements are implemented within Purchase Agreements with first-tier suppliers to help ensure transparency and thereby help prevent violations in the polysilicon supply chain, including forced and bonded labour. Smart aims to trace polysilicon content throughout the supply chain and map companies involved in the transport, trade, warehousing, and production of various materials. Traceability audits will be initiated in 2025, and a reporting system will be established for regular traceability reporting from suppliers, ensuring accountability and adherence to ethical standards.

- **Supplier Code of Conduct:** Smart's Supplier Code of Conduct outlines expectations for ethical and sustainable practices within its supply chain. It requires suppliers to provide a safe and healthy working environment, protect children's rights, prevent human rights violations, and safeguard the environment. Non-compliance may result in the termination of the business relationship, and suppliers are expected to maintain effective mechanisms for investigating and resolving violations.

- **Supply Chain Policy:** Smart expects its suppliers to uphold human rights, labour standards, and environmental protections, and sets strict standards for its supply chain to ensure compliance with these principles.
- **Human Rights Policy:** Smart prioritizes observing fundamental human rights in all business processes, fostering an egalitarian and fair working environment free from discrimination, ensuring compliance with national and international human rights standards, and rejecting all forms of child labour, forced labour, and discrimination. This Human Rights Policy highlights Smart's commitment to respecting human rights and continuously improving its practices.
- **Sustainability Policy:** Smart sets sustainability goals aligned with UN Sustainable Development Goals and continuously monitors its performance through a dedicated Sustainability Committee. Smart adheres to ethical principles, national and international standards, and legal regulations across all geographies and sectors of operation, engages in corporate social responsibility projects, fosters stakeholder cooperation, and invests in employee awareness and training initiatives to integrate sustainability into its corporate culture.

Through the implementation of these policies and strategies, Smart will demonstrate proactive approach to addressing human rights risks and promoting sustainable labour practices across its supply chain and operations.

5.3.3.5 Smart's Sustainable Supply Chain System

According to the information provided by Smart, Smart has established a sustainable supply chain system, the details of which are outlined in this section.

Solar cells and panels are first produced at the Aliağa Integrated Production Facility in Türkiye. These cells are then used to produce solar panels in a nearby facility on the same campus, which are subsequently transported to the Project site. The primary raw material for production is grey wafers made from polysilicon. Other materials for cell production include process chemicals such as phosphoryl chloride, triethylaluminium, nitrogen, oxygen, ammonia, silane, nitrous oxide, etc.. Solar panel production requires additional raw materials like aluminium frames, glass, junction boxes, EVA (ethylene vinyl acetate) sheets, ribbons, busbars, flux, seal silicone, and potting glue. Cardboard is used for packaging.

Materials used in the production will be sourced from Türkiye, China, India, Singapore and the Netherlands. Smart has completed supply chain mapping for all direct suppliers of components used in both solar cell and solar panel production. Aware of the potential human rights risks in the solar panel supply chain, Smart conducts comprehensive supply chain mapping, particularly for polysilicon supply chain. This mapping extends across five tiers of suppliers, covering wafer producers, solar-grade polysilicon producers, metallurgical-grade silicon producers, and quartzite suppliers.

The objectives of the supply chain mapping are:

- To ensure that no companies in its supply chain are based in the Xinjiang region of China.
- To confirm that no companies in its supply chain are listed under the UFLPA Entity List.
- To eliminate companies with verified involvement in forced labour or child labour within its supply chain.

In the scope of supply chain mapping and due diligence for the polysilicon supply chain associated with the Project;

- Full polysilicon supply chain mapping has been performed for all wafers that have been purchased. Mapping is made for all companies used in the supply chain from wafer down to mined silica. Information about the supply chain is obtained from first-tier supplier of Smart and Smart require documentation to confirm the origins of all supplies.
- Smart Solar screens all of the mapped companies that have been used in the supply chain so far against the Uyghur Forced Labor Prevention Act (USFLPA) Entity List and none of the mapped suppliers are included in this list. Additionally, the RepRisk due diligence tool is used to assess companies to verify if there is any ESG incident registered including forced labour risks. As a results of investigation, it is confirmed that all mapped companies on the polysilicon supply chain have no incidents or concerns identified in relation to forced labor.

Smart follows the procedures outlined below to ensure effective supply chain mapping and the implementation of sustainable supply chain practices.

Before commencing operations with a supplier, Smart applies the following procedures:

- Supplier Code of Conduct: Smart has published a Supplier Code of Conduct, available on its website, which all first-tier suppliers are expected to adhere to at all times. Before initiating operations with a supplier, Smart shares the Supplier Code of Conduct and provides online or in-person training to first-tier suppliers through the Sustainable Supply Chain team. Smart encourage first-tier suppliers to share the Supplier Code of Conduct with their lower-tier suppliers but this is not formalised as a contractual obligation.
- Polysilicon Traceability Requirements: Smart has also published specific Polysilicon Traceability Requirements. These outline traceability standards that all companies within the polysilicon supply chain must meet. By implementing these requirements alongside supply chain mapping, Smart ensures the identification and then, if necessary, the exclusion of non-compliant companies from its supply chain.
- Two-Step Due Diligence System: Smart employs a two-step due diligence process for all mapped companies, which composed of two steps.
  - Step 1 - First Tier and Polysilicon Supply Chain Due Diligence: Smart applies due diligence to all first-tier suppliers and all lower-tier entities in the polysilicon supply chain down to the silica mine site using the RepRisk global risk assessment tool. This independent, paid tool provides ESG-related scoring for countries, sectors, and individual companies. It enables Smart to identify reported incidents or allegations related to forced labour and other human rights risks as well as to see the overall ESG rating for the supplier company.
  - Step 2 - New Supplier Assessment: Before onboarding a new first-tier supplier, the Sustainable Supply Chain Executive investigates the supplier using the RepRisk tool, based on information provided by Smart's Purchasing Department.

Incident Monitoring: RepRisk issues warnings and adjusts ESG scores if any incidents related to forced labour, child labour, health and safety, or environmental violations are reported. If a verified incident is flagged for a new supplier, Smart does not proceed with the partnership unless the supplier provides evidence disproving the allegations.

The procurement for the solar panels required by the Project has now been completed, other than in relation to any future replacement panels. Wafer purchase for the Project is completed as of May 2025. Two direct suppliers used for supply of all wafers. These two suppliers are committed to Smart supplier code of conduct and traceability requirements. In total, there are 13 companies used within the supply chain, starting from wafer

down to the Quartz. Traceability evidence proving these 13 companies are used within the supply chain is available. None of these 13 companies are located in Xinjiang region of China and also listed on Uyghur Forced Labor Prevention Act Entity List. Additional human rights due diligence for all 13 companies performed using 3rd party independent risk assessment tool and there is no forced labour risk reported for any of these 13 companies. In addition, human rights due diligence investigation to all companies used as direct suppliers of other materials used for the production are performed using 3rd party independent risk assessment tool and there is no forced labour risk identified.

While these checks cannot prove that there are no risks of forced labour or other human rights abuses within the supply chain they are valuable as a practical method to identify known and reported risks. Additionally, Smart has confirmed that in the context of the Project, to the best of their knowledge, having conducted all reasonable enquiries, no procurement has been made from companies located in the Xinjiang region of China. Smart has undertaken some additional desktop review of first-tier suppliers through self-assessment questionnaires but site audits have not been undertaken due to the constraints in performing such audits in China and particularly for those lower-tier suppliers for which Smart does not have a direct contractual relationship.

5.3.3.6 Project Human Rights Assessment

Human rights impacts are mainly influenced by the local human rights context and the specific activities of a project. To align with international standards, it is essential to consider the full scope of human rights impacts, including those directly caused or contributed to by the Project, cumulative impacts, and those linked to the Project through business relationships. Hence, Human Rights Impact Assessment is conducted to ensure that Smart understand and address the potential human rights impacts of its activities, promote ethical behaviour and responsible business practices, and contribute to sustainable development. It is worth noting that the potential issue areas typically assessed in the ESIA overlap with key human rights considerations, such as livelihoods and labour, community health and safety, resettlement, gender, and vulnerability.

Table 5-26 presents the assessment conducted is to determine the levels of human rights risks and potential mitigation measures pertinent to the Project.

Table 5-26: Human Rights Assessment

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
Human Resources							
Working conditions and working hours	It is planned to employ 100 people during the construction phase of the Project and 20 people during the operation phase. Workforce will be sourced from local communities. National requirements, ILO Conventions ratified by Türkiye and IFC PS2 will be applied both direct and contractor workers. Working hours will be planned in compliance with the Labor Law. Construction working hours are planned to be 8 hours/day as 1 shift and operation working hours are planned to be in 3 shifts of 8 hours each.	Project workers	Duration: Very long Frequency: Frequent Geo. Extent: Local Intensity: Medium Sensitivity: Very high Reversibility: Short mid-term	**High**	Medium-high	The Project will implement Human Resources Policy of Smart. This policy will provide predictable employment opportunities for direct and indirect employees. The copies of HR 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	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
						clear and understandable to the employee. A copy of contract will be given to the employee. The Project will enhance local employment and give priority to local population during recruitment. Equal tender process will be applied. Capacity development will be supported. The safety and health protection of workers will be ensured by implementing necessary measures, including preventing occupational risks, and providing information and training,	
Wages	The Labor 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	Project workers	Duration: Very long Frequency: Frequent Geo. Extent: Local Intensity: Medium Sensitivity: Very high Reversibility: Short mid-term	**High**	Medium-high	The contracts of the workers will include the information regarding to salary and increase when decided. All workers will be paid equal for equal jobs. Smart will ensure that all payroll practices adhere strictly to relevant labor laws and regulations,	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	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.					guaranteeing that workers receive their entitled wages and benefits in accordance with legal standards. Regular audits and reviews of payroll records and compensation practices will be conducted to identify and rectify any discrepancies or errors, maintaining accuracy and integrity in payroll management.	
Non-discrimination	Labor Law: Article 5 of the Labor Law of Türkiye regulates the ban of discrimination in employment. According to that article 'no discrimination based on language, race, sex, gender, political opinion, philosophical belief, and religion or similar reasons is permissible in the employment relationship. The same article also serves as a base for the principle of equal pay for equal value of work by stating that	Project workers	Duration: Very long Frequency: Infrequent Geo. Extent: Local Intensity: Medium Sensitivity: Very high Reversibility: Mid-term	**High**	Medium-high	Smart will actively promote equality of treatment and zero tolerance for harassment in the workplace. Human Rights Policy of Smart will be implemented. 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. Smart will ensure all forms of discrimination is	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	"differential remuneration for similar jobs or for work of equal value is not permissible."					prohibited by the Subcontractors and the Client itself. Regular evaluations and feedback mechanisms will be implemented to identify areas for improvement and implement necessary changes.	
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. Given the human rights context in Türkiye, particularly regarding freedom of expression, assembly, and association, there may be contextual risks related to the right to form and join trade unions. However, the Project will not cause any restrictions regarding workers' right to join trade unions and	Project workers	Duration: Very long Frequency: Recurrent Geo. Extent: National Intensity: Medium Sensitivity: Very high Reversibility: Short mid-term	**High**	Medium High	In case of the absence of the unions, workers representatives should be elected, and periodical meetings will be held with the representatives. Worker representatives should be elected by the workers themselves. The employer shall consult workers or representatives authorized by trade unions in enterprises with more than two workers' representatives or workers' representatives themselves in the absence of trade union representative to ensure the consultation and participation of workers. These measures will be implemented by the Subcontractors as well and	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	participate in union activities.					monitoring will be done by Smart.	
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. For the Project, Smart has developed an Ethics Complaint Evaluation Instruction	Project workers	Duration: Very long Frequency: Infrequent Geo. Extent: Local Intensity: High Sensitivity: Very high Reversibility: Mid-term	**High**	High	Shift schedule of the direct and indirect workers will be strictly monitored and the annual overtime working hours will not extend 270 hours. In compliance with the article 44 of the Labor 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. Smart is committed to upholding human rights and will not tolerate any form of forced labour within its operations. Employees will have the freedom to terminate their employment	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	and Labour Management Regulation – 5.1.7. Forced Labour which outlines Smart's commitment to preventing forced labour, ensuring voluntary employment, and providing clear protocols for addressing any potential violations, including support for affected individuals and non-engagement with subcontractors or suppliers that use forced labour will be implemented. In terms of supply chain operations, Smart commits to upholding the right not to be subjected to slavery, servitude, or forced labour, and has taken steps to identify and address potential forced labour risks, particularly in relation to polysilicon sourcing.					in accordance with national law, ensuring that their rights are respected and protected. Smart will adhere strictly to all relevant labour laws and regulations regarding termination procedures, providing employees with the necessary support and guidance throughout the process. Human Rights Policy, Ethics Complaint Evaluation Instruction, Recruitment and Placement Instruction and Labour Management Regulation of Smart will be implemented. All first-tier suppliers of smart will be contractually required to comply with Smart's Supplier Code of Conduct, which strictly prohibits forced labour and includes traceability and transparency obligations.	

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	Smart conducts detailed supply chain mapping and due diligence down to the raw material level to identify and exclude suppliers with verified links to forced labour. Smart uses independent ESG risk assessment tools and monitors suppliers for any incidents related to forced or child labour, with a zero-tolerance policy for violations. Smart has confirmed that no companies in the Project's supply chain are based in the Xinjiang region or listed under the UFLPA Entity List, and no procurement has been made from these sources.						
Right to abstain from work	According to Occupational Health and Safety Law No. 6331, workers have the right to leave their workstation in the	Project workers	Duration: Very long Frequency: Infrequent Geo. Extent: Local Intensity: Medium	**High**	High	Occupational Health and Safety Policy of Smart will be implemented. In the event of serious, imminent, and unavoidable danger; workers shall leave	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	event of serious, imminent, and unavoidable danger.		Sensitivity: Very high Reversibility: Mid-term			their workstation or dangerous area and proceed to a place safety. Workers will not be placed at any disadvantage because of their action.	
Right of protection for the children	Labor Law No. 4857, Article 71 states that employment of children who have not reached the age of 15 is prohibited. However, children who have reached the age of 14 and have completed their primary education may be employed in light labour that will not hinder their physical, mental, or moral development. For those who continue their education, they may only work jobs that will not prevent their school attendance. Smart has developed an Ethics Complaint Evaluation Instruction and Labour Management Regulation – Article	Project workers	Duration: Very long Frequency: Infrequent Geo. Extent: Local Intensity: Medium Sensitivity: Very high Reversibility: Mid-term	**High**	High	National laws and regulations will be followed and implemented strictly. Human Rights Policy, Ethics Complaint Evaluation Instruction, Recruitment and Placement Instruction and Labour Management Regulation of Smart will be implemented. The minimum working age will be 18 for all direct and indirect workers. Subcontractor monitoring system will be established by Smart to ensure that all subcontractors comply with work age limits. Smart will require all suppliers to comply with its Supplier Code of Conduct. Smart will conduct regular supply chain mapping and risk assessments using independent ESG tools	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	5.1.6 on Child Labour, which include a strict policy against child labour, outlining the termination of employment and support for affected children to continue their education if detected, and the hiring of an adult family member when possible, while ensuring young workers are employed in compliance with legal conditions and are not exposed to harmful or unsafe situations. Article 5.1 of the Recruitment and Placement Instruction of Smart outlines that recruitment is conducted by prohibiting discrimination and child labour, while only allowing young workers under 18 to be employed as interns under strict legal conditions, including work-hour limitations					tools to identify and address any potential child labour risks.	

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	and protective measures. Also, to prevent overlooking child or young labour, a signed "Job Application Form," age declarations, and a photocopy of the ID card are required during the hiring process. In its supply chain operations, Smart is committed to upholding the right of children to be protected from economic exploitation and child labour. Smart's Supplier Code of Conduct prohibits the use of child labour and requires all first-tier suppliers to ensure compliance with national laws and international labour standards. Through supply chain mapping and traceability requirements, Smart monitors the origins of materials and screens						

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	all suppliers for any child labour-related incidents using third-party ESG risk tools.						
Right to social security, including social insurance	Social Insurance and General Health Insurance Act No. 5510 of 31 May 2006 determines the rights of beneficiaries and provides for general rules for the functioning of the insurance system and funding conditions. Also contains provisions on employers and workplaces, short-term and long-term insurances. All direct and indirect workers will have right 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	Project workers	Duration: Very long Frequency: Frequent Geo. Extent: Local Intensity: Medium Sensitivity: Very high Reversibility: Short mid-term	**High**	Medium High	Social insurance payments of all direct and indirect workers will be strictly monitored by Smart. Awareness meetings will be held with the Project workers if required.	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	create decrease on the pension payment.						
Migrant workers	The Project will not employ any migrant workers.	Project workers	Duration: Very long Frequency: Infrequent Geo. Extent: Local Intensity: Low Sensitivity: Very high Reversibility: Short mid-term	**Medium**	Medium High	Considering OHS, working conditions and personnel rights, migrant workers will not be allowed to work unregistered in the field and monitoring studies will be carried out on this issue.	**Low**
Women's employment	While the Project is anticipated to have a positive impact on women's employment in the local area, it is essential to acknowledge and mitigate potential human rights risks associated with women's employment.	▪ Women in local communities ▪ Project workers	Duration: Very long Frequency: Infrequent Geo. Extent: Local Intensity: Medium Sensitivity: Very high Reversibility: Short mid-term	**Medium**	Medium High	For the job opportunities and benefits created within the scope of the Project to be equally beneficial, it will be ensured that the vulnerable groups, especially those affected by the Project, and women are informed at a sufficient level. Equal pay for equal work will be implemented especially considerate of gender pay gap. Smart will not discriminate against women on the basis of their marital or reproductive status. Positive discrimination will be applied to female	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
						candidates during the recruitment process. Priority will be given to women if there are local procurement opportunities. The safety and needs of female staff at the Project site will be met at a high level.	
Grievance Mechanism	The fundamental legal base rights on the freedom and rights of the citizens with respect to communication, expression and dissemination of thought, and information request are guaranteed by the Constitution of the Republic of Türkiye. The Presidency's Communication Centre (CIMER) has been providing a centralized complaint system for Turkish citizens, legal persons, and foreigners. CIMER will be available to Project stakeholders as an	▪ Local communities ▪ Project workers	Duration: Very long Frequency: Continuous Geo. Extent: Local Intensity: High Sensitivity: Very high Reversibility: Short mid-term	**High**	Medium High	Worker Grievance Mechanism will be established and implemented. Community Grievance Mechanism will be established and implemented. Grievance & Request Box and forms will be placed in accessible places within the villages such as Mukhtars' offices for the use of local communities and all stakeholders. Grievance & Request Box and forms will be placed in accessible places at the Project site for the use of Project workers. All direct and indirect workers will be informed on	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	alternative and well-known channel for conveying their Project-related grievances and feedback directly to the state authorities. In addition, Project specific grievance mechanism both for the Project workers and the stakeholders will be implemented.					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.	
Labour standards in supply chains	Importing polysilicon, a critical component in the solar panel industry, has raised concerns about forced labour risks within the supply chain. Smart has developed and is dedicated to implementing a comprehensive set of policies and strategies aimed at eliminating human rights risks and fostering sustainable labour practices throughout its operations. Smart has a Sustainable Supply	▪ Workers in production in the supply chain	Duration: Very long Frequency: Recurrent Geo. Extent: International Intensity: Medium Sensitivity: Medium high Reversibility: Long term	**High**	High	Smart 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. Smart will not meet Project's material needs from suppliers where forced and child labour is being used. All first-tier suppliers will be required to comply with Smart's Supplier Code of Conduct, which prohibits forced and child labour and	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	Chain System that ensures the exclusion of non-compliant suppliers, particularly those involved in forced child labour, by conducting comprehensive supply chain mapping and implementing traceability and due diligence procedures for the polysilicon supply chain. In relation to the polysilicon supply chain this system includes a Supplier Code of Conduct, a two-step due diligence process for new suppliers, and monitoring using the RepRisk tool to identify and address any human rights or environmental violations within the supply chain. Comprehensive mapping of the polysilicon supply chain has been conducted, covering five tiers. All 13					promotes safe and fair working conditions. Suppliers must meet specific traceability standards, disclosing the full supply chain from solar panels down to raw material sources to prevent forced labour links. First-tier suppliers will be contractually obligated to uphold Smart's standards and receive training on human rights and sustainability expectations. Smart will implement traceability audits starting in 2025 and requires regular traceability reports from suppliers to enhance accountability. The following policies and strategies will be implemented by Smart: ■ Sustainable Supply Chain System including Polysilicon Traceability Requirements ■ Supplier Code of Conduct ■ Supply Chain Policy	

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	identified suppliers were screened against the UFLPA Entity List and assessed using the RepRisk tool; no forced labour risks were identified. Smart has confirmed that no companies in the Project's supply chain are based in the Xinjiang region or listed under the UFLPA Entity List, and no procurement has been made from these sources.					■ Human Rights Policy ■ Sustainability Policy	
Socioeconomic and Cultural Context							
Freedom of thought and opinion	According to Article 25 of Constitution of Republic of Türkiye. Everyone has the right to freedom of thought and opinion. No one shall be compelled to reveal his thoughts and opinions for any reason or purpose, nor shall anyone be blamed or accused on account of his thoughts and opinions.	■ Local communities ■ Project workers	Duration: Very long Frequency: Continuous Geo. Extent: Local Intensity: Medium Sensitivity: Medium-high Reversibility: Short mid-term	**Medium**	Medium high	A Stakeholder Engagement Plan and the Grievance mechanism will be established to provide stakeholders to express their thoughts and the opinions on the Project. Stakeholder Engagement Meetings will be inclusive (encouraging the participation of locals including vulnerable groups such as women).	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	Given the human rights context in Türkiye, particularly regarding freedom of expression and assembly, there may be contextual risks to the right to freedom of opinion and participation for affected communities. However, the Project will commit to respect human rights and ensure open and inclusive communication with all stakeholders.						
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.	▪ Local communities ▪ Project workers	Duration: Very long Frequency: Frequent Geo. Extent: Regional Intensity: Medium Sensitivity: Medium-high Reversibility: Short mid-term	**Medium**	Medium high	A Stakeholder Engagement Plan will be prepared for the Project and implemented in all phases of the Project. ESIA disclosure activities will be performed to inform all stakeholders of the Project impacts. During the construction and operation phases of the Project, all stakeholders will be informed about the status of the Project with various tools including the	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	Everyone has the right to information on the activities of public institutions and professional organizations, which qualify as public institutions. Given the human rights context in Türkiye, including concerns around freedom of expression, there may be contextual risks to the right of affected communities to receive timely and accurate information. However, the Project will provide transparent, clear, accessible information to all stakeholders.					face-to-face meetings, project website, media.	
Right to an adequate standard of living and housing	The Project constitutes 11.7% of the total grazing land available in the Seslikaya village. The Project covers 202 hectares of pastureland, and the remaining pastureland	▪ Local communities ▪ Project workers	Duration: Very long Frequency: Continuous Geo. Extent: Local Intensity: Low Sensitivity: Medium high Reversibility: Long term	**High**	High	Community development initiatives and social responsibility projects will be implemented by Smart to reduce the economic impacts on land-based livelihoods. Smart has been in contact with vulnerable households	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	of Seslikaya is 1,516 hectares. Some villagers continue to rely on pastures for grazing for sheep breeding. However, drought conditions in the region have significantly reduced the availability of pastureland, limiting its use for grazing activities. 10 households from Seslikaya are actively engaged in sheep breeding, utilizing the pastureland, while 7 households are involved in cattle breeding within their barns. The Project has an ETL as an associated facility. Approximately 29.5 km long 154 kV ETL was established by TEİAŞ to transmit the produced electrical energy to the Yaysun SPP Substation. It has been determined that the establishment of					in the villages and will continue to maintain communication while providing ongoing support, especially to the household identified in Badak village. Feed support will be provided to 10 households from Seslikaya who utilize pasturelands for sheep breeding and to 7 households who perform cattle breeding in barns, separately and on a regular basis. Periodic surveys will be conducted to assess the perceptions of affected communities regarding changes in their livelihoods and land use specifically due to the Project. Changes in livestock numbers and productivity among affected households will be tracked, along with shifts in grazing practices. The outcomes of community-led livelihood restoration projects will be documented, including participation levels and income generation.	

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	the ETL impacts two privately owned lands, which is analysed in detail in Section 5.3. For the areas along the ETL route, a consultation process has been carried out with the landowner of one private parcel. During the construction phase, compensation for any crops affected by the installation of the poles was provided to the landowner and the remaining portions of the land continue to be used by the owner without any restrictions or disruption caused by the Project. For the treasury and public lands along the ETL route, of the total 40 poles along the ETL route, 10 poles are located on treasury lands. Despite these poles being installed in the area, the use of the					Land use in the private parcel and treasury lands affected by the ETL will be monitored to ensure that the areas surrounding the poles can be used and that the users are not facing any restrictions on their activities. Access to land surrounding the poles of the ETL will be verified to ensure that the remaining areas are accessible and usable for their intended purposes. Ongoing engagement with local authorities and stakeholders will be maintained to ensure that treasury lands are managed in accordance with the Project's commitments, and that there are no adverse impacts on community use or access. Stakeholder Engagement Plan will be prepared and implemented. Grievance mechanism will be prepared and implemented.	

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	surrounding land is not restricted. There will be no physical resettlement due to the Project. Accommodation of the personnel is provided in houses. There is no on-site accommodation for the Project.					Grievance mechanisms will be followed to document any complaints or concerns raised regarding the use of land, crop losses, or other issues related to the Project's impact on land use.	
Right to health, food, water, and sanitation	Potential risks to local residents identified in the ESIA include traffic intensity, risk of communicable diseases, strain on local infrastructure and ecosystem services such as health services and water resources. Traffic intensity and impact on local road and transportation is expected due to the Project, which will be mitigated strictly.	▪ Local communities ▪ Project workers	Duration: Very long Frequency: Frequent Geo. Extent: Local Intensity: Medium Sensitivity: Very high Reversibility: Short mid-term	**High**	Medium High	Traffic Management Plan will be prepared and implemented. Community Health and Safety Management Plan will be prepared and implemented. Waste Management Plan will be prepared and implemented. The SPP construction area and all operational areas are to be regularly monitored for potential risks. In case of a grievance, additional measurements will be held, and the results will be shared with the local communities.	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
Right to take part in cultural life	The main impact identified in the ESIA is increase in population during the construction phase which may create social unrest and changes in the dynamics within the local communities.	▪ Local communities ▪ Project workers	Duration: Very long Frequency: Recurrent Geo. Extent: Local Intensity: Medium Sensitivity: Medium-high Reversibility: Short mid-term	**Medium**	Medium High	Cultural awareness training will be provided to the workers. In addition to the implementation of Stakeholder Grievance Mechanism, CLOs will have a continuous dialogue with the local communities so that if they have problems with the Project workers, it would be detected.	**Low**
Rights of minorities	Results from the social surveys indicated that there are vulnerable groups within the villages. There are women-headed households with low incomes, and households generally have low socioeconomic status in the villages.	▪ Local communities ▪ Project workers	Duration: Very long Frequency: Recurrent Geo. Extent: Local Intensity: Low Sensitivity: Very high Reversibility: Mid term	**High**	Medium High	Community Liaison Officers (CLOs) will have a continuous dialogue with the local communities to ensure that the rights of minorities are respected and protected. The Project will assist vulnerable groups, including women-headed households, in accessing essential services such as healthcare, and create social responsibility projects that offer financial assistance to support their socio-economic needs. Awareness sessions and workshops will be conducted to educate both Project personnel and	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
						community members about the importance of minority rights within the Project area. For the job opportunities and benefits created within the scope of the Project to be equally beneficial, it will be ensured that the vulnerable groups, especially those affected by the Project are informed at a sufficient level.	
Environmental issues	The fundamental law in Turkish Environmental Legislation is the Environmental Law No. 2872 (Issued on 11.08.1983, Official Gazette No.18132, amended by Law No. 5491). According to Environmental Law, citizens, as well as the State, bear responsibility for the protection of the environment based on the "polluter pays" and "user pays" principles. According to the Article 56 of	▪ Local communities ▪ Project workers	Duration: Very long Frequency: Recurrent Geo. Extent: Local Intensity: Low Sensitivity: Medium-high Reversibility: Short term	**Medium**	Medium High	Suitable and sufficient environmental management plans for waste, wastewater, noise, and air quality will be established and implemented. A relationship with municipal environmental department will be established in advance and monitoring of air and noise will be done in accordance with local regulations. The SPP construction area and all operational areas are to be regularly monitored for environmental aspects. In case of a grievance,	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	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.					additional measurements will be held, and the results will be shared with the local communities. Monitoring will be given high importance to ensure both Smart and Subcontractors comply with the international environmental and social standards. All employees including of contractors and subcontractors will receive general workplace orientation, site-specific workplace orientation and comprehensive training that includes environmental and social awareness and compliance training to be aligned with Project ESIA and ESMS.	
Security issues	During the construction and operation phase of the Project, unarmed private security personnel will be needed on the site.	▪ Local communities ▪ Project workers	Duration: Very long Frequency: Continuous Geo. Extent: Local Intensity: Low Sensitivity: Medium-high Reversibility: Short mid-term	**Medium**	Medium High	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.	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
						Security Management Plan will be established and implemented by Smart. 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. Security personnel will be trained adequately in their envisaged roles and responsibilities, the use of force, gender-based violence and harassment and appropriate conduct toward workers and affected communities and the applicable laws. Security Forces: Assessing and Managing Risks and Impacts and Voluntary Principles on Security and Human Rights will be implemented by the Project.	

5.3.3.7 Mitigation and Monitoring Measures

The stage of mitigating and monitoring 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. By implementing the following mitigation and monitoring measures, Smart aims to continuously improve its approach to human rights management and maintain transparency and accountability in its operations:

- In accordance with IFC PS-2, risks related to social and labour issues, including human rights violations, forced labour, child labour, unsafe working conditions, and discrimination, will be eliminated.
- The minimum working age will be set at 18 for all workers. Forced labour will not be tolerated in any part of the Project's operations or primary supply chain.
- Smart will source necessary products from companies/countries that comply with international labour standards and eliminate human rights violations at the highest level.
- Smart will conduct thorough due diligence on suppliers to ensure compliance with international labour standards and human rights principles.
- Suppliers/service providers will be evaluated on their Health, Safety, Environment (HSE), Quality, System, Legal, and Compliance performance.
- Regular audits with first-tier suppliers in Türkiye and desktop assessments across the polysilicon supply chain will be conducted to identify and address any potential human rights violations within the supply chain.
- All first-tier suppliers will be contractually obligated to comply with Smart's Supplier Code of Conduct, which prohibits forced and child labour and includes transparency and traceability obligations.
- Smart will conduct regular supply chain mapping and risk assessments using independent ESG tools to identify and address any potential labour rights violations.
- Regular monitoring and audits of labour practices will be conducted to ensure compliance with national labour laws and international human rights standards.
- Training programs will be initiated to related parties to raise awareness of human rights issues and promote adherence to ethical labour practices.
- A Project-specific grievance mechanism will be implemented for both Project workers and local communities to address concerns.
- Tools for stakeholders to raise grievances and requests will be provided in accessible locations.
- Stakeholders will be encouraged to report any concerns or suspicions of human rights abuses, and appropriate actions will be taken to address them in a timely manner.
- Any grievances related to human rights violations will be promptly investigated and addressed through the Project-specific grievance mechanism.
- A target/term target for grievance closing percentage will be determined and monitored.

5.3.4 Cultural Heritage

According to the information acquired from site visits during ESIA studies, interviews with mukhtars, household surveys and face-to-face meetings with Smart, intangible forms of cultural heritage does not present in the Project area.

Additionally, as per EIA Report of ETL Project, archaeological surveys were conducted by the Konya Regional Board experts for the section of the ETL that lies within the Konya Regional Board's jurisdiction, including confirmation that no potential adverse impacts are expected / occurred.

Therefore, according to the cultural heritage assessments carried out by the Project, the Project is not expected have an impact on any critical cultural heritage. For the detailed impact assessment, this section should be read with ESIA Report of the Project.

6.0 RE-EVALUATION OF CUMULATIVE IMPACT ASSESSMENT

6.1 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.

6.1.1 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: Construction activities, including excavation, vehicle movement, and equipment operation, generate noise that can affect nearby receptors. Cumulative noise impacts may arise from multiple projects operating in the same area or extended construction periods.
- Air Quality: Dust emissions from land clearing, material transportation, and construction activities can degrade local air quality. If other projects are ongoing nearby, cumulative dust and emissions may pose health risks to communities and workers.
- Traffic : Heavy vehicle movement for transporting equipment, materials, and workforce increases local road congestion and accident risks. Cumulative traffic impacts may arise if multiple infrastructure projects or industries are present in the same region
- Visual Aesthetics: Construction activities alter the landscape, affecting scenic views. If multiple developments occur simultaneously, the cumulative visual impact may significantly change the natural character of the area.
- Terrestrial Biodiversity: Site clearance may result in habitat loss, fragmentation, and disturbance to flora and fauna. If nearby projects also involve land conversion, cumulative impacts could lead to biodiversity loss.
- Social (resettlement and land acquisition, community health and safety, labour influx):
  - Land Acquisition: Multiple projects acquiring land in the same area may lead to pressure on pastureland.

- Community Health and Safety: Increased movement of workers and machinery may pose health risks, including accidents.
- Labour Influx:. The project can contribute to local employment and business opportunities, but if multiple projects are developed in the same area, there may be increased demand for skilled labor, inflationary effects, or uneven economic benefits

Operation

- Traffic: The operation phase requires periodic transportation of personnel, maintenance equipment, and spare parts, which could increase traffic in the local area. If multiple infrastructure projects or industrial facilities operate in the same region, cumulative traffic impacts may lead to congestion, road deterioration, and increased accident risks.
- Visual Aesthetics: The presence of large solar panels, substations, and transmission infrastructure can alter the landscape
- Terrestrial Biodiversity: While operational solar farms have minimal direct disturbance, they can still impact local biodiversity.
- Social (economy, labour influx): The project can contribute to local employment and business opportunities, but if multiple projects are developed in the same area, there may be increased demand for skilled labor, inflationary effects, or uneven economic benefits.

Since water will be supplied via tankers from Kemerhisar Municipality there will be no interaction with the water source of the nearby Villages. On the other hand, septic tank will be used and there will be no water discharge.

6.1.2 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.

6.1.3 Spatial Boundaries

The relevant spatial boundaries for this CIA are the same with each specific Area of Influence (AoI) defined in Chapter 5 of the EISA Report for each relevant topic (physical, biodiversity, social, etc.).

6.2 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.

6.2.1 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

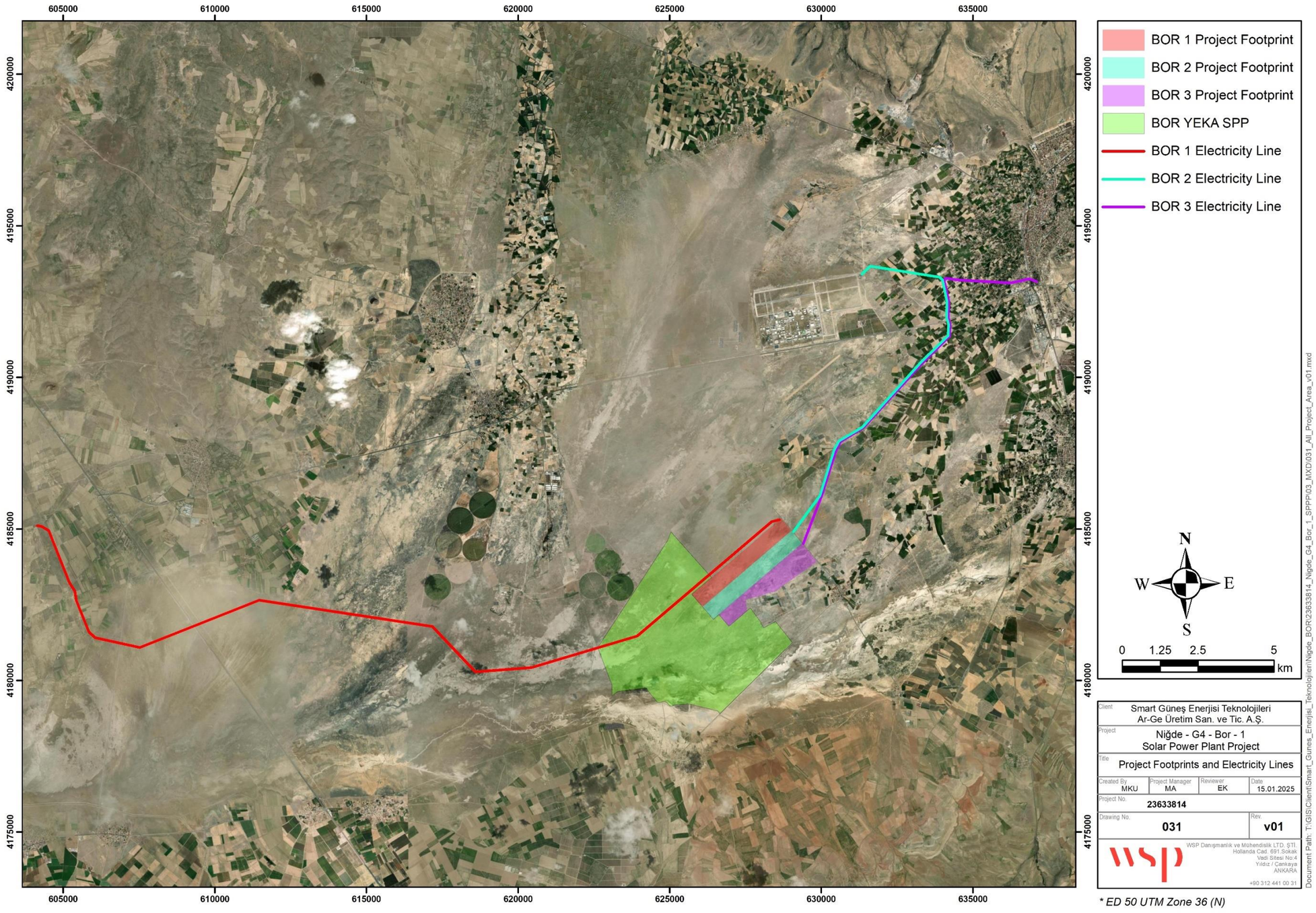
- Google Earth satellite views
- Internet searches especially for the SPP projects

Existing, and reasonably planned projects and activities likely to interact with the Project are given in detail in the table below.

Although the G4-BOR-1 SPP Electricity Transmission Line is defined as an associated facility, the project kept in the CIA to comprehensively assess all possible impacts.

Table 6-1: Existing and Planned Projects (3rd party facilities) and Activities in the CIA Examination Area

No	Project / Activity	Distance to the Project (m)	Capacity	Condition (as of 02.01.2025)
1	G4-BOR-2 Solar Power Plant Project	0	150 MWp / 100 Mwe 202.2 hectare	Operation phase
2	G4-BOR-3 Solar Power Plant Project	550 m	130 MWp / 100 Mwe 201.3 hectare	Operation phase
3	G4-BOR-1 SPP Electricity Transmission Line	0 m	154 kV 1272 MCM	Operation phase
4	G4-BOR-2 SPP Electricity Transmission Line	475 m	154 kV 1272 MCM	Operation phase
5	G4-BOR-3 SPP Electricity Transmission Line	950 m	154 kV 1272 MCM	Operation phase
6	Bor YEKA SPP	0m	1.500 MWm/ 1.100 MWe – 1926,8 ha.	Local EIA process still on going



* ED 50 UTM Zone 36 (N)

Figure 6-1: Other Activities in the CIA Study Area

6.2.2 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.

6.3 Step 3 – Establish Information on Baseline Status of VECs

Considering that the existing/planned facilities identified in Step 2 (except for Bor YEKA SPP) 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. On the other hand, national EIA process of Bor YEKA SPP project is still on-going and construction schedule is not certain yet.

6.4 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 6-2: Cumulative Impact Assessment

Project / Activity	Construction					
	Noise	Air Quality	Traffic	Visual Aesthetics	Biodiversity	Social
G4-BOR-2 Solar Power Plant Project	√	√	√	√	√	√
G4-BOR-3 Solar Power Plant Project	√	√	√	√	√	√
G4-BOR-1 SPP Electricity Transmission Line	√	√	√	√	√	√
G4-BOR-2 SPP Electricity Transmission Line	√	√	√	√	√	√

Project / Activity	Construction					
	Noise	Air Quality	Traffic	Visual Aesthetics	Biodiversity	Social
G4-BOR-1 SPP Electricity Transmission Line	√	√	√	√	√	√
Bor YEKA SPP	√	√	√	√	√	√

Project / Activity	Operation			
	Traffic	Visual Aesthetics	Biodiversity	Social
G4-BOR-2 Solar Power Plant Project	√	√	√	√
G4-BOR-3 Solar Power Plant Project	√	√	√	√
G4-BOR-1 SPP Electricity Transmission Line	√	√	√	√
G4-BOR-2 SPP Electricity Transmission Line	√	√	√	√
G4-BOR-1 SPP Electricity Transmission Line	√	√	√	√
Bor YEKA SPP	√	√	√	√

6.5 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 6-2, 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

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.

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.

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.

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.
- The increase in the volume of traffic where the village roads used to access the site.

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.

6.5.1 Noise

Two other SPP projects adjacent to the Project area, namely the G4-Bor-3 Solar Power Plant Project to be realized by Kalyon Enerji Yatırımları A.Ş. and G4-Bor-2 Solar Power Plant Project to be realized by Ecogreen Elektrik Enerji Üretim A.Ş., has already been constructed and under operation. Due to similarities between projects in terms of both area and technologies, no significant noise generation is expected from these projects during operation phase. Moreover, G4-BOR-1, G4-BOR-2 and G4-BOR-3 SPP ETLs construction works were completed. ETLs are linear projects and only very limited portion of the lines lay within the CIA study area. On the other hand, since they are in operation phase, there is no significant noise generation from these ETLs. Therefore, no cumulative noise impacts are expected from these assets.

On the other hand, the Bor YEKA SPP Project is still in the planning phase, and the national EIA process has not yet been completed. Considering the current developments of the G4-BOR-1 Project and the fact that its construction phase is nearly completed, it is assumed that during the construction phase of the Bor YEKA SPP Project, the G4-BOR-1 Project will already be in the operation phase. Therefore, during the construction of the Bor YEKA SPP Project, it will be the only foreseeable project under construction, with no significant noise generation expected from other projects in the operation phase. Since during the construction phase of the Bor YEKA Project, the subject Project will be in operation phase, cumulative noise impact will not be expected.

Although no cumulative impact is expected originated from these facilities which are already under operation, to be on the safe side, additional mitigation measures to be taken by Smart to further reduce the impacts are given in Chapter 7.1.2.3.2, and Chapter 7.1.2.4.2 of the ESIA Report and Pollution Prevention Plan of the subject Project. Considering all mitigation measures and commitments specified in the ESIA and the management plan, the expected noise impact of this project will be at **Low level**.

6.5.2 Air Quality

Cumulative impacts on air quality are likely to occur at most sites where construction will be conducted concurrently. Two other SPP projects adjacent to the Project area, namely the G4-BOR-3 Solar Power Plant Project to be realized by Kalyon Enerji Yatırımları A.Ş. and G4-Bor-2 Solar Power Plant Project to be realized by Ecogreen Elektrik Enerji Üretim A.Ş., has already been constructed and under operation. Moreover, G4-BOR-1, G4-BOR-2 and G4-BOR-3 SPP ETLs' constructions were completed. Due to similarities between projects in terms of both area and technologies, no air emission generation is expected from these assets during their operation phase. With the consideration of status of these facilities which are under operation, the expected cumulative impact will be **Low level** dominated by the impacts from the subject Project.

On the other hand, the Bor YEKA SPP Project is still in the planning phase, and the national EIA process has not yet been completed. Considering the current developments of the G4-BOR-1 Project and the fact that its construction phase is nearly complete, it is assumed that during the construction phase of the Bor YEKA SPP Project, the G4-BOR-1 Project will already be in the operation phase. Therefore, no concurrent construction activity is expected. As per draft EIA report of the Bor YEKA SPP Project, dust emission from the construction will be negligible. Since the Project assessed in the scope of this ESA will be in operation phase, there will not be cumulative air quality impact regarding that the air quality is not the identified VEC for this Project.

6.5.3 Terrestrial Biodiversity

A total of four Solar Power Plant Projects, including the present G4-BOR-1 SPP Project, and the three Transmission Lines considered will be located within the salt steppe of the Ereğli Plain Key Biodiversity Area (KBA) and Important Bird and Biodiversity Area (IBA). This site was internationally recognised as a Key Biodiversity Area of International significance in 2004 since meeting the thresholds for KBA criteria A1a, A1c, A1d, D1a, as described in the Global Standard for the Identification of KBAs[58]. In addition, the site was internationally recognised as Important Bird and Biodiversity Area in 2004 since meeting the thresholds for IBA criteria A1, A4i, B1i, B2, B3, as described on BirdLife website[59].

The Bor YEKA SPP area has also been included in the Cumulative Impact Assessment (CIA). Based on the assessment conducted using satellite imagery, the site was found to contain more heavily degraded natural habitats compared to other project sites. This condition is believed to have been triggered by human activities such as water abstraction, overgrazing, and wind erosion. As the project site will be fenced, at least overgrazing will be prevented, and a positive effect is expected through an increase in plant biomass. Additionally, when examining over the past 30 years of historical satellite imagery of the eastern part of Ereğli Plain KBA, which includes the Project Area, it was observed that the area has remained devoid of lentic and lotic systems. This suggests that the site had lost its wetland characteristics much earlier. The primary reasons for this loss are anthropogenic impacts, particularly water abstraction for agricultural use and reduced water inputs. This situation has also been supported by scientific research. In studies conducted, the temporal land use/land cover change of surface water bodies in the Ereğli KBA&IBA was evaluated using Landsat satellite images over the past 30 years. According to these assessments, it has been determined that the Akgöl Wetland has lost approximately 96% of its water surface and is under threat of extinction. Additionally, the semi-arid character of

[58] Key Biodiversity Areas Partnership (2023) Key Biodiversity Areas factsheet: Ereğli Plain. Extracted from the World Database of Key Biodiversity Areas. Developed by the Key Biodiversity Areas Partnership: BirdLife International, IUCN, American Bird Conservancy, Amphibian Survival Alliance, Conservation International, Critical Ecosystem Partnership Fund, Global Environment Facility, Rewild, NatureServe, Rainforest Trust, Royal Society for the Protection of Birds, World Wildlife Fund and Wildlife Conservation Society. Downloaded from http://www.keybiodiversityareas.org/ on 29/11/2023.

[59] BirdLife International (2023) Important Bird Area factsheet: Ereğli Plain. Downloaded from http://datazone.birdlife.org/site/factsheet/ereğli-plain-iba-türkiye on 29/11/2023.

the region is another limiting factor for the wetland, as precipitation is the only water source of the area, and rainfall amounts are expected to decrease in the near future due to the effects of climate change[60].

The terrestrial biodiversity field survey performed on the 18 October 2023 within the LSA by the expert zoologist Şafak Bulut, PhD (see section 5.2 of ESA Report for a detailed description of the methodology and of the results of the survey) allowed to observe 32 bird species, among which only 3 species (*Marmaronetta angustirostris*, *Phalacrocorax pygmeus* and *Oxyura leucocephala*) were included in the list of the 23 bird species triggering KBA and IBA criteria for this internationally recognised area.

In addition, the same local fauna expert-initiated monitoring studies in September 2024, confirming the ESIA studies and contributing to the implementation of necessary mitigation measures and monitoring activities.

Field survey was carried out at 9 Sampling Points (SPs) determined in order to identify the flora characteristics of the LSA. It was conducted 18 October 2023 by the expert botanist Prof. Hayri Duman of University of Gazi, Türkiye. The same local fauna expert initiated monitoring studies in September 2024, confirming the ESIA studies and contributing to the implementation of necessary mitigation measures and monitoring activities.

In addition, during the flora monitoring study conducted in September 2024, the invasive alien species *Xanthium spinosum* was identified. Also, potential invasive species that could be found in the area have been identified. These include *Xanthium strumarium*, *Conyza canadensis*, and *Chenopodium botrys*.

Other important threats are represented by overgrazing and wind erosion. In addition, water inputs are expected to cease entirely once two new reservoirs will be completed.

At this stage all facilities are under operation; potential impacts on biological components from the Project will mainly be associated with the following impact factors: emission of noise, emission of light, Increase of traffic, introduction of alien species (potential).

The main impact of the projects on biodiversity will be due to the presence of permanent infrastructures (e.g., inverter stations, substation, administrative buildings, internal roads, etc.) will cause a loss of available natural habitat during the entire operation phase, which will directly and indirectly affect habitats, flora, and fauna species. Flora and vegetation are expected to at least partially recover during the operation phase, due to rehabilitation of the temporary facilities, but also in the areas under the PV panels. In addition, if indirect impacts are not properly mitigated, habitat fragmentation and degradation could also occur.

However, literature shows that the Solar Power Plants in desertic and steppe areas could determine overall positive effects on biodiversity, in terms of increased plant diversity and increased plant biomass provided that appropriate long-term management and restoration activates implemented[61,62,63].

Based on these considerations and assuming that appropriate mitigation and monitoring measures will be applied in all SPPs and associated powerlines, the expected cumulative impact of these projects at the regional scale is expected to be Low.

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[60] Musaoglu, N., Tanik, A., Gumusay, M. U., Dervisoglu, A., Bilgilioglu, B. B., Yagmur, N., ... & Gokdag, M. F. (2018, June). Long-term Monitoring of Wetlands via Remote Sensing and GIS: A case study from Turkey. In *The Proceedings of The International Conference on Climate Change* (Vol. 2, No. 1, pp. 11-21).

[61] 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.

[62] 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.

[63] 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.

6.5.4 Traffic

The Emen Village road is being used for access to the SPP areas for G4-BOR-1, G4-BOR-2 and G4-BOR-3 SPPs. Developers of this three SPPs established a consortium, and the traffic topic was also included to the list of topics discussed among project owners. Therefore, in order to mitigate the traffic impacts and to prevent potential accidents/incidents, traffic signs/labels, speed bumps and two convex mirrors in proper places were placed in the Emen Village Road. Traffic impacts due to ETLs are not expected. Considering the traffic load increase amount calculated for the projects and all mitigation measures specified in the ESIA Report, the associated management plan and other projects' EIAs/PIFs, the expected cumulative traffic impact will be at **low** significance.

During operation phase, the vehicle traffic will be mainly from the maintenance works and staff shuttles/cars entering and leaving the Project Areas. 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

The mitigation measures to be taken by Smart to further reduce the impacts are given in Chapter 7.1.6 of the ESIA Report and the associated Traffic Management Plan.

Since the Bor YEKA SPP Project is still in the planning phase, and the national EIA process has not yet been completed and considering the current developments of the G4-BOR-1 Project it is assumed that the G4-BOR-1 Project will already be in the operation phase during the construction phase of the Bor YEKA SPP Project.. During operation phase of the current SPPs in the Project Area, the vehicle traffic will be mainly from the maintenance works and staff shuttles/cars entering and leaving the Project Areas. Regarding that there will be low number of staff working in the operation phases of these projects, cumulative traffic impact is expected to be dominated by the construction works' traffic of Bor YEKA SPP Project.

The draft EIA report for the Bor YEKA SPP Project does not specify the roads to be used to access the area. Depending on the road chosen, the following scenarios are considered:

- Seslikaya Village Road: If this road is used, no cumulative impact is expected.
- Emen Village Road: If this road is used, communication will be established via consortium, and additional mitigation measures will be applied if required.

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.

6.5.5 Visual

Since all the facilities are under operation except Bor YEKA SPP Project, permanent structures and solar panels are presented in the project area. The PV panels have impacts on visual aesthetics in terms of glint and glare impacts. In the Project, with the use of anti-reflection (AR) coatings, no glint-glare impact is foreseen during operation phase of the Project. However, information on the visual impacts of other projects including material to be used in the project could not be found.

During construction phase of the Bor YEKA SPP Project 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 this project will be temporary and has a short duration. In addition, there is no overlap of the projects in their construction phase. Therefore, no cumulative impact will be occurred during construction phase of the Bor YEKA SPP Project.

Based on that, considering the worst-case scenario, the expected cumulative impact during operation phase of this project will be **Low**.

6.5.6 Land Occupation

All SPPs are part of a process initiated by the Ministry of Energy and Natural Resources, which has allocated 2,539 hectares of land in the Bor District of Niğde Province on 29.09.2023. The legal status of the plots was formerly pastureland, and it was declared an industrial zone suitable for the development of solar projects: a Renewable Energy Resource Area.

The land within the Project Area and the surrounding SPP Projects is owned by the government, and it is classified as Niğde-Bor Energy Specialized Industrial Zone with the decision taken on 01.06.2018 by Niğde Governorship Revenue Office National Real Estate Directorate.

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

The Project Area is classified as IV. class lands and determined as treasury land. In the parcels of pasture quality within the borders of Niğde-Bor Energy Specialized Industrial Zone where the Project Area is located, with the letter dated 01.06.2018 and numbered 7112 of the Niğde Governorship Revenue Office National Real Estate Directorate, a change in qualification was made, and its registration was carried out in the name of the treasury. In this context, the entire project area remains within the treasury land. As stated in Section 5.3.2, The findings from social field study of the ESIA indicated that livestock breeding in the region has shifted over the years. Due to recurring droughts and the associated challenges of engaging in livestock breeding with age, most livestock breeders in the villages have transitioned from sheep to cattle farming. This transition has primarily been facilitated by feeding livestock in barns using stored feed, as pasture grazing has become increasingly difficult. Some villagers continue to rely on pastures for grazing for sheep breeding. However, drought conditions in the region have significantly reduced the availability of pastureland, limiting its use for grazing activities.

The land requirements of the SPPs are presented below.

Ecogreen: The project site is located 26.5 km north of Niğde City Centre and 13.3 km north of Bor District Centre. The nearest sensitive structure is located in the Seslikaya neighbourhood, 1.43 km southeast of the project site. The entire project area remains within the treasury land. The project area is categorized as an "Industrial Zone" in the 1/100,000 Scale Environmental Plan. The total area required for the Project development is 202.02 ha.

Kalyon: The project site is located 26.5 km north of Niğde City Centre and 13.3 km north of Bor District Centre. The nearest sensitive structure is located in the Seslikaya neighbourhood, 1.43 km southeast of the project site. The entire project area remains within the treasury land. The project area is categorized as an "Industrial Zone" in the 1/100,000 Scale Environmental Plan. The total area required for the Project development is 201.3 ha.

Bor YEKA SPP: The project site is located 26.5 km north of Niğde City Centre and 13.3 km north of Bor District Centre. The nearest sensitive structure is located in the Badak neighbourhood, 1.24 km south of the project site. The entire project area remains within the treasury land. The project area is categorized as an "Industrial Zone" in the 1/100,000 Scale Environmental Plan. The total area required for the Project development is 1926.8 ha.

ETLs: There will be a loss of area only due to the pole areas. During the crossing of the 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 by TEİAŞ. After the installation of the ETLs, activities (such as animal husbandry and agriculture) can be carried out by considering the distances specified in the "Regulation on Electric Power Current Facilities." During the 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.

The land allocation impact will result in negative effects on both pasturelands and their users. As shown in Figure 6-1, the Bor YEKA SPP Project requires the largest land, with 1926 ha, while the G4-BOR-1 Project covers 203 ha. Due to its larger scale, the Bor YEKA SPP Project will have the most pronounced impact on pasturelands. However, the cumulative land requirements of all projects will collectively place significant strain on existing pasturelands.

Mitigation measures have been determined for the G4-BOR-1 Project to minimize the impacts on pasturelands. All projects in this announced Renewable Energy Resource Area will have impacts on these former pasturelands. Since the Project footprint is smaller compared to the other projects, the impact of the G4-BOR-1 Project on pasturelands within its area of influence will be reduced more effectively after the implementation of mitigation measures. Considering the greater impacts associated with the larger footprint of the Bor YEKA SPP Project, the cumulative impact on pasturelands is expected to reduce to medium levels. In order to reduce this effect, mitigation strategy is developed and given in Step 6 (see Section 6.6).

6.5.7 Community Health and Safety

Since G4-BOR-2 and G4-BOR-3 projects are already under operation, developers of three SPPs established a consortium, and the received grievances are discussed in the consortium and necessary actions to resolve grievances are taken regarding noise, air, population changes etc..

On the other hand, as given in Section 6.5.1, 6.5.2 and 6.5.4 cumulative impacts on the noise, air and traffic is deemed low with the introduction of the Bor YEKA SPP project. In case a grievance received regarding the Bor YEKA SPP is received, the grievance will be conveyed to the management of the Bor YEKA SPP project.

According to mitigation measures for both ESIA, the Project´s embedded controls and programs proposed would appropriately mitigate the negative impacts which will be **low**.

6.5.8 Employment

The impact of the Project and the other six projects including 3 SPPs and three ETLs on employment has been assessed. The employment requirements for each project are provided below.

Ecogreen: 25 personnel are employed during the operation phase.

Kalyon: 20 personnel are employed during the operation phase.

Bor YEKA SPP: 250 personnel will be employed during construction and 100 personnel will be employed during operation

ETLs: No personnel will be employed during the operation phase of the ETLs rather than temporary maintenance and repair times.

Additional employment opportunities will be created construction and operation phase of the Bor YEKA SPP project therefore the cumulative impact will be positive.

6.5.9 Local Procurement

The Project, along with six others comprising three SPPs and three ETLs, as well as external factors, has the potential to enhance local procurement.

These Projects are anticipated to generate economic benefits for the local economy through the acquisition of goods and services, such as fuel for mobile equipment, transportation, food, passenger vehicles for Project use, electrical energy requirements, maintenance materials, office supplies, vehicle maintenance, travel logistics, accommodation, communication, and security. Consequently, the Project is expected to positively impact the local economy of the region.

6.5.10 National Energy Production

G4 Bor-1 Solar Power Plant Project ("the Project") will have 140 MWp /100 Mwe. The total energy production of the Ecogreen Project will be 150 MWp /100 Mwe, Kalyon SPP will be 140 MWp /100 Mwe and Bor YEKA SPP will be 1100 MWe . Among renewable energy sources, solar energy is the energy type with the highest potential. Türkiye, which has a high solar energy potential due to its location, has an average annual total sunshine duration of 2,640 hours (daily total of 7.2 hours) and an average total radiation intensity of 1,311 kWh/m²-year (daily total of 3.6 kWh/m²). Considering the possibility of providing uninterrupted energy with energy transmission, the Projects is expected to have a substantial contribution to the national economy of Türkiye.

6.6 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, as mitigation strategy for cumulative impacts would require cooperation and coordination among the Project owners, Interface Management Plan is prepared for the Project. The Plan explains how the Project Company will interface with third parties operating within and managing the ESIZ, including those responsible for the offsite Associated Facilities (i.e. the ETL developer/operator) to demonstrate reasonable efforts are made with ongoing communication and cooperative action in relation to E&S mitigation, management, and monitoring. 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,. The effectiveness of this coordination/cooperation cannot be guaranteed at this stage and will depend on the mutual preparedness of companies other than Smart 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 medium or low intensity. 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, Smart 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 Smart to prepare a specific Stakeholder List for the CIA.

- Smart 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 Smart.
- In case of any grievances about the cumulative impact, Smart will inform the other project owners and joint actions will be taken.
- Smart will conduct close engagement and consultation activities with the projects mentioned in this CIA.

On the other hand, the cumulative impact assessment highlights the potential for pressure on pasturelands resulting from land occupation. In response, as a mitigation strategy, Smart Enerji has already formed a joint partnership with Kalyon and Ecogreen to address feedback, complaints, and suggestions from the local community. This initiative plays a significant role in mitigating the negative impacts and enhancing the positive outcomes of these three projects

To further strengthen efforts, it is recommended to establish active communication with the management of the. Bor YEKA Solar Power Plant (SPP) project, which is currently undergoing the Environmental Impact Assessment (EIA) process. By working collaboratively with Bor YEKA SPP, community feedback can be more effectively addressed, ensuring a unified approach to regional concerns.

Additionally, it is advised to provide Bor YEKA SPP management with comprehensive information about the existing and proposed projects, alongside the findings of the cumulative impact assessment. This exchange of information should be accompanied by proposals for strategic collaboration, aimed at managing cumulative impacts and fostering sustainable development in the region.

6.6.1 Cumulative Impact Mitigation Strategy (CIMS)

This Cumulative Impact Mitigation Strategy (CIMS) is designed to manage and minimize the cumulative effects of the Smart Enerji project while promoting collaboration, adaptive management, and continuous improvement. Through effective communication with local communities and coordination with other project owners, the strategy aims to ensure sustainable development in the region.

6.6.1.1 Identification of Existing Cumulative Impacts

Noise: Noise is expected from excavation, vehicle movement, and equipment operation during construction phase. Cumulative noise impacts are not expected since G4-BOR-2 and G4-BOR-3 are already under operation and G4-BOR-1 Project will be in operation when the Bor YEKA SPP Project starts construction. Due to the nature of the projects, no significant noise generation is expected therefore cumulative impact is not expected during operation phase

Monitoring and grievance mechanism and management are in place.

Air Quality: Dust emissions are expected from land clearing and material transportation during construction phase. Cumulative air impacts are not expected since G4-BOR-2 and G4-BOR-3 are already under operation and G4-BOR-1 Project will be in operation when the Bor YEKA SPP Project starts construction. Due to the

nature of the projects, no significant air emission is expected during operation phase therefore cumulative impact is not expected during operation phase

Monitoring and grievance mechanism and management are in place.

Terrestrial Biodiversity: Potential impacts on biological components from the Project will mainly be associated with the following impact factors: emission of noise, emission of light, Increase of traffic, introduction of alien species (potential). With the mitigation measures defined in the EISA Report and Biodiversity Management Plan, the expected cumulative impact of these projects at the regional scale is expected to be Low. Monitoring is in place.

Traffic: Increased traffic volume and accident risks from heavy vehicle movement and maintenance vehicles in village road are the potential impacts during construction and operation. Traffic signs/labels, speed bumps and two convex mirrors in proper places were placed in the Emen Village Road to prevent potential accidents/incidents. Considering the traffic load increase amount and all mitigation measures specified in the ESIA and the management plan, the expected cumulative traffic impact will be at **low** significance

Visual Aesthetics: The PV panels have impacts on visual aesthetics in terms of glint and glare impacts. The Project, with the use of anti-reflection (AR) coatings, no glint-glare impact is foreseen during operation phase of the Project. therefore cumulative impact is not expected.

Land Acquisition: Pressure on pasturelands from multiple projects. The land allocation for energy projects will negatively affect pasturelands and their users, with the Bor YEKA SPP Project causing the greatest impact due to its large footprint, compared to G4-BOR-1. While all projects contribute to cumulative pressure on pasturelands, mitigation measures for G4-BOR-1 are expected to effectively reduce its localized impact. Overall, with mitigation, the cumulative impact is expected to be reduced to medium level. Monitoring and grievance mechanism and management are in place, and a detailed mitigation strategy is outlined in

Community Health and Safety: Increased movement of workers and machinery posing health risks. Cumulative impacts on the noise, air and traffic are deemed low with the mitigation and monitoring measures.

Labor Influx: Increased demand for labor therefore positive cumulative impact is expected.

6.6.1.2 Mitigation Measures

Noise Reduction:

- Implement noise reduction measures during construction and operation phases as defined in the Noise Management Plan.
- Monitor noise levels and address grievances promptly.

Air Quality Control:

- Control dust emissions during construction and ensure air quality standards are met as defined in the Noise Management Plan.
- Monitor noise levels and address grievances promptly.

Biodiversity Protection:

- Protect habitats and species and prevent the introduction of invasive species as defined in Biodiversity Management Plan and Invasive Alien Management Plan.
- Monitor biodiversity as defined in Biodiversity Management Plan

Traffic Management:

- Manage traffic impacts through signage, speed bumps, and convex mirrors.
- Coordinate with other projects to minimize congestion and accident risks.

Visual Aesthetics Management:

- Use anti-reflection coatings and manage light emissions during construction.

Land Use Management:

- Mitigate impacts on pasturelands as defined in the ESIA and ESA Report and through community engagement.
- Coordinate with other projects to manage land use effectively as defined in the Interface Management Plan.

Community Health and Safety:

- Implement health and safety measures, monitor impacts, and address grievances as defined in the Air Quality Management Plan, Noise Management Plan and Traffic Management Plan.
- Engage with local communities to ensure their concerns are addressed.

Employment and Local Procurement:

- Maximize local employment opportunities and ensure fair distribution of economic benefits.
- Enhance local procurement to benefit the regional economy.

6.6.1.3 Collaboration and Coordination

- Collaborate with other project owners and authorities to manage cumulative impacts effectively as defined in the Interface Management Plan.
- Establish active communication with the management of other projects like Bor YEKA SPP to address community feedback more effectively. Propose strategic collaboration to manage regional concerns.

6.6.1.4 Inclusive Communication and Transparency:

A continuous dialogue and transparent communication network should be established with the local community and stakeholders as defined in the Stakeholder Engagement Plan.

6.6.1.5 Monitoring and Adaptive Management

- Monitoring Programs: Detailed monitoring programs are defined in the Management Plans along with the KPIs to track progress and effectiveness of mitigation measures.
- Adaptive Management: Both impacts and the effectiveness of management approaches are monitored through management system, adjustments will be applied as needed.

6.6.1.6 Grievance Mechanism

- A robust grievance mechanism are already implemented to address community concerns promptly. Ensure transparency and responsiveness.
- Grievances are conveyed to other project owners and take joint actions. This process will help reduce the environmental and social impacts of all related projects.

6.6.1.7 Reporting and Review

- Regularly report on the status of impacts and mitigation measures as defined in each management plan. Review and adjust strategies based on monitoring results and stakeholder feedback.
- Review and update of CIMS periodically to incorporate new Project information and cumulative impacts, especially from future projects within the Bor YEKA area.

7.0 CHANGES IN ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING

7.1 Additions in Environmental and Social Management System

In the scope of this ESA Study, following additional plans to the ESMS defined in the ESIA report of the Project, which are expected to be developed in the scope of ESMS documentation of the Project, will be prepared as **separate documentation** for the implementation on site by integrating to the other ESMPs:

Additional Plans:

- Interface Management Plan construction and operations phases
- ESMS Manual for construction and operations phases
- Management of Change Procedure (including E&S Aspects and Impacts Register) construction and operations phases
- E&S Monitoring Plan for construction and operation phases
- Air Quality Management Plan (including a monitoring programme) for construction phase
- Noise and Vibration Management Plan (including a monitoring programme) for construction phase
- Water Management Plan ("WMP") for construction phase
- Retrenchment and Demobilisation Plan for construction phase
- Project Environmental and Social Policy

7.2 Revisions on Environmental and Social Management Plans

Following plans will be updated as per the comments, recommendations and suggestions of LESC in ESDD report as separate documentation for the implementation on site integrated to the ESMS:

Updated ESMPs for construction phase:

- Updated SEP including External Grievance Mechanism
- Updated Labour Management Procedure
- Updated Pollution Prevention Management Plan
- Updated Soil Management Plan
- Updated Waste Management Plan
- Updated Hazardous Materials Management Plan
- Updated Community Health and Safety Management Plan
- Updated Emergency Preparedness and Response Management Plan

- Updated Traffic Management Plan
- Updated Resource Efficiency Management Plan
- Updated Biodiversity Management Plan
- Updated Cultural Heritage Management Plan and
- Updated Accommodation Management Plan

Updated ESMPs for operation phase:

- Air Quality Management Plan
- Noise and Vibration Management Plan
- Water Management Plan
- Waste Management Plan
- Hazardous Materials Management Plan
- Community Health and Safety Management Plan
- Emergency Preparedness and Response Management Plan
- Resource Efficiency Management Plan and
- Biodiversity Management Plan.

8.0 CONCLUSIONS

This ESA Report is prepared to re-assess environmental and social impacts of the Project after consideration of lenders' and LESC's comments, recommendations and suggestions.

The findings of this study have led to the following conclusions:

- Changes in grievance mechanism will be implemented at the site during the lifetime of the Project.
- Actual annual GHG emission calculations show similarity with the assumed GHG values in the ESIA Report of the Project.
- Climate change risk assessment was updated with the consideration of chronic hazards water stress and heat stress. Additional mitigation measures defined in CCRA will be followed during the lifetime of the Project.
- Critical Habitat Assessment and impact assessment were updated with the consideration of ETL Project. Accordingly, Biodiversity Management Plan was updated as a separate document and will be implemented during construction and operation phases of the Project.
- There is no land, cultural heritage, or settlements under the collective customary use of indigenous peoples that would be affected by the Project and PS-7 protections do not apply in this context.
- The livestock breeder households, including vulnerable members were identified in ESA Report and additional mitigation measures were determined and integrated to the related ESMPs.
- Human Rights Impact Assessment was updated with the consideration of supply chain risks and it will be implemented with updated Human Rights Management Plan during the lifetime of the Project.

- According to the cultural heritage assessments carried out by the Project, the Project is not expected to have an impact on any critical cultural heritage.
- A supplementary CIA assessment was conducted with the consideration of planned projects around the Project area. Accordingly;
  - 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, Smart 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 Smart to prepare a specific Stakeholder List for the CIA.
  - Smart will ensure that all mitigation measures given in the 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 Smart.
  - In case of any grievances about the cumulative impact, Smart will inform the other project owners and joint actions will be taken.
  - Smart will follow the mitigation strategy defined in the CIA.
  - Smart will conduct close engagement and consultation activities with the projects mentioned in this CIA.

APPENDIX A

List of Applicable National Legislation and International Agreements Ratified by Türkiye

Table 1: Current Relevant Environmental Laws and Regulations in Türkiye

Law/Regulation
Environment Law
Permitting
Regulation on Environmental Impact Assessment
Regulation on Environmental Auditing
Regulation on Environmental Permit and License
Law on Use of Renewable Energy Resources for Electrical Energy Production
Law on Industrial Zones
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
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 Water Pollution Control Regulation Sampling and Analysis Methodology
Communique on 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
Law on Pasture
Waste Management
Regulation on Waste Management
Regulation on Zero Waste
Regulation on Control of Excavation Soil, Construction and Demolition Wastes
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 Management of Waste Electrical and Electronic Goods
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 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 Material
Regulation on the Transportation of Hazardous Goods by Road
Regulation on the Classification, Labelling and Packaging of Substances 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

Law/Regulation
Regulation on Wildlife Protection and Wildlife Enhancement Areas
Law on Forestry
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 2023 List
Regulation on Collection, Production and Export of Natural Floral Onions from Nature
Energy Efficiency
Law on Energy Efficiency
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
Regulation on Research, Drilling and Excavation of Cultural and Natural Assets
Principal Decision No. 658 issued on 5 November 1999
Law on the Approval of the Convention for the Protection of the Intangible Cultural Heritage
Other Applicable Legislation

Law/Regulation
Türkiye Building Earthquake 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
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 Distribution System Regulation
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 2: 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.)

Existing Labour and H&S Law and Regulations
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 Environments
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
Regulation on Protection of Buildings Against Fire
Regulations on the Prevention of Biological Exposure Risks

Existing Labour and H&S Law and Regulations
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 Public Health

Table 3: International Conventions/Protocols Türkiye Has Signed

International Convention / Protocol	Date and Number of Issuing Turkish Official Gazette
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
Agreement on an International Energy Program; Paris, 1974	23/01/1981

International Convention / Protocol	Date and Number of Issuing Turkish Official Gazette
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	Date and Number of Issuing Turkish Official Gazette
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 8-1: 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)	-	-

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]
			210 (for 2024 and after)		
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.

DRINKING WATER QUALITY

Table 8-2: 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****	**-**
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

Parameter	Unit	Turkish[1]	WHO[2]
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**	-
Tritium[64]	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

[64] 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

The Regulation on Soil Pollution Control and Point Source Contaminated Sites ("Soil Regulation") was published on June 8th, 2010 (Official Gazette: 27605) and was fully implemented on June 8th, 2015. In accordance with Soil 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 8-3: 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

Soil Quality Standards in the "Soil Regulation* related to the above-mentioned activity codes are given below.

Table 8-4: 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

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**
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 8-5: 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 23:00 - 07:00
Industrial facilities, transportation sources	LAeq,5min.	65 dB(A)	60 dB(A)	55 dB(A)
Music broadcasting establishments	LAeq 63-250 Hz	60 dB(A)	55 dB(A)	50 dB(A)
Workplaces	LAeq,5min.	Background + 5 dB(A)		Background + 3 dB(A)
In case of more than one workplace	LAeq,5min.	Background + 7 dB(A)		Background + 5 dB(A)
All sources	LCmax	100 dB(C)		

Table 8-6: 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 8-7: Vibration Standards (Turkish Regulation on 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
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 8-8: 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 8-9: 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		

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
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 8-9 and major damage to a building structure can occur at values greater than four times the tabulated values.

In addition, the values in Table 8-9 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 8-9 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 8-10: 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

Climate Change Physical Risk Assessment

FINAL REPORT

Niğde G4-Bor-1 Solar Power Plant Project

Environmental and Social Impact Assessment - Climate Change Risk Assessment

Submitted to:

Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San ve Tic A.Ş.

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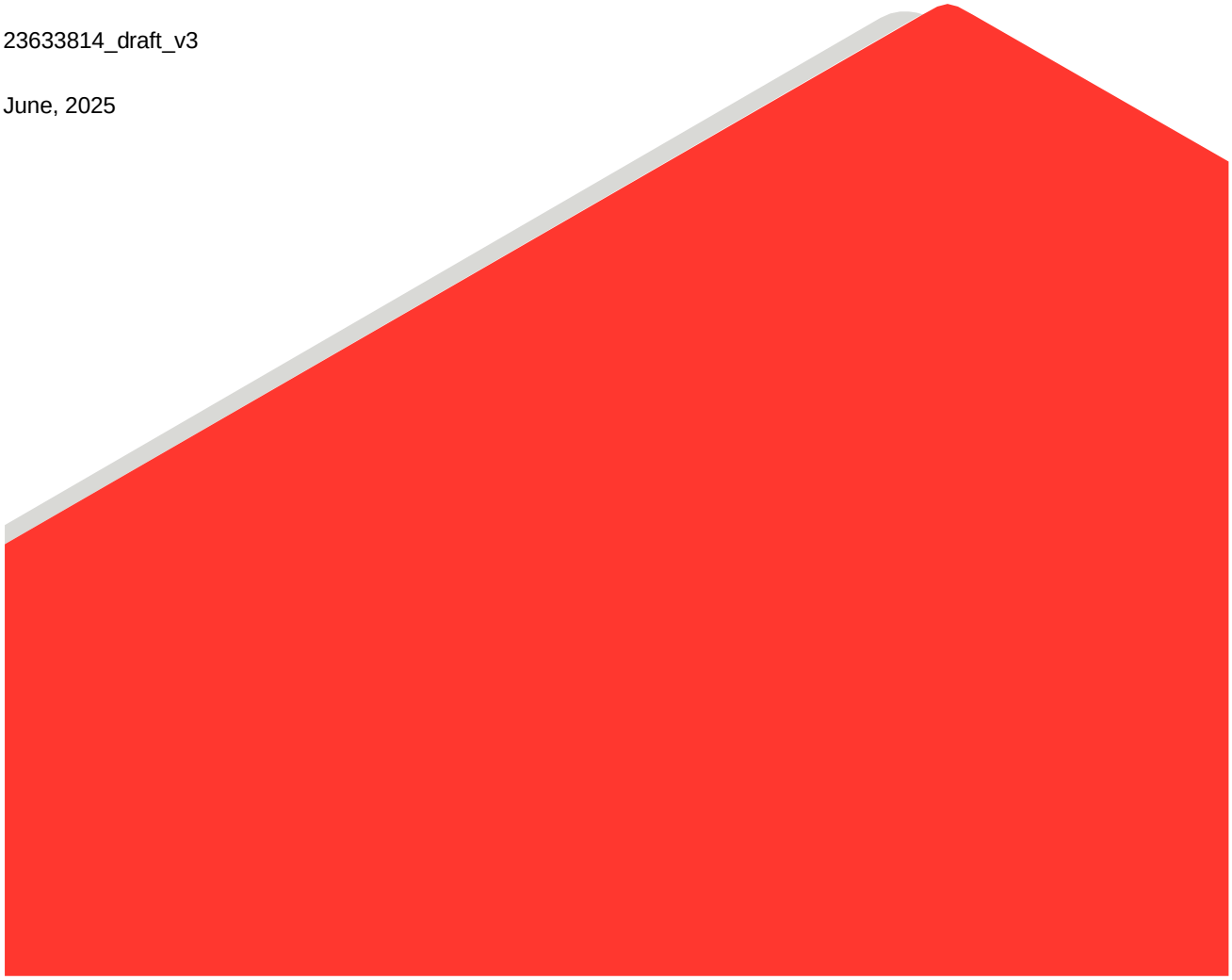
23633814_draft_v3

June, 2025



Distribution List

1 copy - Lenders

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1 copy - WSP Danışmanlık ve Mühendislik Ltd. Şti.

Record of Issue

Company	Client Contact	Version	Date Issued	Method of Delivery
Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San ve Tic A.Ş.	Ebru Sağ	Draft_R0	09.04.2024	E-mail (word)
Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San ve Tic A.Ş.	Ebru Sağ	Draft_R1	31.01.2025	E-mail (word)
Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San ve Tic A.Ş.	Ebru Sağ	Draft_R2	02.05.2025	E-mail (word)
Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San ve Tic A.Ş.	Ebru Sağ	Draft_R3	21.05.2025	E-mail (word)

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1.0 INTRODUCTION

Smart Güneş Enerjisi Teknolojileri Ar-Ge Üretim San ve Tic A.Ş. (hereinafter referred as “Smart”) has retained WSP Danışmanlık ve Mühendislik Ltd. Şti. (hereinafter referred as “WSP Türkiye” or “WSP”) to prepare the Environmental and Social Impact Assessment (“ESIA”) for the Niğde G4-Bor-1 Solar Power Plant Project (hereinafter referred as “the Project’”) in compliance with the national and international requirements. The Project will have a total installed capacity of 140 MWp / 100 Mwe and located in Seslikaya and Badak Villages Bor District, Niğde Province.

Climate change is a multifaceted and complex issue that can lead to serious environmental and socioeconomic consequences and even threaten the security of countries. The impacts of climate change have become one of the most important challenges for the life of future generations.

This report presents a Climate Change Risk Assessment (CCRA) for the evaluation, at present and in the future, of the potential climate-related events that could affect the Project and that may exacerbate as a consequence of the climate change.

Within this framework stands the revision and release of the Equator Principles[1] (EPs, version IV) which is a risk management framework adopted by financial institutions for determining, assessing, and managing environmental and social risks in projects and is primarily intended to provide a minimum common standard for due diligence and monitoring to support responsible risk decision-making. Currently more than 110 Equator Principles Financial Institutions (EPFIs) have officially adopted the EPs, covering the majority of international project finance debt within developed and emerging markets. The EPs categorize projects that are financed by EPFIs based on the environmental and social impacts that they generate and the risks that they may pose to financing. Category A projects have the highest risks, while category C is used for low-risk projects.

According to EPIV, a Climate Change Risk Assessment (CCRA) is required to be undertaken:

- For Category A and, as appropriate, Category B projects. For these projects, the CCRA has to include consideration of relevant climate-related ‘Physical Risks’ as defined by the Task Force on Climate-Related Financial Disclosure (TCFD)[2].
- For all projects, in all locations, when combined Scope 1 and Scope 2 emissions are expected to be more than 100,000 tons of CO_2 equivalent annually. For these projects, the CCRA is to include considerations of climate-related ‘Transition Risks’ (as defined by the TCFD). The CCRA must also include a completed alternatives analysis which evaluates lower greenhouse gas (GHG) intensive alternatives.

As per the environmental and social categorization criteria of the applicable standards, based on the discussions held with the Lenders and Lenders’ Advisor, available data, the National EIA, Project area being located inside Key Biodiversity Area (KBA), the Project is categorised as “Category A”. Since combined emissions of the Project are below 100,000 tons of CO_2 equivalent annually (Please see Section 2.2), 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”.

[1] The Equator Principles Association, 2020 (The Equator Principles_EP4_July2020 (equator-principles.com).

[2] Task Force on Climate-Related Disclosures (TCFD), Recommendations of the Task Force on Climate-related Financial Disclosures, June 2017.

Acute physical climate risks can include increased severity and frequency of droughts, storms, floods, heat waves and wildfires. Chronic physical climate risks can include sea level rise and longer-term temperature increase. Climate-related Physical Risks may include a variety of effects:

- Direct damage to assets, as a result of extreme weather events (i.e., drought, storms) or rising sea levels.
- Changes in water availability, sourcing and quality, often with consequent social impacts.
- Disruption to operations, ability to transport goods and supplies and impacts on employee/community safety, and more.

This assessment should be considered a screening level CCRA aimed at supporting the Environmental and Social Assessment process in the frame of the Equator Principles IV provisions. This CCRA relies on the interpretation of the results of modelling of future climatic conditions which have an inherent high level of uncertainty, and on the identification of project vulnerability that are based on a feasibility level of definition. The conclusions and recommendations are meant to guide the Client in defining an appropriate Risk Management framework and should not be relied upon in the design and sizing of specific infrastructures, nor in taking financial decisions regarding the feasibility or level of exposure to future damages or losses related to climate change.

2.0 PROJECT BACKGROUND

The Project area had been declared as an area suitable for the development of a solar project: a Renewable Energy Resource Area (“YEKA”).

The Solar Power Plant (“SPP”) will consist of solar panels, an assembly structure, an inverter, a substation, an administrative building and Supervisory Control and Data Acquisition (“SCADA”) system as main components. The energy transmission line (“ETL”) will be established as an associated facility. With the establishment of the Project, it is planned to produce 100 MWe of electrical energy annually during the operation phase, and the produced energy will be transmitted to the Yaysun SPP Substation by approximately 29.5 km long 154 kV ETL that will be constructed by Turkish Electricity Transmission Corporation (“TEİAŞ”). Details of the Project components are provided in Chapter 3 of the ESIA report.

The Project pre-construction activities, namely, mobilization of temporary site facilities, site preparation, grading and levelling, material delivery and storage and certain early trenching activities for cable laying have been started in October 2023. Within the scope of the Project, construction phase is estimated around 11 months, while operation phase is estimated as 30 years.

The Project is set to be developed on a 201.3 ha of former pastureland. Designated as an "Industrial Zone" in the 1/100,000 Scale Environmental Plan, the Project site falls within the borders of the "Niğde-Bor Energy Specialized Industrial Zone."

The location of the Project is given in Figure below.

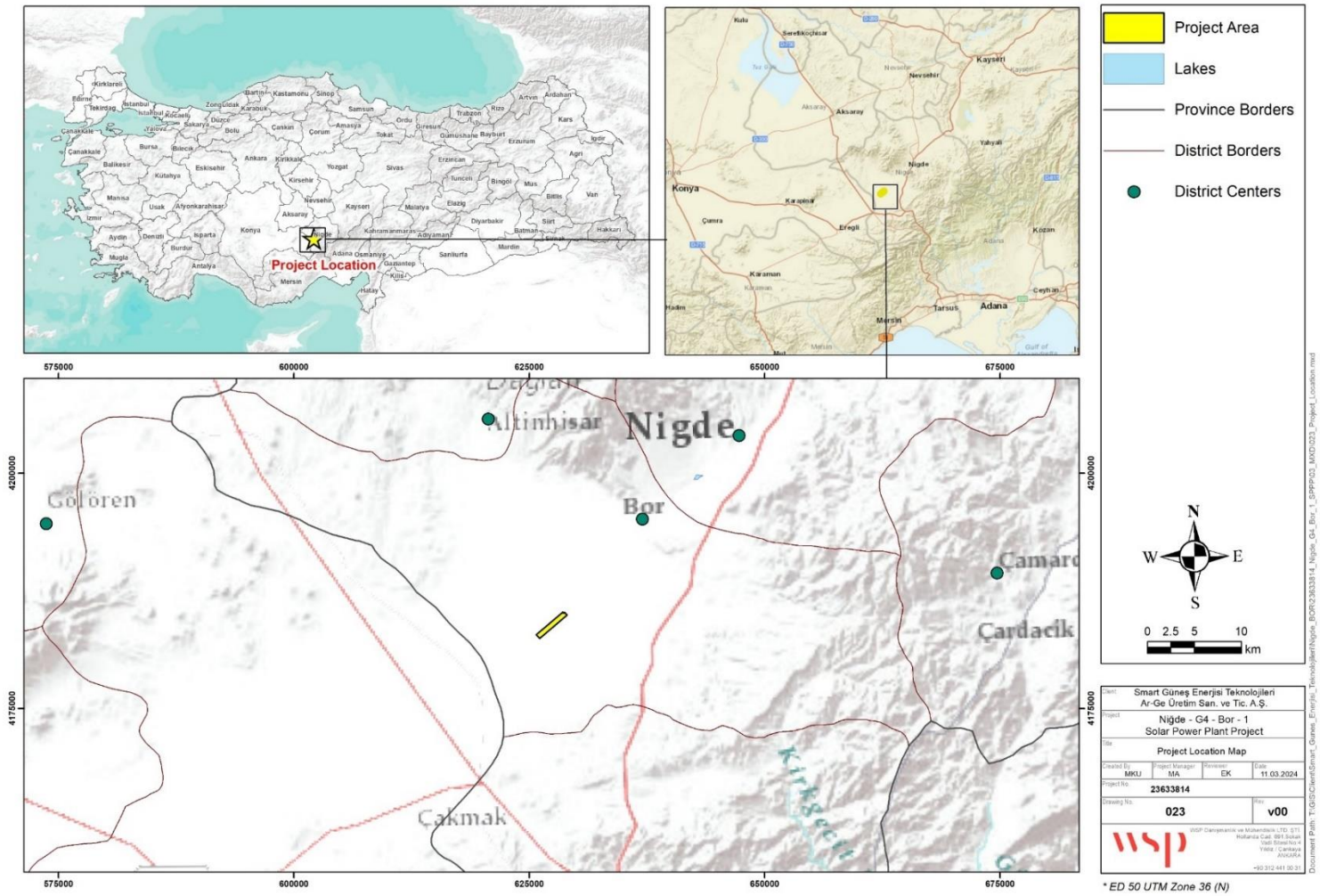


Figure 2-1: Location of the Project

2.1 Preliminary NCC/NDCs Compatibility Review

Parties to the Paris Agreement have been obliged since 2015 to submit Nationally Determined Contributions (NDCs), or national climate action plans. While not required, countries are also encouraged to submit Long-Term Strategies (LTS) for a low-carbon economy.

The primary means via which nations publicly declare their self-defined intentions for establishing long-term decarbonization targets to keep global temperature rise below 1.5 degrees Celsius and to set goals for improving climate resilience are the Nationally Determined Contributions (NDCs) filed under the Paris Agreement.

As outlined in the EPIV Guidance Note on Climate Change Risk Assessment, the purpose of the preliminary NCC compatibility review of physical risks is to assess their alignment with the host country's National Climate Contributions (NCCs) and relevant global adaptation objectives under the Paris Agreement. This includes objectives such as enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change, all with the aim of contributing to sustainable development.

According to Republic of Türkiye Updated First Nationally Determined Contribution (NDC) Report[3], Türkiye has made significant investments in many sectors to mitigate the impacts of climate change, especially in the energy sector, which greatly resulted in the reduction in GHG emissions. Like many other countries, the energy sector has the highest GHG emission share compared to others. Therefore, policies and measures to reduce GHG emissions have had a higher focus on energy policies with clear renewable energy generation targets, particularly in the power sector. Türkiye aims to raise this rate even further. The nation's energy policy has placed a high priority on making the most use of renewable energy sources while reducing reliance on imports by enhancing supply security. Türkiye's primary energy sector mitigation strategy for 2030 is to make the most use of renewable energy and energy efficiency while taking market conditions, energy security, and feasibility into account. Investments in renewable energy, particularly solar and wind power, have accelerated thanks in large part to YEKA and the Renewable Energy Sources Support Mechanism (YEKDEM).

As of September 2022, the total installed capacity is 102,281 MW. Renewable energy sources have 55,630 MW and constitute 54 percent of Türkiye's electricity generation installed power capacity. In 2023, Türkiye has become one of the 14 countries in the world with an installed power exceeding 100 thousand megawatts. Among 54% in the share of renewable energy sources, the share of hydro, wind, solar, geothermal, and biomass are 30.9%, 10.9%, 8.8%, 1.6%, and 1.8%, respectively. In the last two years, 97% of commissioned energy sources were from renewables; the rest is cogeneration, which is a good practice of efficiency. Approximately 3,000 MW of solar plus wind power was commissioned in 2021. Given these circumstances, the project aligns with national policies and commitments for climate adaptation or resilience. Project-related physical climate risks been identified and addressed in the following chapters.

The 2022 Sustainability Report[4] published by Smart states that the Company aims to be net zero in 2040. Smart has created a road map and projected all the steps it will take to achieve its net zero target. Adopting a responsible and sustainable production approach, the Company's greenhouse gas emissions from electrical energy consumption in management and factory buildings were zeroed in 2022 by obtaining I-REC certification. The International REC Standard (I-REC) is an international standard created by the International REC Standard Foundation to track the source and prove the consumption of energy produced from renewable sources in any country in the world. The I-REC Certificate, called Renewable Energy Certificate or Green Energy Certificate in Türkiye, certifies that electricity is produced from renewable energy sources by ensuring the traceability of the source and attribute of the energy produced.

[3] https://unfccc.int/sites/default/files/NDC/2023-04/T%C3%9CRK%C4%B0YE_UPDATED%201st%20NDC_EN.pdf

[4] https://smartsolar.com.tr/pdf/Surdurulebilirlik-Raporu.pdf

2.2 Calculated GHG Emissions

As it has been described in Supplementary E&S Assessment Report which is the main report of this appendix, the combined annual emissions from the construction phase of the Project are about **1,648.96 t CO_2e per annum**. This annual value is below the 25,000 t CO2e threshold defined in IFC PS3 and Equator Principles IV. Therefore, no additional monitoring will be required.

With the consideration of this assumption, annual emissions from the operation phase of the Project are about **28.80 t CO_2e per annum**. This annual value is well below the 25,000 t CO2e threshold defined in IFC PS3 and Equator Principles IV. Therefore, no additional monitoring will be required.

3.0 RISK ASSESSMENT 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

[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.

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.
- 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. Workflow of the risk assessment for a specific hazard "h" is explained in Figure 3-1. For each specific hazard, the risk components are assigned a qualitative class ("i.e., "high", "medium", "low") and then combined using qualitative matrices (see , The result is a class of Risk ("low", "medium", "high" or "extreme") for each climate-related hazard considered in the analysis. An explanation of criteria for ratings and identification of significance are given in Table 3-1.

Figure 3-1: 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

Table 3-1: Criteria of Ratings

Rating	Sensitivity Criteria (Degree of impact)	Adaptive Capacity Criteria (Ability to respond)
Highest	Extremely vulnerable; severe operational, financial, or environmental consequences.	No adaptation measures; lack of financial, technological, or institutional capacity to respond.
High	High sensitivity; significant performance, safety, or economic impacts.	Limited adaptation capacity; measures exist but are insufficient or poorly implemented.
Medium	Moderate sensitivity; some disruptions or costs are expected but manageable.	Moderate adaptation capacity; some measures in place but requiring improvements.
Low	Low sensitivity; minor or negligible impacts on operation and performance.	Good adaptation capacity; proactive strategies in place, but some risks remain.
Lowest	Resilient; not significantly affected by climate hazards.	Fully resilient with comprehensive adaptation strategies in place.

Table 3-2: Criteria of Hazard Classes

Rating	Hazard Class Criteria
High	The climate-related hazard is highly likely to occur and/or has the potential to cause significant disruption to operations, infrastructure, or surrounding communities.
Medium	The hazard has a moderate likelihood and/or impact. Some disruption may occur, but existing mitigation measures can partially address the risk.
Low	The hazard has low likelihood and minimal potential impact. Disruptions, if any, are expected to be negligible and easily managed with existing systems and infrastructure.

4.0 CLIMATE CHANGE PHYSICAL RISK ASSESSMENT

The CCRA that follows is referred to Niğde G4-Bor-1 Solar Power Plant Project located in Bor District of Niğde Province of Turkey (see Figure 4-1).

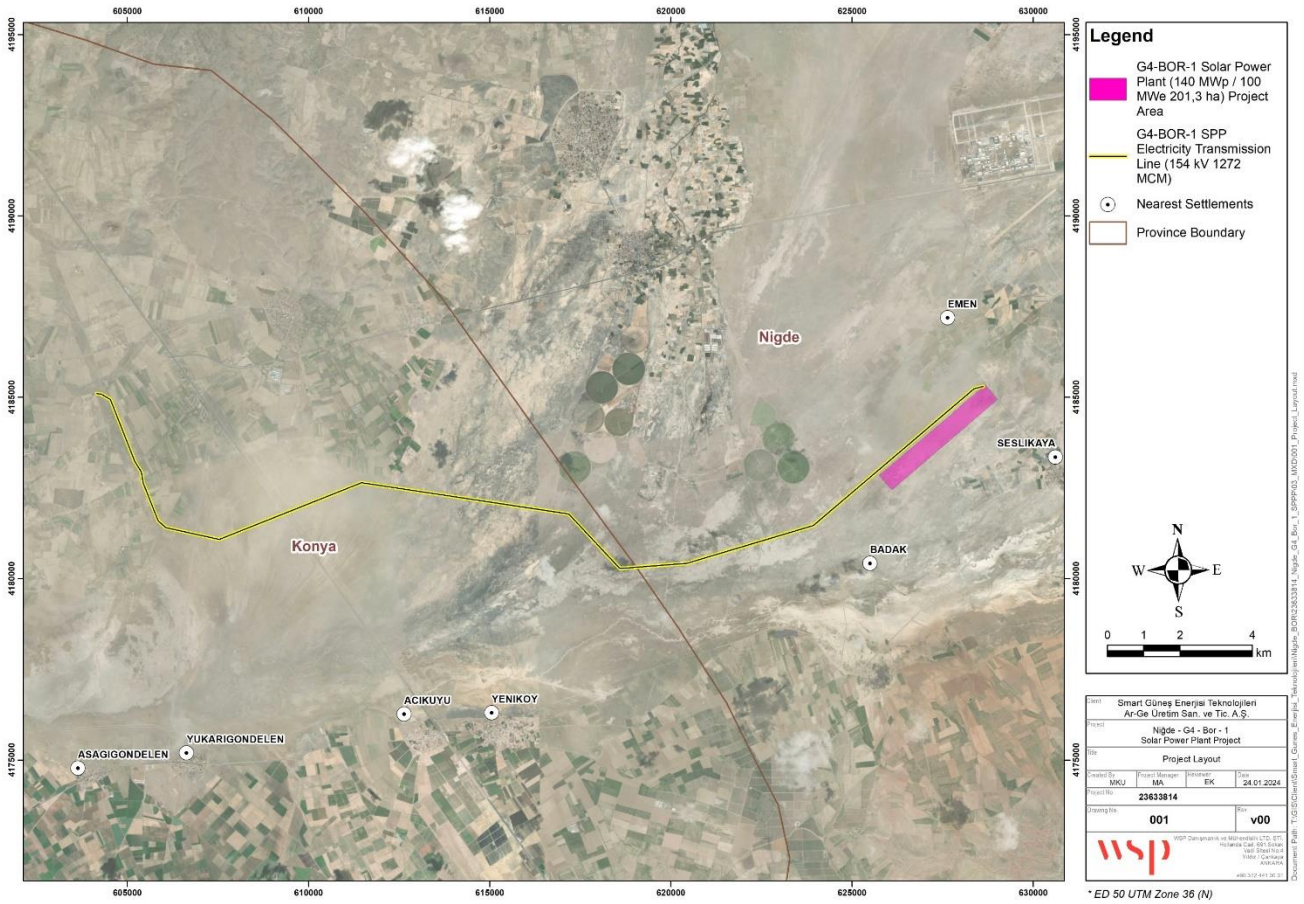


Figure 4-1: Project Layout with Energy Transmission Line

The CCRA focuses on following Project components that could potentially be affected by climate-related hazards.

- PV Solar panels, which Integrates semiconductor PV cells on the panel to ensure the generation of direct current electricity from the sunlight,
- Inverter, which converts the direct current electricity generated by PV panels into grid electricity for daily use,
- Pannel support system, which refers to the support structure systems and mounting apparatus where photovoltaic PV panels are installed,
- Balance of System (BOS), which encompasses elements beyond the fundamental materials mentioned above. In the context of Solar Energy Plants, the part outside the Module, Inverter, and construction is defined as BOS. It includes infrastructure activities and materials necessary for the sustainability and protection of the system, such as infrastructure, AC-DC cables, connectors, paralleling panels, switchgear equipment, low-voltage panels, transformer substations, medium/high-voltage panels, construction works, wire fences, lighting, camera systems,
- Energy transmission line with 29.5 km length and 154 kV, and

- Project personnel.

4.1 Assessment of Hazards

4.1.1 Climate Overview – Country Level

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.

The Project is located in Niğde Province in 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 Meteorological Stations located around the Project area. The most comprehensive data representing the Project area was obtained from Niğde Meteorological Station of Turkish State Meteorological General Directorate (see Figure 4-2), which is also the closest meteorological station to the project area This data is used to establish a general view on basic conditions for meteorology and climatology.

[8] The Climate Change Knowledge Portal (CCKP) provides global data on historical and future climate, vulnerabilities, and impacts.

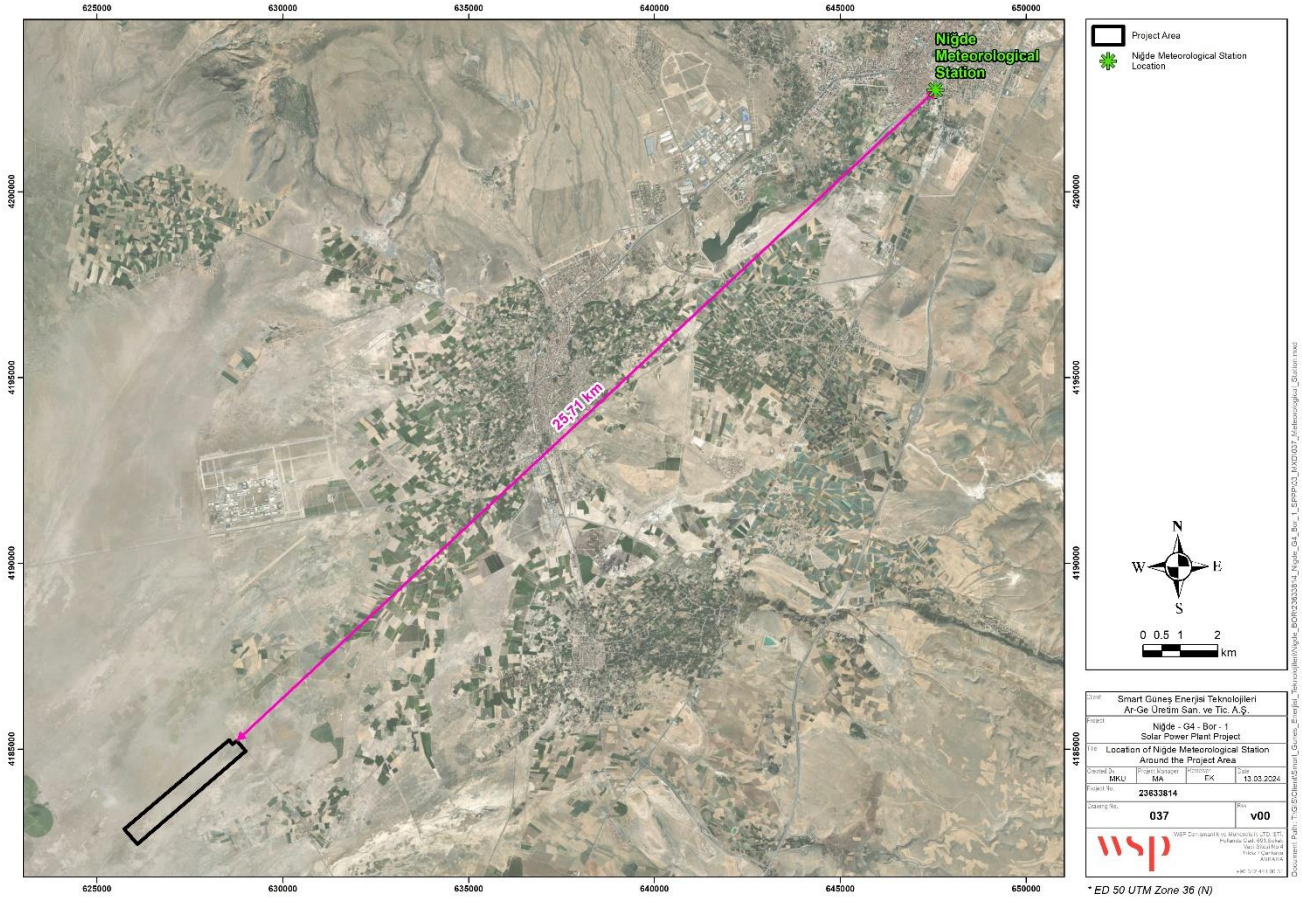


Figure 4-2: Niğde Meteorological Station

4.1.2 Climate Overview – Local Level

4.1.2.1 Historical Data

Niğde is located in the Central Anatolia region of Türkiye. The continental climate is prevailing in the Niğde province and winters are cold and snowy, and summers are hot and dry with transitional periods of mild weather in spring and autumn.

Air Temperature

According to the observation records of Niğde Meteorology Station between 1960 and 2021, the highest air temperature was recorded in July and August with 38.5°C, and the lowest air temperature was measured in February with -24.2°C. Annual average air temperature is 11.2°C (see Table 4-1 and Figure 4-3).

Table 4-1: Niğde Meteorological Station – Air Temperature Measurements (°C) (1960 - 2021)

Months	Average Air Temperature	Maximum Air Temperature	Minimum Air Temperature
January	-0.3	19.9	-21.7
February	1.2	20.5	-24.2
March	5.4	26.3	-23.9
April	10.6	30.8	-6.9
May	15.0	32.1	-2.6
June	19.0	34.8	3.5

Months	Average Air Temperature	Maximum Air Temperature	Minimum Air Temperature
July	22.4	38.5	7.1
August	22.1	38.5	6.7
September	18.0	37.3	1.0
October	12.5	30.6	-5.2
November	6.4	24.6	-14.7
December	1.9	20.9	-20.6
Annual	**11.2**	**38.5**	**-24.2**

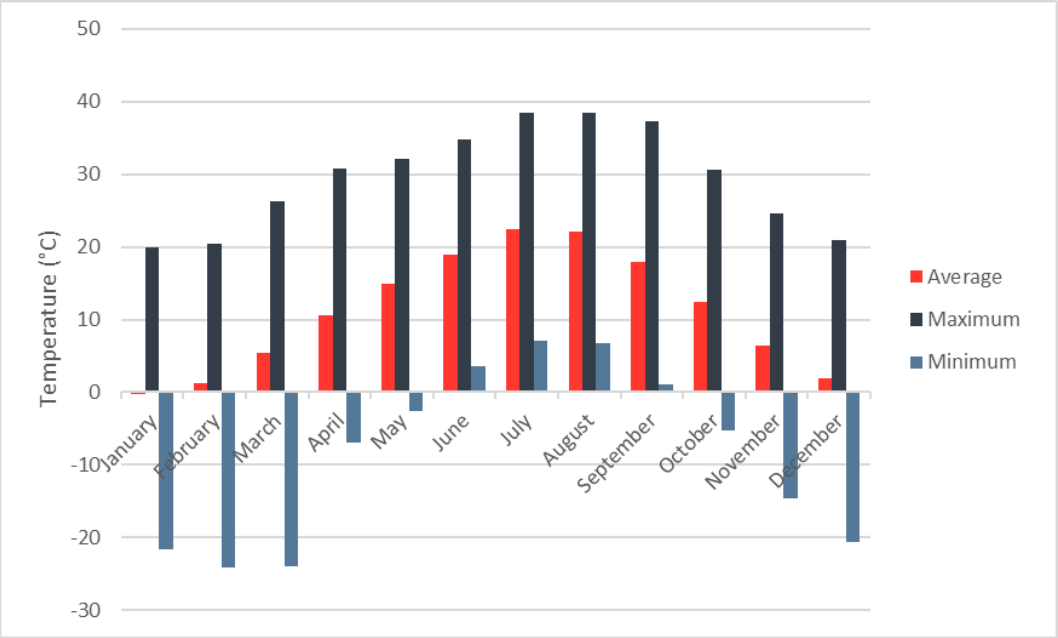


Figure 4-3: Niğde Meteorological Station – Air Temperature Measurements (°C) (1960 - 2021)

Precipitation

According to the observation records of Niğde Meteorology Station between 1960 and 2021, maximum amount of precipitation per day was measured in December with 54.5 mm. Annual average total precipitation is 336.9 mm (see Table 4-2 and Figure 4-4).

Table 4-2: Niğde Meteorological Station - Precipitation Measurements (mm) (1960 - 2021)

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

Months	Average Total Precipitation	Maximum Daily Precipitation
July	5.1	22.5
August	5.4	20.6
September	10.1	27.8
October	26.4	34.4
November	31.4	43.7
December	41.3	54.5
Annual	**336.9**	**54.5**

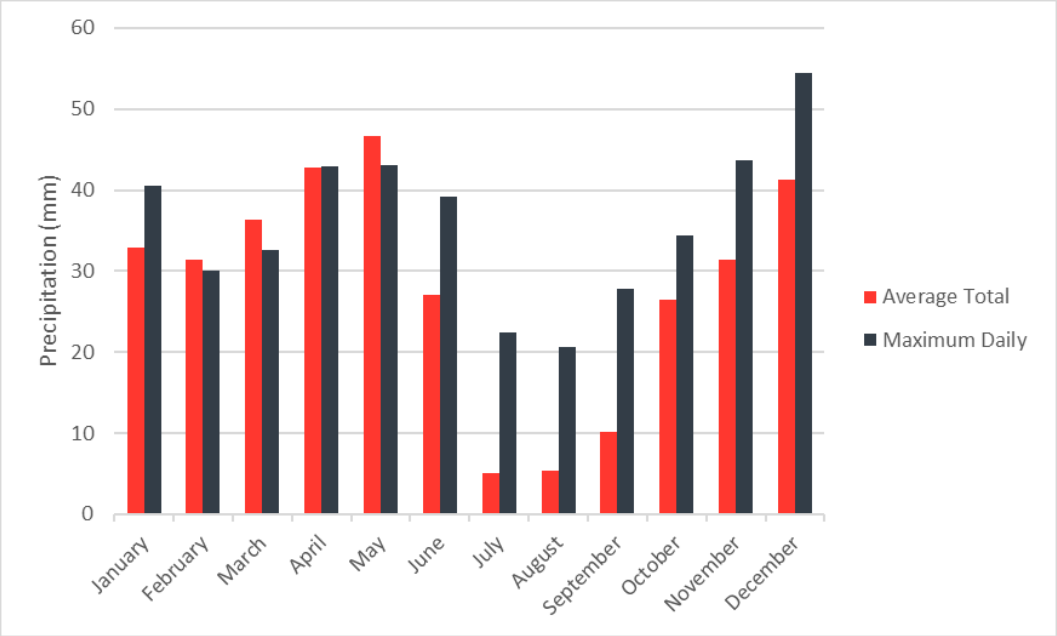


Figure 4-4: Niğde Meteorological Station - Precipitation Measurements (mm) (1960 - 2021)

Atmospheric Pressure

According to the long term (1960-2021) observation records of Niğde Meteorology Station, maximum atmospheric pressure is observed as 899.9 hPa, and minimum atmospheric pressure is 852.9 hPa. Average atmospheric pressure is 879.6 hPa per year (see Table 4-3 and Figure 4-5).

Table 4-3: Niğde Meteorological Station - Atmospheric Pressure Measurements (hPa) (1960 - 2021)

Months	Average Atmospheric Pressure	Maximum Atmospheric Pressure	Minimum Atmospheric Pressure
January	880.2	899.9	852.9
February	879.0	895.5	856.3
March	878.1	892.8	854.7
April	877.7	890.3	860.1
May	878.8	888.5	865.0
June	878.5	886.9	866.7

Months	Average Atmospheric Pressure	Maximum Atmospheric Pressure	Minimum Atmospheric Pressure
July	877.3	885.3	869.1
August	878.2	885.1	870.3
September	880.6	889.2	868.4
October	882.7	891.9	865.6
November	882.8	893.3	865.0
December	881.4	896.4	852.9
Annual	**879.6**	**899.9**	**852.9**

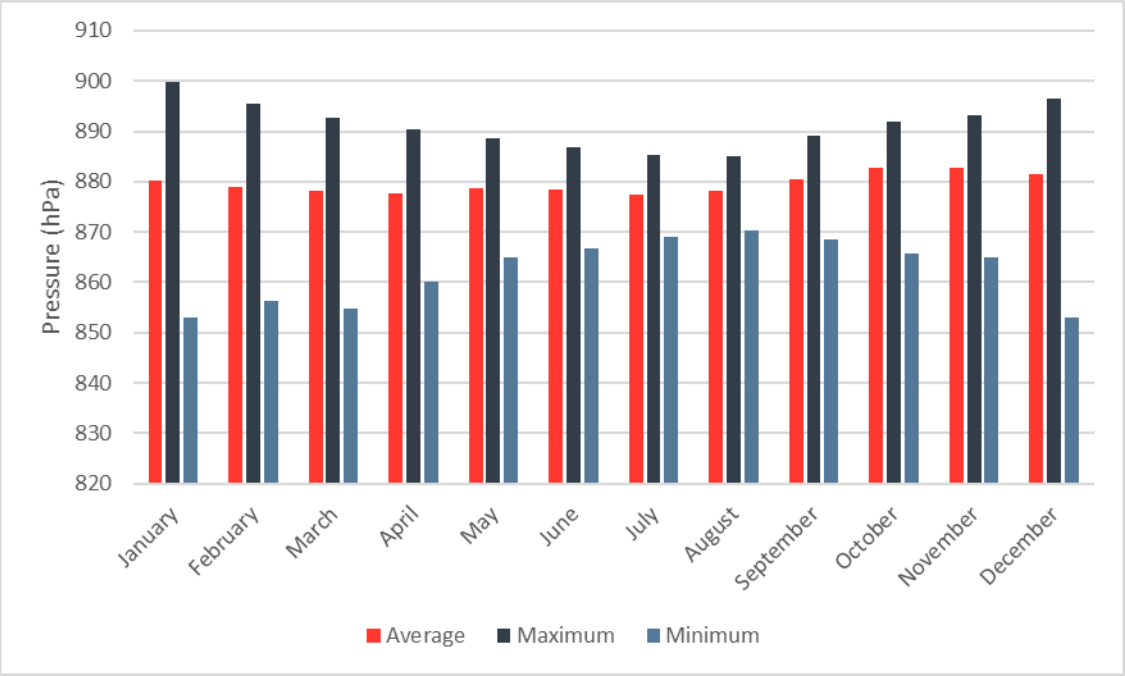


Figure 4-5: Niğde Meteorological Station - Pressure Measurements (1960 - 2021)

Relative Humidity

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

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

Months	Average Relative Humidity (%)
January	72.8
February	69.9
March	63.1
April	57.7
May	55.9

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

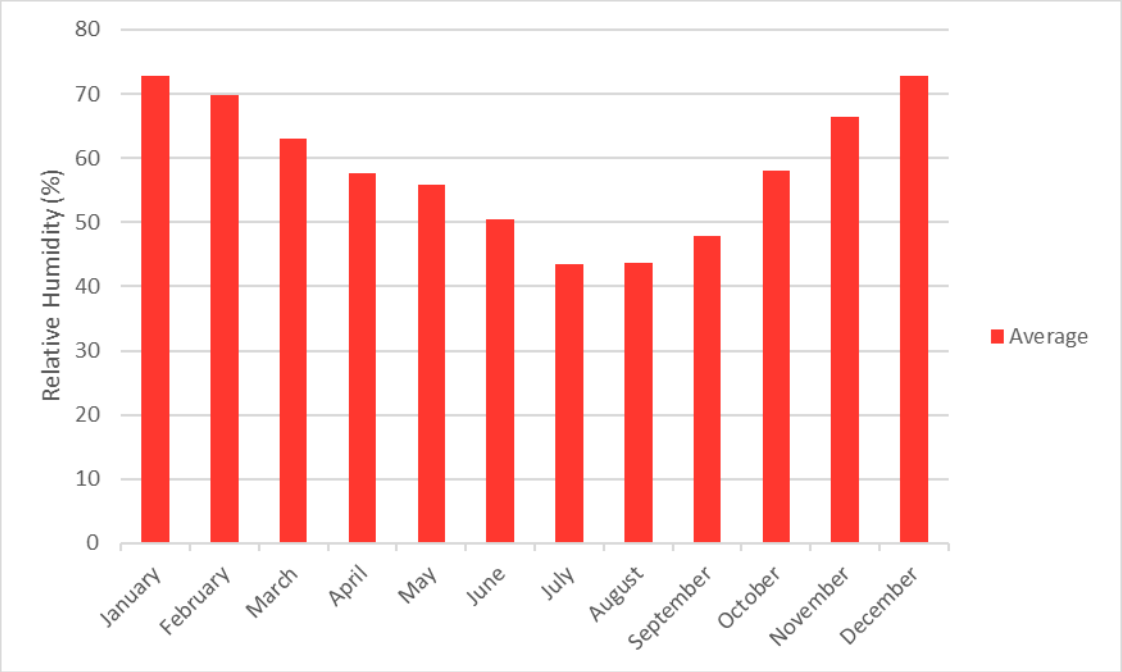


Figure 4-6: Niğde Meteorological Station - Relative Humidity Measurements (%) (1960 - 2021)

Evaporation

According to the observation records of Niğde Meteorology Station between 1960 and 2021, the average total evaporation was 1272.6 mm, and the daily maximum evaporation was 17 mm in June and July. Evaporation Values for 1960-2021 are presented in Table 4-5 and Figure 4-7.

Table 4-5: Niğde Meteorological Station - Evaporation Measurements (mm) (1960 - 2021)

Months	Average Evaporation (mm)	Daily Maximum Evaporation (mm)
January	0	-
February	0	-
March	0	-
April	58.3	12.1

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

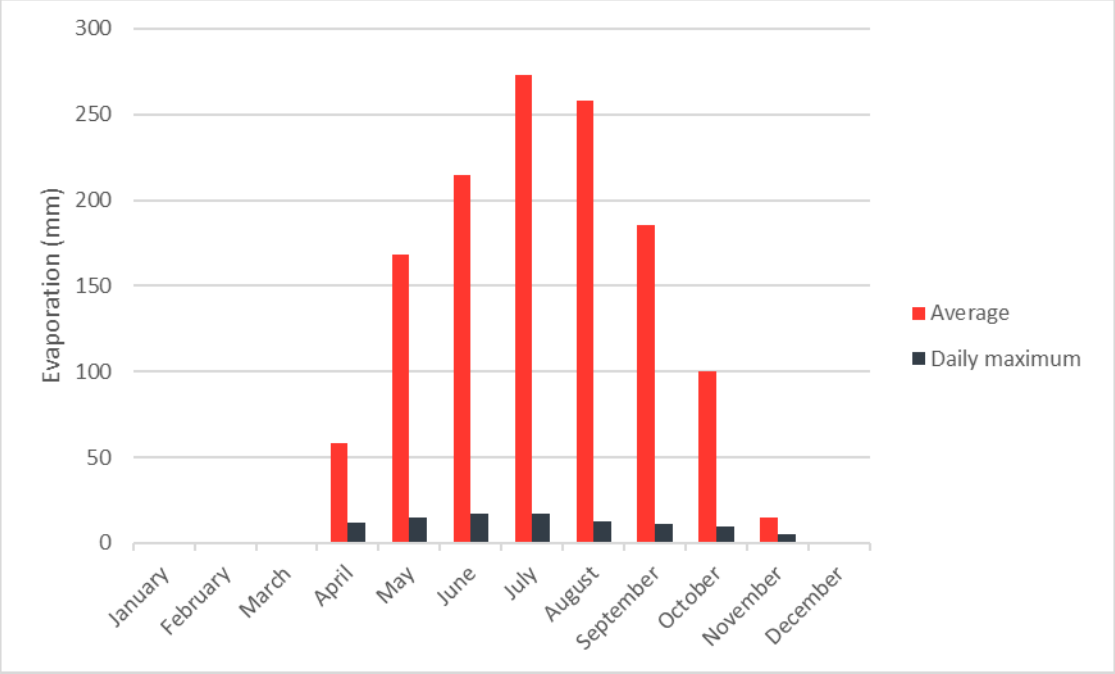


Figure 4-7: Niğde Meteorological Station - Evaporation Measurements (mm) (1960 - 2021)

Wind Distribution

Number of Winds

The total number of the wind blowing measured at Niğde Meteorological Station between 1960 and 2021 is given in Table 4-6 and Figure 4-8. As can be seen from the Table 4-6 and Figure 4-8, dominant wind direction is blowing from north-northeast (NNE) direction, second degree dominant wind direction is blowing from northeast (NE) direction.

Table 4-6: Niğde Meteorological Station - Wind Direction Measurements (mm) (1960 - 2021) (blowing from)

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

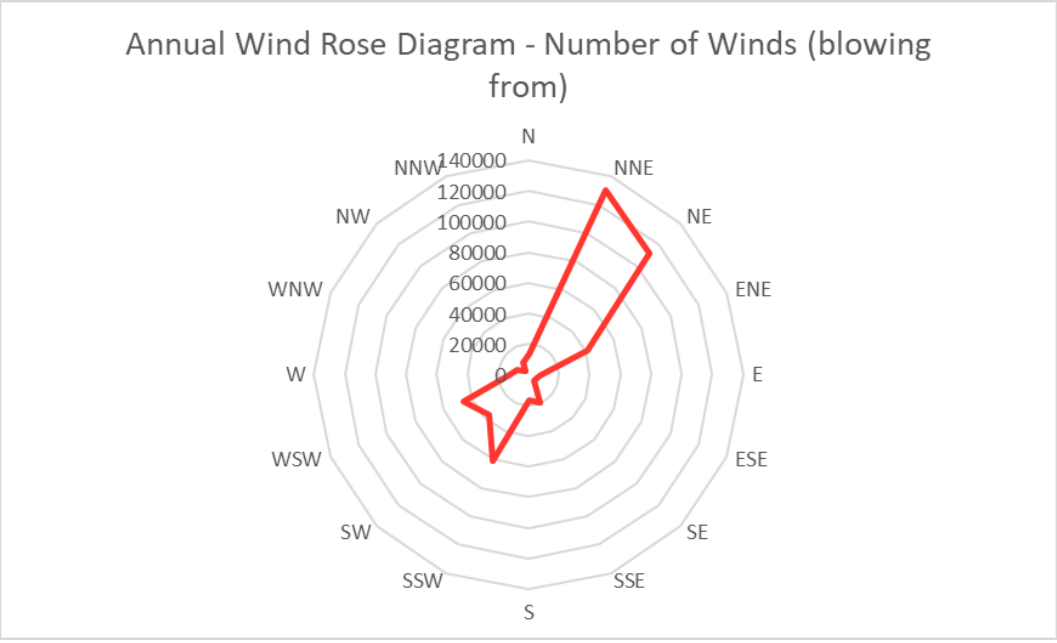


Figure 4-8: Niğde Meteorological Station - Wind Direction Measurements (mm) (1960 - 2021) (blowing from)

Wind Speed

According to data from Niğde Meteorology Station between 1960 and 2021, the annual average wind speed is 3.0 m/s. Maximum monthly wind speed is measured as 38.3 m/sec blowing from south-southeast (SSE) direction (see Table 4-7)

Table 4-7: Niğde Meteorological Station - Wind Speed (m/ sec) (1960 - 2021)

	Average Monthly Wind Speed (m/sec)	Maximum Monthly Wind speed (m/sec) and Direction
I	3	SSE 32.0
II	3.3	SSE 30.4
III	3.4	SE 31.0
IV	3.3	SSE 38.3
V	2.8	SE 28.3
VI	2.8	SE 26.2
VII	3.1	S 20.9
VIII	3	W 24.3
IX	2.7	S 25.3
X	2.5	S 21.7
XI	2.7	WSW 35.9
XII	2.9	SSE 27.8
Annual	3	SSE 38.3

Other parameters

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

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

4.1.2.2 Future Projection

World Bank Climate Change Knowledge Portal[9] 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

[9] World Bank Climate Change Knowledge Portal , 2025, https://climateknowledgeportal.worldbank.org/download-data

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 construction period of the Project is estimated to be 8 months and the total operation period will be 30 years, therefore the period between 2020-2100 were taken into consideration within the scope of the CCRA to cover all construction and operation phase of the Project.

Average Mean Surface Air Temperatures

Average mean surface air temperature is expected to increase in all considered scenarios as can be seen from Figure 4-9.

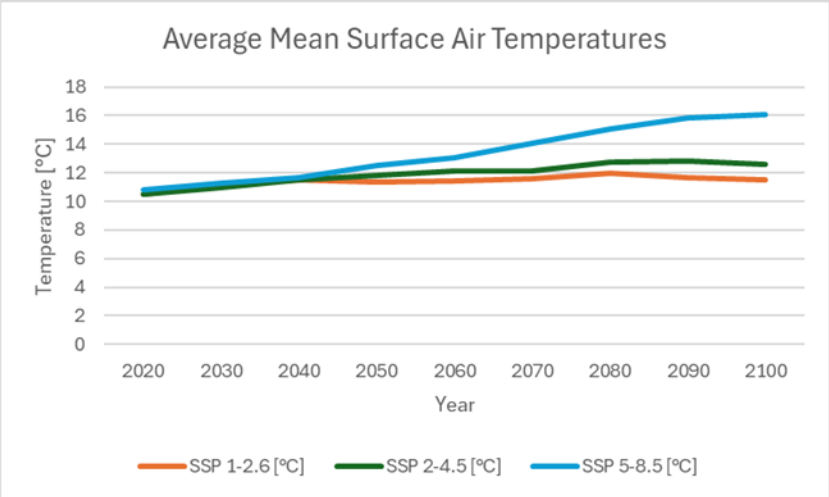


Figure 4-9: Average Mean Surface Air Temperature in climate models (CMIP6) for the historical period (1950-2020) and the Future Projections (2020-2100) in the three SSPs considered (World Bank Climate Change Knowledge Portal,2025)

The provided table below (see Table 4-8).shows the average temperature changes from 2020 to 2100 under different climate scenarios (SSP 1-2.6, SSP 2-4.5, and SSP 5-8.5). Compared to 2020, an increase in average

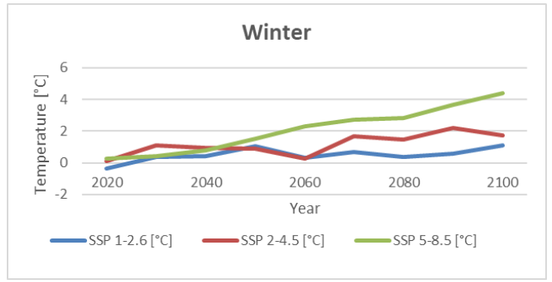
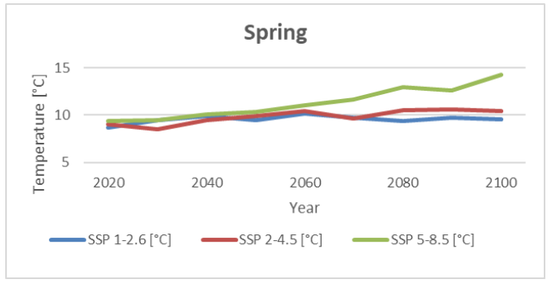
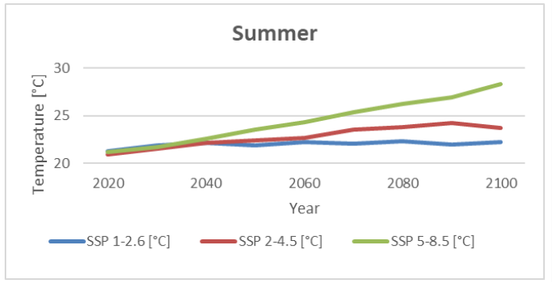
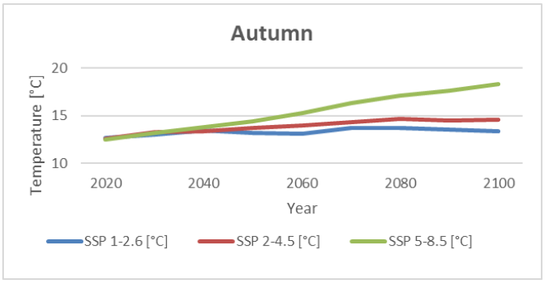
temperature is expected across all three scenarios by 2100. The SSP 1-2.6 scenario shows the lowest temperature rise, with an increase of approximately 0.96°C from 2020 to 2100. In the SSP 2-4.5 scenario, the temperature rise reaches 2.16°C, and the highest temperature increase is observed in the SSP 5-8.5 scenario, with a rise of 5.24°C by 2100. From 2040 onwards, the temperature increases accelerate in all three scenarios, becoming more pronounced by 2080.

Table 4-8: Average Mean Surface Air Temperature in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	SSP 1-2.6 [°C]	SSP 2-4.5 [°C]	SSP 5-8.5 [°C]
2020	10.54	10.47	10.82
2030	11.18	10.95	11.28
2040	11.53	11.54	11.67
2050	11.39	11.81	12.49
2060	11.44	12.11	13.04
2070	11.61	12.12	14.09
2080	11.99	12.75	15.08
2090	11.67	12.79	15.82
2100	11.5	12.63	16.06

Seasonal variations of average mean surface air temperature in CMIP6 (2020-2100) are given in Table 4-9. Seasonal temperature projections show an overall warming trend across all seasons and emission scenarios throughout the 21st century. Winter temperatures, initially below or near 0°C in 2020 under all scenarios, are projected to increase steadily, with the most significant rise under SSP5-8.5, reaching approximately 4.4°C by 2100. Spring temperatures show relatively modest increases under SSP1-2.6 and SSP2-4.5, but a marked rise under SSP5-8.5, particularly after 2060, reaching over 14°C by 2100. Summer temperatures, already high in 2020 (around 21°C), exhibit a strong upward trend, especially under the high-emission SSP5-8.5 scenario, where they reach over 28°C by the end of the century. Autumn follows a similar pattern, with gradual increases under SSP1-2.6 and SSP2-4.5, and a sharp rise under SSP5-8.5, exceeding 18°C by 2100. These trends highlight the seasonal asymmetry of climate change impacts, with the most pronounced warming expected in winter and summer months, particularly under high-emission pathways.

Table 4-9: Seasonal Variations of Average Mean Surface Air Temperature in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	Winter			Spring			Summer			Autumn		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
2020	-0.37	0.11	0.25	8.65	9.03	9.35	21.23	20.92	21.19	12.68	12.6	12.47
2030	0.39	1.1	0.4	9.43	8.53	9.51	21.83	21.51	21.73	12.97	13.3	13.18
2040	0.41	0.93	0.81	9.91	9.46	10.12	22.09	22.09	22.54	13.47	13.33	13.81
2050	1.05	0.88	1.51	9.44	9.9	10.31	21.84	22.36	23.5	13.15	13.71	14.41
2060	0.31	0.28	2.33	10.13	10.44	11.02	22.26	22.66	24.32	13.06	13.95	15.28
2070	0.7	1.66	2.73	9.72	9.67	11.63	22.04	23.55	25.37	13.67	14.32	16.32
2080	0.38	1.47	2.82	9.38	10.54	12.99	22.31	23.78	26.2	13.75	14.63	17.11
2090	0.6	2.2	3.68	9.73	10.58	12.59	21.93	24.18	26.93	13.51	14.5	17.66
2100	1.12	1.71	4.39	9.58	10.47	14.28	22.22	23.73	28.3	13.37	14.57	18.36
Grapihcs												

Average Maximum Surface Air Temperatures

Average maximum surface air temperature is expected to increase in all considered scenarios as can be seen from Figure 4-10.

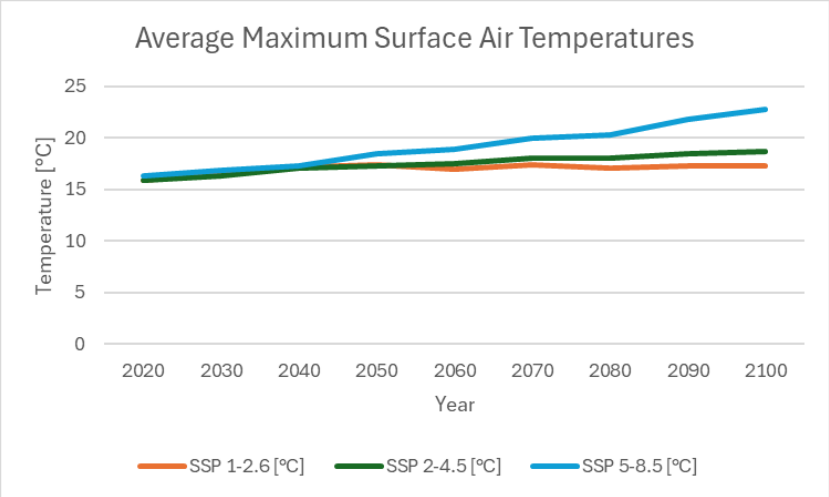


Figure 4-10: Average Maximum Surface Air Temperature in climate models (CMIP6) for the historical period (1950-2020) and the Future Projections (2020-2100) in the three SSPs considered (World Bank Climate Change Knowledge Portal,2025)

Table 4-10 displays the maximum temperature changes from 2020 to 2100 under different climate scenarios (SSP 1-2.6, SSP 2-4.5, and SSP 5-8.5). From the data, it is clear that all three scenarios predict a rise in maximum temperatures by 2100. The SSP 1-2.6 scenario shows a relatively moderate increase, with a rise of 1.35°C from 2020 to 2100. The SSP 2-4.5 scenario experiences a larger increase of 2.79°C, while the SSP 5-8.5 scenario shows the most significant rise of 6.42°C. In the SSP 5-8.5 scenario, the maximum temperature exceeds 22°C by 2100, the highest among all scenarios.

Table 4-10: Average Maximum Surface Air Temperature of Daily Maximum in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	SSP 1-2.6 [°C]	SSP 2-4.5 [°C]	SSP 5-8.5 [°C]
2020	15.93	15.9	16.36
2030	16.66	16.27	16.9
2040	17.23	17.09	17.3
2050	17.4	17.25	18.44
2060	17.01	17.49	18.85
2070	17.41	18.09	19.98
2080	17.08	18.08	20.34
2090	17.24	18.46	21.77
2100	17.28	18.69	22.78

Seasonal variations of average maximum surface air temperature in CMIP6 (2020-2100) are given in Table 4-9. Seasonal temperature projections indicate a consistent warming trend across all emission scenarios (SSP1-2.6, SSP2-4.5, SSP5-8.5), with the most significant increases observed under the high-emission pathway (SSP5-8.5). Winter temperatures, starting between 3.7°C and 4.5°C in 2020, are projected to rise steadily, reaching up to 8.8°C by 2100 under SSP5-8.5. Spring temperatures follow a similar trend, with modest increases under low and intermediate scenarios, while under SSP5-8.5, spring temperatures could exceed 20°C by the end of the century. Summer temperatures, which are already high at baseline (around 27.5°C), are projected to increase gradually, with the most dramatic rise again under SSP5-8.5, reaching nearly 35°C by 2100. Autumn shows a comparable pattern, with temperatures increasing by 1–6°C depending on the scenario, culminating in nearly 25°C under SSP5-8.5. Overall, all seasons show clear warming, but summer and autumn are projected to experience the greatest increases, especially under high-emission scenarios.

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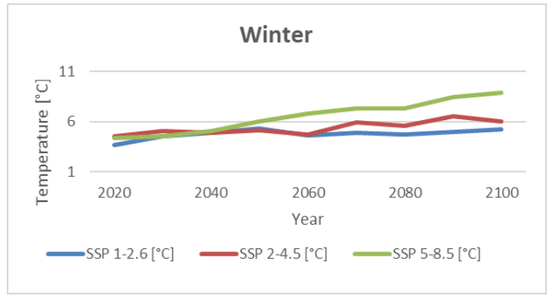
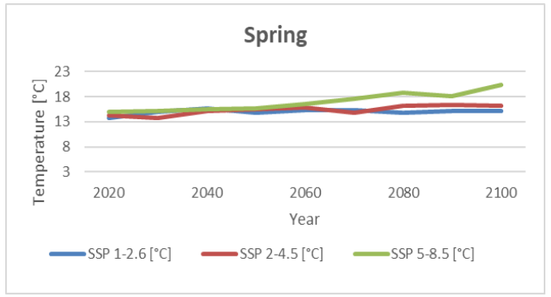
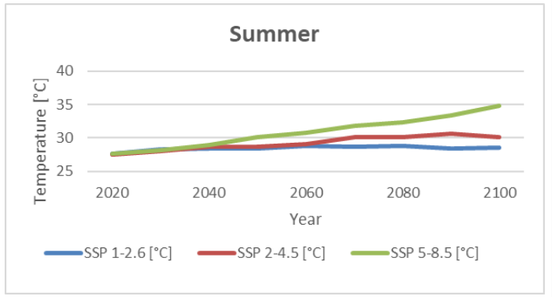
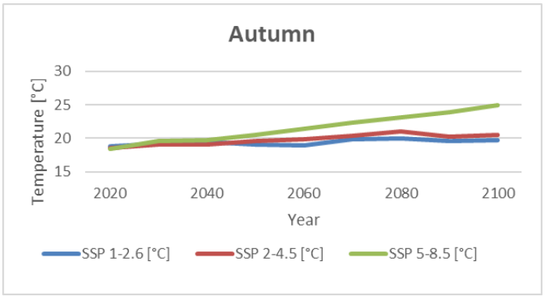
Table 4-11: Seasonal Variations of Average Maximum Surface Air Temperature in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	Winter			Spring			Summer			Autumn		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
2020	3.7	4.54	4.38	13.82	14.21	14.90	27.58	27.49	27.63	18.79	18.49	18.38
2030	4.55	5.01	4.50	14.89	13.72	15.13	28.26	27.98	28.19	19.22	19.09	19.57
2040	4.92	4.85	5.02	15.59	15.09	15.48	28.46	28.66	28.92	19.41	19.04	19.69
2050	5.33	5.17	5.97	14.83	15.48	15.64	28.37	28.73	30.19	19.03	19.65	20.54
2060	4.60	4.68	6.76	15.40	15.89	16.54	28.82	29.12	30.83	18.95	19.85	21.40
2070	4.88	5.88	7.28	15.36	14.88	17.54	28.70	30.11	31.86	19.82	20.37	22.35
2080	4.67	5.54	7.34	14.84	16.11	18.72	28.80	30.11	32.40	19.94	21.05	23.09
2090	4.98	6.53	8.47	15.21	16.45	18.17	28.37	30.70	33.37	19.65	20.21	23.93
2100	5.25	6.00	8.84	15.14	16.17	20.45	28.60	30.17	34.88	19.77	20.44	24.94
Graphics												

Average Minimum Surface Air Temperatures

Average minimum surface air temperature is expected to increase in all considered scenarios as can be seen from Figure 4-11.

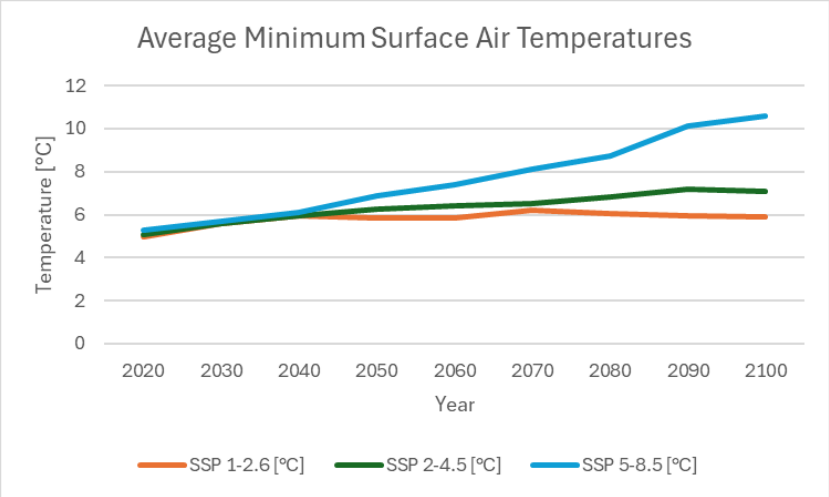


Figure 4-11: Average Minimum Surface Air Temperature in climate models (CMIP6) for the historical period (1950-2020) and the future projections (2020-2100) in the three SSPs considered (World Bank Climate Change Knowledge Portal,2025)

Table 4-12 presents the minimum temperature changes from 2020 to 2100 under different climate scenarios (SSP 1-2.6, SSP 2-4.5, and SSP 5-8.5). In all three scenarios, a clear upward trend in minimum temperatures is observed. The SSP 1-2.6 scenario shows a moderate increase of 0.91°C by 2100, with the minimum temperature reaching 5.89°C. The SSP 2-4.5 scenario experiences a larger increase of 2.01°C, reaching a minimum temperature of 7.09°C by 2100. The SSP 5-8.5 scenario sees the most substantial rise, with a temperature increase of 5.3°C, leading to a minimum temperature of 10.6°C by 2100. Notably, the minimum temperatures in the SSP 5-8.5 scenario exceed 10°C, highlighting the significant warming expected under high emission scenarios.

Table 4-12: Average Minimum Surface Air Temperature of Daily Minimum in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	SSP 1-2.6 [°C]	SSP 2-4.5 [°C]	SSP 5-8.5 [°C]
2020	4.98	5.08	5.3
2030	5.58	5.57	5.68
2040	5.95	5.95	6.1
2050	5.87	6.27	6.89
2060	5.85	6.43	7.38
2070	6.23	6.52	8.14
2080	6.07	6.84	8.71
2090	5.95	7.21	10.11
2100	5.89	7.09	10.6

Maximum of Daily Max-Temperature

Single-day maximum temperature is expected to increase in all considered scenarios as can be seen from Figure 4-10 and Table 4-13

In the SSP1-2.6 scenario, the temperature increases by approximately 0.02°C/year, as shown in the table, with temperatures reaching around 34.78°C by 2080 (from 33.36°C in 2020). This indicates an increase of approximately 1.42°C by 2080 compared to 2020. Based on this, the temperature increase is about 4.25% by 2080.

In the SSP2-4.5 scenario, the projected increase is about 0.04°C/year, with temperatures expected to rise to 35.92°C by 2100 (from 33.20°C in 2020), as shown in the table. This represents a 2.72°C increase compared to 2020, or an approximate 8.2% increase by 2100.

In the SSP5-8.5 scenario, the temperature increases about 0.08°C/year, as shown in the table, with temperatures potentially rising to 40.18°C by 2100 (from 33.35°C in 2020). This represents an increase of 6.83°C compared to 2020, or an approximate 20.4% increase by 2100.

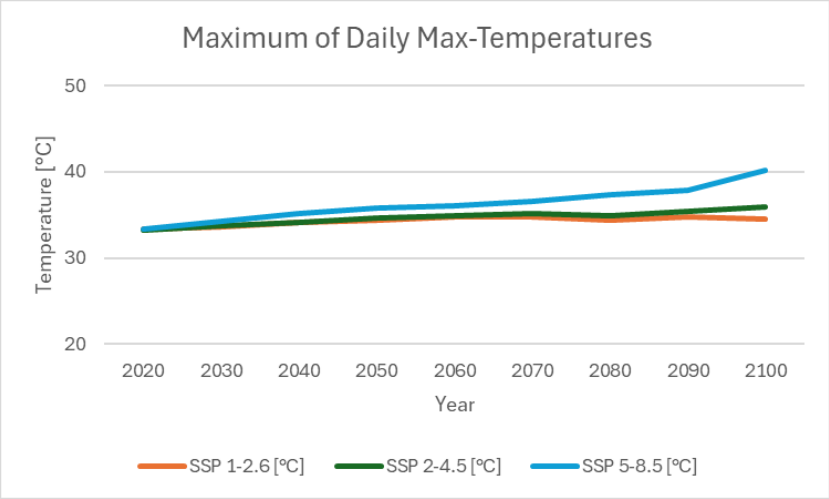


Figure 4-12: Maximum of Daily Max-Temperature in climate models (CMIP6) for the historical period (1950-2020) and the future projections (2020-2100) in the three SSPs considered (World Bank Climate Change Knowledge Portal,2025)

Table 4-13: Maximum of Daily Max-Temperature in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	SSP 1-2.6 [°C]	SSP 2-4.5 [°C]	SSP 5-8.5 [°C]
2020	33.36	33.2	33.35
2030	33.63	33.68	34.2
2040	34.17	34.11	35.15
2050	34.36	34.66	35.8
2060	34.75	34.85	36.02
2070	34.82	35.22	36.61
2080	34.38	34.85	37.32
2090	34.74	35.36	37.81
2100	34.5	35.92	40.18

Seasonal variations of daily maximum of maximum surface air temperature in CMIP6 (2020-2100) are given in Table 4-9. The comparison between the two datasets reveals a clear distinction in baseline temperature levels and projected increases. The second dataset indicates significantly higher seasonal temperatures for all years and scenarios, suggesting either a different region or a different reference baseline. For instance, in 2020, winter temperatures start around 12–13°C in the second table, while they are around 4°C in the first, indicating at least an 8°C baseline difference. Despite this, both datasets show similar trends: steady warming across all seasons, more pronounced under SSP5-8.5. In both datasets, summer temperatures show the sharpest increases, exceeding 41°C by 2100 in the second dataset under SSP5-8.5, compared to 34.9°C in the first. Autumn also exhibits strong warming, particularly under high emissions, reaching up to 36.1°C in the second dataset. The consistency in projected trends despite different baselines reinforces the robustness of warming projections, while highlighting potential regional disparities in climate impact severity.

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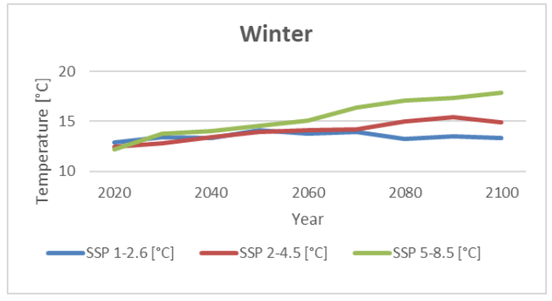
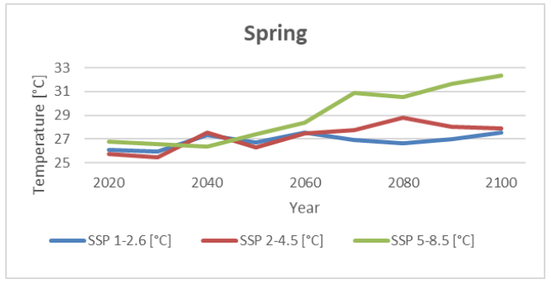
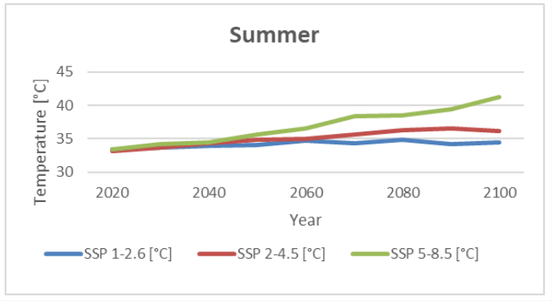
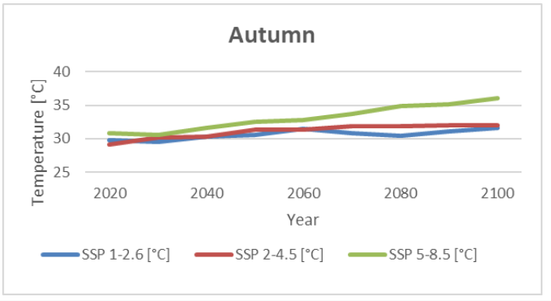
Table 4-14: Seasonal Variations of Daily Maximum of Maximum Surface Air Temperature in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	Winter			Spring			Summer			Autumn		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
2020	12.93	12.49	12.24	26.1	25.72	26.79	33.36	33.2	33.35	29.72	29.14	30.87
2030	13.43	12.85	13.81	25.92	25.49	26.59	33.63	33.68	34.2	29.54	30.24	30.56
2040	13.33	13.44	14.01	27.36	27.53	26.33	33.87	34.36	34.49	30.37	30.37	31.57
2050	14.14	13.96	14.54	26.7	26.32	27.44	33.99	34.85	35.63	30.56	31.37	32.59
2060	13.73	14.08	15.09	27.53	27.46	28.35	34.77	34.99	36.59	31.48	31.34	32.73
2070	13.98	14.24	16.4	26.94	27.72	30.86	34.34	35.57	38.37	30.88	31.82	33.73
2080	13.22	15.03	17.07	26.61	28.79	30.52	34.83	36.22	38.52	30.46	31.88	34.83
2090	13.54	15.45	17.33	27.01	28.04	31.65	34.18	36.5	39.39	31.05	32.02	35.18
2100	13.35	14.88	17.86	27.55	27.88	32.36	34.43	36.16	41.27	31.58	32.06	36.11
Graphics												

Minimum of Daily Min-Temperature

Single-day minimum temperature is expected to increase in all considered scenarios as can be seen from Table 4-15.

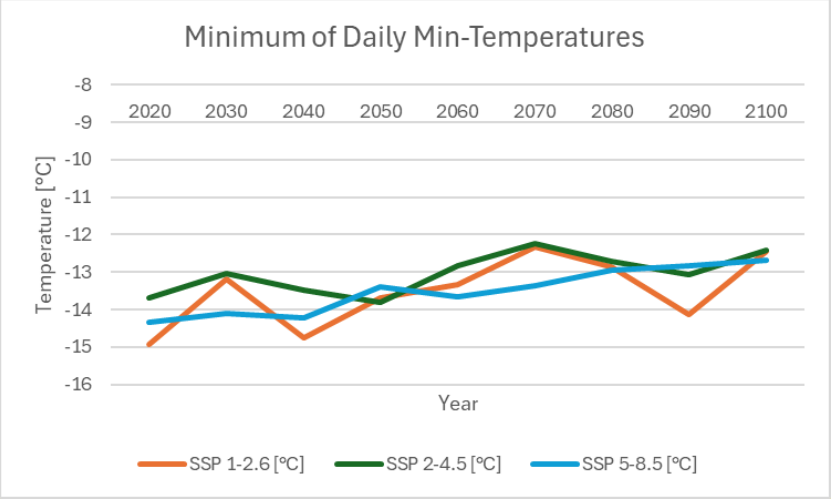


Figure 4-13: Minimum of Daily Min-Temperature in climate models (CMIP6) for the historical period (1950-2020) and the future projections (2020-2100) in the three SSPs considered (World Bank Climate Change Knowledge Portal,2025)

Table 4-15: Minimum of Daily Min-Temperature in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	SSP 1-2.6 [°C]	SSP 2-4.5 [°C]	SSP 5-8.5 [°C]
2020	-14.94	-13.68	-14.35
2030	-13.18	-13.04	-14.1
2040	-14.75	-13.47	-14.22
2050	-13.68	-13.8	-13.39
2060	-13.34	-12.84	-13.65
2070	-12.34	-12.25	-13.35
2080	-12.87	-12.72	-12.95
2090	-14.12	-13.07	-12.84
2100	-12.45	-12.43	-12.68

Hot Days (Tmax > 35 °C)

The number of hot days (Tmax > 35°C) is projected to increase under all emission scenarios throughout the 21st century, as shown in Figure 4-14 and Table 4-16.

The rate and magnitude of increase differ significantly between scenarios. Under the SSP1-2.6 scenario, the number of hot days remains relatively low, with only a slight increase from 2020 to 2100, reaching around 3 days/year by the end of the century. In the SSP2-4.5 scenario, the number of hot days shows a more noticeable upward trend, peaking at around 8–9 days/year by 2080 and then stabilizing. In contrast, the SSP5-8.5 scenario indicates a dramatic increase, with hot days rising steadily throughout the century to reach over 50 days/year

by 2100. This scenario demonstrates the strongest sensitivity to continued high emissions, emphasizing the importance of mitigation efforts.

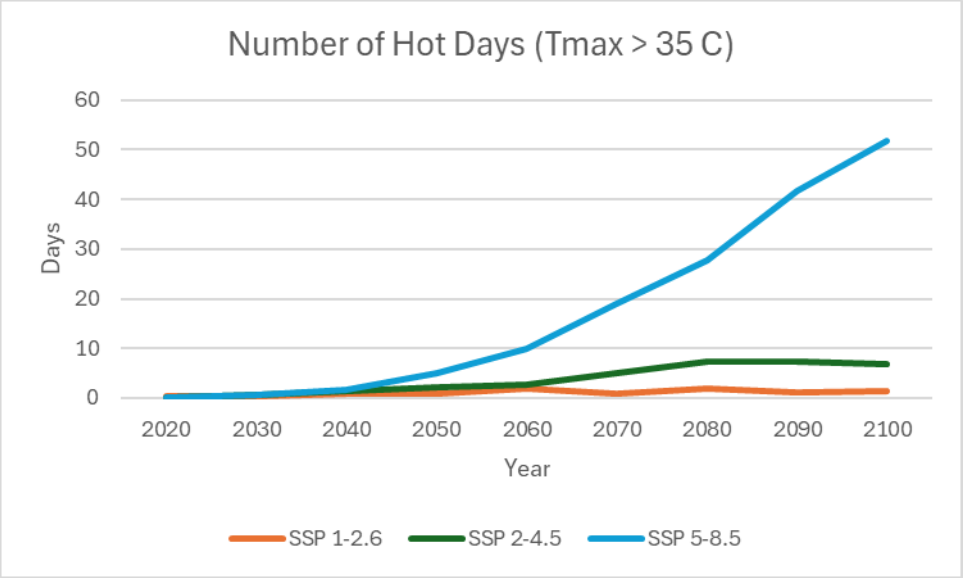


Figure 4-14: Number of Hot Days (Tmax > 35 °C) in climate models (CMIP6) for the historical period (1950-2020) and the future projections (2020-2100) in the three SSPs considered (World Bank Climate Change Knowledge Portal,2025)

Table 4-16: Number of Hot Days in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	SSP 1-2.6 [days]	SSP 2-4.5 [days]	SSP 5-8.5 [days]
2020	0.28	0.23	0.22
2030	0.35	0.51	0.73
2040	0.95	1.44	1.63
2050	0.79	2.06	5.15
2060	1.91	2.67	9.81
2070	0.91	4.94	18.88
2080	1.89	7.29	27.8
2090	1.12	7.4	41.66
2100	1.37	6.9	51.72

Frost Days (Tmin < 0 °C)

Number of frost days is projected to decrease under all considered scenarios in the first half of the century as can be seen from Figure 4-15. For the second half of the century predictions show different trend according to different emission scenarios: fluctuations with overall stability for the SSP1-2.6 scenario; fluctuations with overall decrease in the SSP2-4.5 and SSP5-8.5 scenarios.

In the SSP1-2.6 scenario, the number of frost days is expected to decrease around 0.05 days/year by 2080, then it is expected to relatively increase around 2.6 days/year by 2100. Based on that, compared to 2020, the number of frost days is expected to decrease approximately 60% by 2080. In the SSP2-4.5 scenario, the number of frost days is expected to decrease by approximately 0.07 days/year, reaching about 1.2 days/year by 2100. Based on that, compared to 2020, the number of frost days is expected to decrease approximately 75% by 2090. In the SSP5-8.5 scenario, the number of frost days is expected to decrease significantly throughout the century. (see Table 4-17).

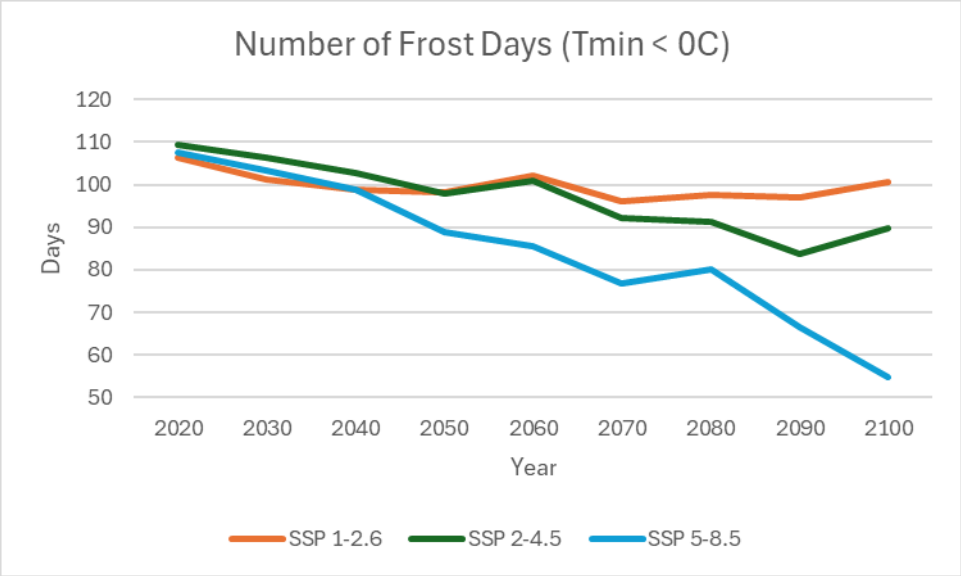


Figure 4-15: Number of Frost Days (Tmin < 0 °C) in climate models (CMIP6) for the historical period (1950-2020) and the future projections (2020-2100) in the three SSPs considered (World Bank Climate Change Knowledge Portal,2025)

Table 4-17: Number of Frost Days in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	SSP 1-2.6 [days]	SSP 2-4.5 [days]	SSP 5-8.5 [days]
2020	106.3	109.44	107.58
2030	101.14	106.27	103.27
2040	98.78	102.61	98.78
2050	98.09	97.78	88.98
2060	102.04	101.03	85.4
2070	95.96	92.16	76.74
2080	97.59	91.18	80.05
2090	97.09	83.71	66.63
2100	100.76	89.89	54.8

Precipitation

Precipitation is projected to remain stable under all considered scenarios in the first half of the century as can be seen from Figure 4-16. For the second half of the century predictions show different trend according to

different emission scenarios: fluctuations with overall increase in the SSP1-2.6; fluctuations with overall stability for the SSP2-4.5; decrease for the SSP5-8.5.

In the SSP1-2.6 scenario, precipitation is expected to decrease relatively around 490 mm/year till around 2050. In the second part of the century, values tend to increase, reaching around 520 mm/year in 2100. Based on that, compared to 2020, precipitation is expected to increase approximately 7% by 2100. In the SSP2-4.5 scenario, precipitation is expected to fluctuate around 510 mm/year until 2050. In the second part of the century, values tend to decrease, reaching below 500 mm/year by 2100. In the SSP5-8.5 scenario, precipitation is expected to decrease relatively around 450 mm/year by 2100. Based on that, compared to 2020, precipitation is expected to decrease approximately 15% by 2100. (see Table 4-18).

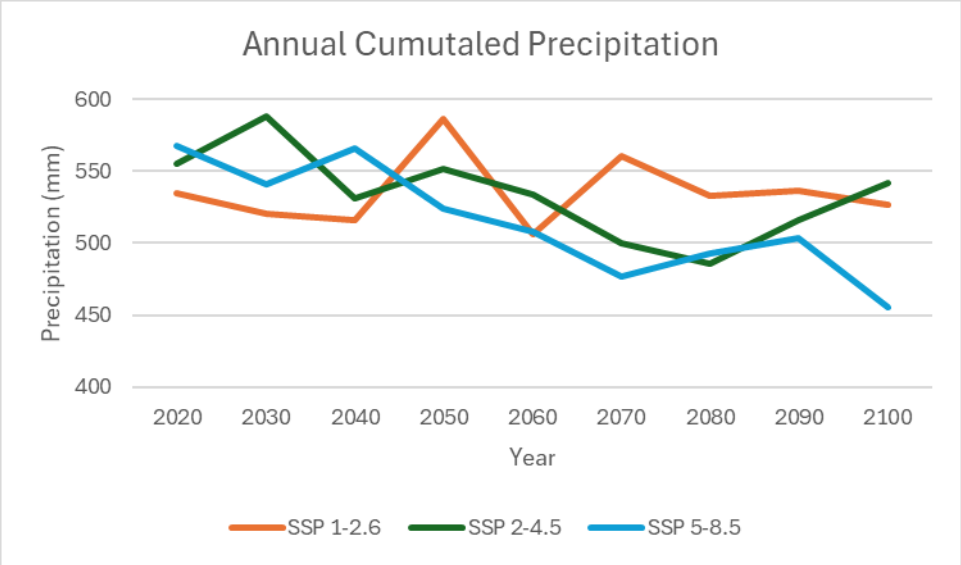


Figure 4-16: Annual Cumulated Precipitation in climate models (CMIP6) for the historical period (1950-2020) and the future projections (2020-2100) in the three SSPs considered (World Bank Climate Change Knowledge Portal,2025)

Table 4-18: Annual Cumutaled Precipitation in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	SSP 1-2.6 [mm]	SSP 2-4.5 [mm]	SSP 5-8.5 [mm]
2020	534.3	555.4	567.96
2030	520.21	588.2	540.76
2040	515.72	531.22	566.29
2050	586.87	551.86	524.05
2060	506.56	533.98	507.71
2070	560.49	499.76	476.96
2080	532.65	485.74	492.99
2090	536.51	515.76	503.32
2100	526.36	541.7	455.14

Average Largest 1-Day Precipitation

Average largest 1-day precipitation is projected to remain stable under all considered scenarios in the first half of the century as can be seen from Figure 4-17. For the second half of the century predictions show different trend according to different emission scenarios: fluctuations with overall stability for the SSP1-2.6 and SSP2-4.5; increase for the SSP5-8.5.

In the SSP1-2.6 scenario, precipitation is expected to change around 0.05 mm/year for the entire century with fluctuations of +/- 0.01 mm. In the SSP2-4.5 scenario, precipitation is expected to change around 0.07 mm/year for the entire century with fluctuations of +/- 0.01 mm. In the SSP5-8.5 scenario, precipitation is expected to change around 0.06 mm/year for the entire century with fluctuations of +/- 0.01 mm (see Table 4-19).

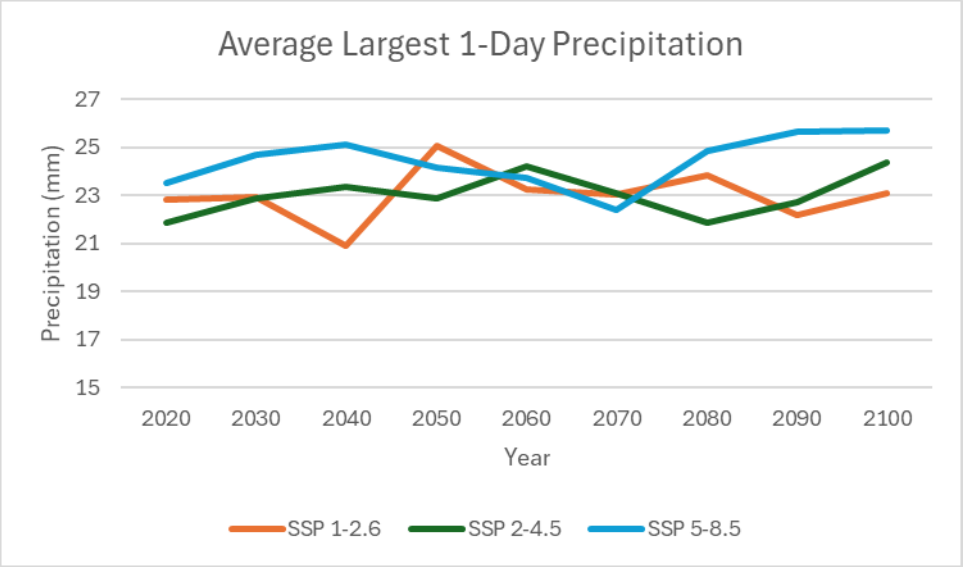


Figure 4-17: Average Largest 1-Day Precipitation in climate models (CMIP6) for the historical period (1950-2020) and the future projections (2020-2100) in the three SSPs considered (World Bank Climate Change Knowledge Portal,2025)

Table 4-19: Average Largest 1-Day Precipitation in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	SSP 1-2.6 [mm]	SSP 2-4.5 [mm]	SSP 5-8.5 [mm]
2020	22.81	21.88	23.51
2030	22.91	22.9	24.7
2040	20.9	23.36	25.11
2050	25.08	22.86	24.17
2060	23.27	24.23	23.73
2070	23.04	23.08	22.37
2080	23.82	21.86	24.84
2090	22.19	22.74	25.65
2100	23.07	24.38	25.72

Average Largest 5-Day Cumulative Precipitation

Average largest 5-day cumulative precipitation is projected to remain stable under all considered scenarios in the first half of the century as can be seen from Figure 4-18. For the second half of the century predictions show different trend according to different emission scenarios: fluctuations with overall stability for the SSP1-2.6 and SSP2-4.5; increase for the SSP5-8.5.

In the SSP1-2.6 scenario, average largest 5-day precipitation is expected to fluctuate around 50 mm/year for the entire century with variations of +/- 5 mm. In the SSP2-4.5 scenario, average largest 5-day precipitation is expected to remain relatively stable around 50 mm/year for the entire century with fluctuations of +/- 5 mm. In the SSP5-8.5 scenario, average largest 5-day precipitation is expected to remain relatively stable around 50 mm/year for the entire century with fluctuations of +/- 5 mm (see Table 4-20).

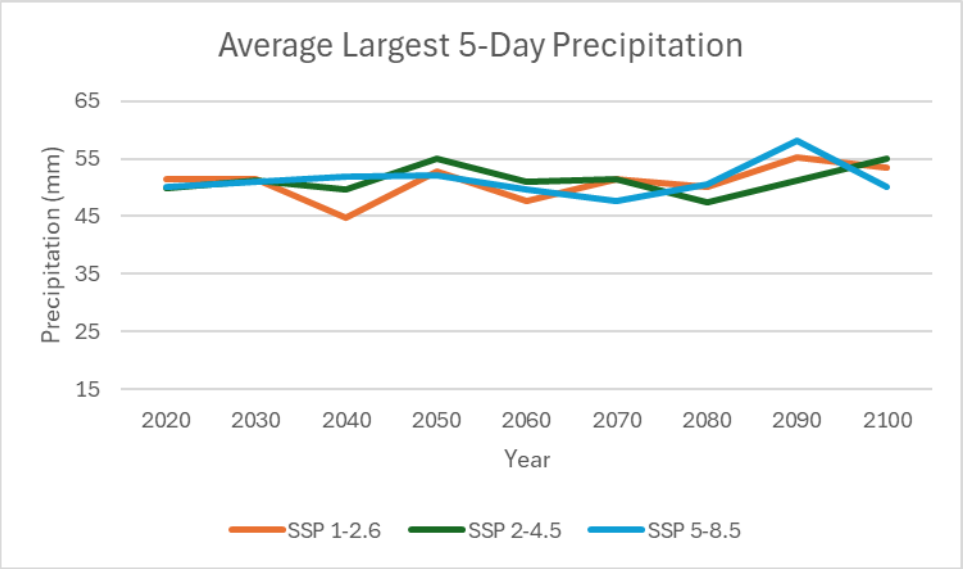


Figure 4-18: Average Largest 5-Day Cumulative Precipitation in climate models (CMIP6) for the historical period (1950-2020) and the future projections (2020-2100) in the three SSPs considered (World Bank Climate Change Knowledge Portal,2025)

Table 4-20: Average Largest 5-Day Cumulative Precipitation in CMIP6 (2020-2100) (World Bank Climate Change Knowledge Portal,2025)

Year	SSP 1-2.6 [mm]	SSP 2-4.5 [mm]	SSP 5-8.5 [mm]
2020	51.47	49.82	50.08
2030	51.53	51.18	50.89
2040	44.67	49.75	51.98
2050	52.74	55.08	52.14
2060	47.71	50.95	49.65
2070	51.54	51.34	47.57
2080	50.02	47.47	50.58
2090	55.13	51.3	58.2

Year	SSP 1-2.6 [mm]	SSP 2-4.5 [mm]	SSP 5-8.5 [mm]
2100	53.49	54.99	50.2

4.1.3 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:

- What are the past events and what are the main issues that affected the site and may be related to climate change?
- What is the climate-related hazards that may become relevant in the future?

Information from World Bank Group – Climate Change Knowledge Portal, Vulnerability section, were consulted to identify the most relevant hazards at the Country level. In addition to this, THINK HAZARD portal (implemented by Global Facility for Disaster Reduction and Recovery (GFDRR) in collaboration with World Bank and providing high level hazard assessment worldwide) was used to refine the investigation at the level of the city of Niğde.

Also, following physical components and their baseline conditions discussed in the ESIA report of the Project is also considered for evaluation of the hazards:

- Meteorology
- Hydrology and Hydrogeology
- Geology, Geomorphology and Geotechnics
- Soil and Subsoil

The outcomes of this processes resulted in the following list of selected hazards. They are listed together with the main justification for their inclusion and assessment (“Highest”, “High”, “Medium”, “Low” or “Lowest”) for the the risk assessment. The assessment was qualitatively characterized based on the future projections and selected according to the characteristics of the Project.

- **Flooding Hazard**

Flooding is a recurring natural hazard throughout Niğde.

The flood risk in Niğde is influenced by its geographic location in the Central Anatolia region of Türkiye. While the city is not located directly on the coast, it can still be affected by heavy rainfall from weather systems passing over the area.

During periods of intense precipitation, rivers and streams in and around Niğde can swell, potentially leading to localized flooding in low-lying areas and areas with inadequate drainage. Urbanization and changes in land use can also contribute to increased flood risk by altering natural drainage patterns.

According to the information in THINK HAZARD Portal, in Bor District, significant floods are expected at least once in the next 50 years. Factors such as intense rainfall and the district's topography contribute to this risk.

Also, according to the information acquired from the ESIA Report of the Project, there is no basins and surface water bodies in or around the Project Site to increase flooding risk.

With the consideration of the data from THINK HAZARD, precipitation condition data from the closest Meteorology Station and future projection data from World Bank Climate Change Knowledge Portal (see Section 4.1.2), this hazard has been **scoped in** for the climate change risks assessment

- **Extreme Heat Hazard**

The mean annual temperature in Niğde has increased by an average of 0.5°C per decade since 1971, adding up to a 1.5°C temperature increase since last century. Temperatures are projected to keep rising in Bor District as well. 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.

With the consideration of the data from THINK HAZARD, temperature condition data from the closest Meteorology Station and future projection data from World Bank Climate Change Knowledge Portal (see Section 4.1.2), this hazard has been **scoped in** for the climate change risks assessment

- **Extreme Cold Hazard**

In Niğde Province, in January, which is typically the coldest month of the year, average minimum temperatures moved from -6.37°C for the period 1901-1930 to -5.58° in the period 1991-2020. According to all scenarios, minimum temperatures are expected to further increase in the future.

With the consideration of the data from THINK HAZARD, temperature condition data from the closest Meteorology Station and future projection data from World Bank Climate Change Knowledge Portal (see Section 4.1.2), this hazard has been scoped in for the climate change risks assessment

- **Drought Hazard**

Droughts have large impacts on agricultural production and the population. Niğde Province has a desertification risk above medium level. It is situated at an elevation of about 1300 m above sea level.

According to a study, 110 droughts lasting six months and more occurred between 1950 and 2015. It was determined that drought magnitude increases from 1-month time scale to 36-month timescale.[10]

Additionally, if droughts intensify, they will pose serious threats to food security, people's main livelihood activity (agriculture), and water resources.

Moreover, according to the information acquired from the ESIA Report of the Project, there is no basins and surface water bodies in or around the Project Site.

With the consideration of the data from THINK HAZARD, temperature and precipitation conditions from the closest Meteorology Station and future projection data from World Bank Climate Change Knowledge Portal (see Section 4.1.2),, this hazard has been scoped in for the climate change risks assessment

[10]https://www.researchgate.net/publication/322157691_INVESTIGATION_OF_TRENDS_IN_METEOROLOGICAL_DROUGHTS_IN_NIGDE_PROVINCE

- **Severe Storms Hazard**

According to The European Severe Weather Database (ESWD)[11], severe storms including severe wind, heavy rain, large hail, damaging lightning is a recurring hazard in Niğde.

With the consideration of the data from THINK HAZARD, wind conditions from the closest Meteorology Station and future projection data from World Bank Climate Change Knowledge Portal (see Section 4.1.2), this hazard has been **scoped in** for the climate change risks assessment

- **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.

With the consideration of the data from THINK HAZARD, precipitation condition data from the closest Meteorology Station and future projection data from World Bank Climate Change Knowledge Portal (see Section 4.1.2), this hazard has been **scoped in** for the climate change risks assessment

- **Wildfires Hazard**

According to Think Hazard portal, in Niğde Province the wildfire hazard is classified as high which means that there is greater than a 50% chance of encountering weather that could support a significant wildfire that is likely to result in both life and property loss in any given year. Based on data available in the Global Forest Watch, Niğde lost 79 ha overall from all loss factors between 2001 and 2022, including the loss of 23 ha of tree cover due to fires. In this time frame, the year 2021 had the greatest amount of tree cover loss due to fires, with 7 ha lost to fires accounting for 55% of all tree cover loss for that year. Fires were responsible for 23% of tree cover loss in Niğde between 2001 and 2022.

In extreme fire weather events, strong winds and winds born debris may weaken the integrity of infrastructures. Future climate projections based on models indicate that there will likely be more instances of fire weather in 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.

With the consideration of the data from THINK HAZARD, temperature and precipitation conditions, from the closest Meteorology Station and future projection data from World Bank Climate Change Knowledge Portal (see Section 4.1.2), together with drought hazard, hazard has been **scoped in** for the climate change risks assessment although the project area is flat and has low vegetation density.

- **Water Stress**

According to the Think Hazard portal[12], Niğde Province is classified as having a high risk of water scarcity. This classification indicates that the area faces significant challenges in meeting water demand due to limited availability. Factors contributing to this risk include low annual rainfall, high evaporation rates, and increasing water consumption across agricultural, industrial, and domestic sectors.

[11] https://eswd.eu/

[12] https://thinkhazard.org/en/

Climate change projections suggest that Niğde may experience higher temperatures and more variable precipitation patterns, potentially exacerbating water scarcity issues.

With the consideration of the data from THINK HAZARD, temperature and precipitation conditions, from the closest Meteorology Station and future projection data from World Bank Climate Change Knowledge Portal (see Section 4.1.2), together with drought hazard, hazard has been **scoped in** for the climate change risks assessment.

- **Heat Stress**

According to the Think Hazard portal, Niğde Province faces a high risk of extreme heat, with maximum summer temperatures occasionally exceeding 35°C. Climate projections indicate that these extreme heat events are likely to become more frequent and severe. According to a study analyzing temperature trends in Niğde between 1950 and 2015, there has been a significant upward trend in both annual and seasonal temperatures.[13]

Climate trends indicate a significant rise in both annual and seasonal temperatures, with projections suggesting more frequent and severe heatwaves. This poses serious health risks, as extreme heat is a leading cause of weather-related deaths and can worsen cardiovascular diseases. Given these challenges, Niğde must implement adaptive measures to mitigate the effects of rising temperatures on its population and infrastructure.

With the consideration of the data from THINK HAZARD, temperature conditions, from the closest Meteorology Station and future projection data from World Bank Climate Change Knowledge Portal (see Section 4.1.2), together with drought hazard, hazard has been **scoped in** for the climate change risks assessment.

- **Landslide**

According to the THINK HAZARD portal, landslides are a notable natural hazard in Niğde Province, Türkiye. The region's topography, characterized by mountainous and hilly terrain, combined with geological conditions and land use practices, contributes to the susceptibility to landslides. Factors such as heavy rainfall, seismic activity, and human-induced alterations like deforestation and construction can further exacerbate the risk.

Bor District, on the other hand, faces a low risk of landslides. According to the information acquired from the ESIA Report of the Project, the Project area is extremely flat and no landslide risk is foreseen for the Project. Therefore, hazard has been **scoped out** for the climate change risks assessment.

- **Soil Erosion**

As it was discussed in the ESIA, although the removal of soil will inevitably result in disturbances, rendering the soil surface more susceptible to soil erosion by wind and/or rain since there are no natural water receptors within the Project AoI, there are no natural watercourses, drainage channels, or nearby surface water bodies within or adjacent to the site. Due to the absence of sloped terrain and water flow, the risk of soil erosion is considered negligible. Furthermore, the plant involves minimal ground disturbance and no large-scale excavation or water use, further reducing the potential for erosion. Therefore, hazard has been **scoped out** for the climate change risks assessment.

4.1.4 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?

[13] https://www.researchgate.net/publication/317936510_Trends_in_Annual_and_Seasonal_Temperatures_in_Nigde_Central_Anatolia_Turkey_For_Period_1950-2015?utm_source=chatgpt.com

The evaluation considered the intrinsic characteristics and features of the Project.

Table 4-21: Exposure Assessment

HAZARD	TYPE OF HAZARD	ELEMENT EXPOSED	EXPOSURE	JUSTIFICATION
FLOODING	ACUTE	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	ACUTE	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	ACUTE	Infrastructures/People	YES	The plant depends on water for its functions.
SEVERE STORMS	ACUTE	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	ACUTE	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	ACUTE	Infrastructures/People	YES	In case of wildfires both people and infrastructures may be affected.
WATER STRESS	CHRONIC	Infrastructures/People	YES	The plant depends on water for its functions.
HEAT STRESS	CHRONIC	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.

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.

4.1.5 Hazards Characterization

With the consideration of historical and future climatical conditions of the Project area, all of the identified hazards are characterized in Table 4-22. National and provincial qualitative data based on down-scaled, regional level climate change projections data from the World Bank Group Climate Change Knowledge Portal was used to identify national and provincial level projections for various climate variables (World Bank Group 2021). Further, qualitative information regarding climate projections was also gathered from the IPCC's Working Group I, on the physical science of climate change, from both AR5 and AR6 reports.

Table 4-22: Hazard Characterization of the Project

Climate Hazard	Trend	Current Climate	Future Trends	Hazard Class
TEMPERATURE				
Extreme Heat (Number of days above 35°C)	Increasing	In Niğde, there were 33.36 days with maximum temperatures greater than 35°C in 2020.	By 2100, the number of extreme heat days is expected to increase significantly under all scenarios, with the highest increase under SSP5-8.5.	High
Extreme Cold (Frost Days, Number of days below 0°C)	Decreasing	In Niğde, there were 106.3 frost days in 2020.	By 2100, the number of frost days is expected to decrease to 100.76 days under SSP1-2.6, 89.89 days under SSP2-4.5, and 54.8 days under SSP5-8.5.	Low
PRECIPITATION				
Extreme Precipitation (maximum 1-day precipitation)	Stable	The observed maximum 1-day precipitation value in Niğde was 22.81 mm in 2020.	By 2100, the average largest 1-day precipitation will be 23.07 mm under SSP1-2.6, 24.38 mm under SSP2-4.5, and 25.72 mm under SSP5-8.5.	Medium
OTHER WEATHER EVENTS				
Severe Storms[14,15]	Increasing	Niğde experiences various storm events, including thunderstorms and heavy rainfall.	By 2100, the frequency and intensity of storm events are expected to increase due to climate change, leading to more severe weather phenomena.	High

[14] Storm Events Database: https://www.ncdc.noaa.gov/stormevents/

[15] Severe Storms and Extreme Events - Data Table: https://www.climate.gov/maps-data/dataset/severe-storms-and-extreme-events-data-table

Climate Hazard	Trend	Current Climate	Future Trends	Hazard Class
Wildfires[16,17]	Increasing	Niğde is susceptible to wildfires, especially during dry periods.	By 2100, the risk of wildfires is expected to increase due to higher temperatures and prolonged drought conditions.	High
Heat Stress[18]	Increasing	Heat stress can be defined as the number of days per year with temperatures exceeding 35°C.	By 2100, the number of heat stress days is expected to increase significantly under all scenarios, with the highest increase under SSP5-8.5.	High
Flooding[19]	Increasing	Flooding can occur due to heavy rainfall, river overflow, or inadequate drainage systems.	By 2100, the risk of flooding is expected to increase due to more frequent and intense precipitation events under all scenarios.	Medium
Drought	Increasing	Niğde experiences periods of drought, originated from both lack of precipitation and extreme temperatures.	By 2100, the frequency and severity of droughts are expected to increase, leading to more significant impacts on water resources and agriculture.	High

4.2 Assessment of Sensitivity, Adaptive Capacity and Vulnerability

4.2.1 Sensitivity for Equipment and Infrastructure

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.

[16] NIFC Open Data Site: https://data-nifc.opendata.arcgis.com/

[17] https://firemap.live/

[18] Heat Stress Index, compared between historical and future time periods, including historical and percent change: https://www.arcgis.com/home/item.html?id=680e87c5b1d34e0585203aa4f67d8426

[19] Floods Near Real-Time Data: https://www.earthdata.nasa.gov/topics/human-dimensions/floods/near-real-time-data

Sensitivity to Flooding: Overall Sensitivity has been assigned “LOW” with following reasons:

- Although Project components such as panels, inverters, transformers, and control systems are sensitive to water damage, the project area is located in a flat area and is not near any waterbodies:

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 “LOW”.

- According to the information provided by Smart, panel cleaning will be done with dry cleaning method which does not require water. Dry cleaning is the practice of using a soft brush or cloth to eliminate loose debris and dirt from solar panels' surfaces. This technique is commonly applied in areas where dust and dirt accumulation is minimal.
- Water need for dust suppression during dry periods is estimated to be 25 m^3/day and water will be supplied from Kemerhisar Municipality by water tankers.

Sensitivity to Severe storms: overall Sensitivity has been assigned “HIGH”. The level is justified that all project components and other infrastructures would be highly impacted in case of strong wind, lightings and intense precipitations which typically characterize severe storms events.

- Severe storms may be accompanied with lightings that could affect the solar panels and the other components of the Project.

Sensitivity to Extreme precipitation: overall Sensitivity has been assigned “MEDIUM”.

- Extreme precipitation could bring damage to the plant and the operations.
- Run-off waters may affect all Project components.
- Extreme precipitations may bring local flooding, potentially affecting the following more sensitive Project components.

Sensitivity to Wildfires: overall Sensitivity has been assigned “LOW”.

- There are only a few potential fire hazards in the plant since the area is flat and has low vegetation density:
  - 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.

Sensitivity to Water Stress: overall sensitivity has been assigned “MEDIUM.” The solar power plant would be impacted with moderate consequences due to both the nature of the hazard and the typology of the infrastructure.

- The plant requires water for panel cleaning and cooling systems. Water scarcity may lead to reduced maintenance efficiency and increased operational costs.
- Dust accumulation on solar panels could intensify due to dry conditions, further decreasing energy output if water availability for cleaning is limited.

Sensitivity to Heat Stress: Overall sensitivity has been assigned “MEDIUM.” The solar power plant would be impacted with moderate consequences due to both the nature of the hazard and the typology of the infrastructure.

- Solar panels could experience reduced efficiency under extreme heat conditions, as high temperatures can lower their energy output.
- Excessive heat may lead to overheating of electrical components, increasing the risk of malfunctions or system failures, potentially reducing the plant's overall reliability.
- Roads and infrastructure leading to the plant may face heat-induced damage, which could disrupt access and logistical operations.

4.2.2 Sensitivity for Project Personnel

Sensitivity to Extreme Cold: Sensitivity for Project Personnel has been assigned “HIGH” because low temperatures can pose health risks to personnel, such as hypothermia and frostbite, especially during prolonged outdoor work.

Sensitivity to Extreme Heat: Sensitivity for Project Personnel has been assigned “HIGH” because prolonged exposure can endanger worker health, reduce productivity, and increase the risk of heat-related illnesses.

Sensitivity to Water Stress: Sensitivity for Project Personnel has been assigned “HIGH” since because the project relies on a stable water supply for construction, sanitation, and dust suppression. In areas already facing limited water availability, increased demand from the project can strain local resources, affecting both operations and occupational health and safety.

Sensitivity to Heat Stress: Sensitivity for Project Personnel has been assigned “HIGH” since the plant's workers may be affected by heat stress, requiring additional cooling measures or work schedule adjustments to ensure health and safety during periods of intense heat.

4.2.3 Adaptive Capacity for Equipment and Infrastructure

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.
- Smart has an Environment and Climate Change Policy which was adopted and put into practice with the Board of Directors Decision dated 23/11/2022 and numbered 2022/46. The Policy is regularly reviewed and updated when deemed necessary. According to the policy Smart declares the following;
  - "While managing all our operations in compliance with relevant environmental legislation and national and international standards, we contribute to the low-carbon energy production of all our business stakeholders with our products and services.
  - We ensure that the technologies we use are environmentally sensitive, and in this context, we attach great importance to innovation and R&D activities.
  - We consider risks and opportunities related to the environment and climate change in our decision-making processes.
  - We protect natural resources, minimize waste generation with the goal of preventing and reducing pollution at its source, and ensure that resources are reused and recycled into the economy. With all these, we reflect the circular economy to our products and services.
  - We take care to develop the concept of social responsibility for the protection of the environment, climate change and raising environmental awareness, including all our stakeholders, subcontractors and suppliers, and ensure that our working environment is environmentally friendly.
  - We evaluate the impacts on biodiversity, environment and ecosystems during the project phase of all our planned investments, and we carry out activities to mitigate these impacts during construction/implementation, operation and post-operation.
  - Within the scope of preventing and combating climate change in the entire value chain, we attach importance to resource efficiency in all our processes, calculate our production-based greenhouse gas emissions in this direction, and develop targets and projects to reduce them.

  - We adopt the United Nations Sustainable Development Goals (SDGs) focused on combating climate change, and contribute to the fight against climate change in the national and international arena with our products and services focused on green technology and low-carbon energy production.
  - We lead the fight against climate change in Türkiye and around the world, and support projects in this field through collaborations and partnerships with national and international public institutions and organizations, private sector companies, academia and non-governmental organizations."

- The project will have an active Emergency Preparedness & Response Plan, which will be prepared by WSP. It will include 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 "LOW".

- There is no drainage system for rainwater and collection points. Procedures will be initiated if deemed necessary depending on the status of the project. No specific measures are in place according to available information to protect the plant.

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 is few Adaptive Capacity measures in place. Overall Adaptive Capacity has been assigned "MEDIUM".

- Project will use dry cleaning for panel cleaning.

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.

Adaptive Capacity to Water Stress: Overall adaptive capacity has been assigned “MEDIUM.”

- The project owner is committed to protecting natural resources and minimizing waste generation, which will help ensure efficient water use in the plant's operations.
- The use of environmentally sensitive technologies and an emphasis on innovation and R&D can potentially lead to the development of water-saving technologies, such as efficient panel cleaning systems that reduce water consumption.
- Resource efficiency, including water use, is a key consideration in the project owner’s operations, and the incorporation of circular economy principles suggests that water recycling and reuse will be prioritized.
- The project’s efforts to evaluate and mitigate impacts on ecosystems during the construction, operation, and post-operation phases show a proactive approach to managing water-related risks, which could include addressing water availability.
- The project also focuses on reducing pollution at its source, which can indirectly reduce the strain on water resources in the region.
- Furthermore, the project's commitment to the United Nations Sustainable Development Goals (SDGs) and partnerships with various stakeholders will strengthen the project’s ability to adapt to water stress by aligning with global best practices in water management.

Adaptive Capacity to Heat Stress: Overall adaptive capacity has been assigned “MEDIUM.”

- The project owner’s commitment to using environmentally sensitive technologies and fostering innovation and research and development (R&D) activities can lead to the development of heat-resistant materials and cooling technologies to minimize heat stress impacts on infrastructure and operations.
- Energy efficiency techniques will be prioritized, including the placement of air intakes and air-conditioning units in cool, shaded locations to optimize cooling systems and reduce energy consumption.
- Ventilation and air conditioning systems will be installed in critical areas, such as the switchyard, to maintain optimal working conditions during extreme heat events. Inverters will also be equipped with self-cooling systems to prevent overheating.
- The project's focus on circular economy principles will help reduce waste heat and improve energy efficiency, further mitigating the impact of heat stress.
- The project’s emphasis on protecting the environment and promoting climate change awareness will ensure that the risks associated with extreme heat are considered in decision-making processes, enabling adaptive responses in the future.
- Additionally, the project’s alignment with the United Nations Sustainable Development Goals (SDGs) demonstrates a commitment to addressing climate change, which will include adapting to heat stress through long-term strategies and collaborations.

4.2.4 Adaptive Capacity for Project Personnel

Adaptive Capacity to Extreme Heat: overall Adaptive Capacity for Project Personnel has been assigned "MEDIUM".

Project personnel have some ability to adapt through scheduled breaks, hydration protocols, and the use of shade or cooling stations. However, adaptation is limited by the physical nature of outdoor work, PPE requirements, and potential lack of permanent climate control infrastructure on-site.

Adaptive Capacity to Extreme Cold: overall Adaptive Capacity for Project Personnel has been assigned "MEDIUM".

Cold weather gear, heated shelters, and flexible work shifts can help personnel cope with extreme cold. Still, the capacity is constrained during peak winter periods or in remote areas where heating and access to protective resources may be inconsistent or costly.

Adaptive Capacity to Water Stress: Overall adaptive capacity for Project Personnel has been assigned "MEDIUM."

Personnel needs can be met through water-saving practices, efficient use of supply, and temporary storage facilities. However, dependence on local water sources and competing demand from nearby users can reduce the project's ability to ensure uninterrupted access.

Adaptive Capacity to Heat Stress: Overall adaptive capacity for Project Personnel has been assigned "MEDIUM."

Adaptation measures such as worker training, acclimatization programs, and modified work hours help reduce vulnerability. Yet, these measures may not fully prevent health impacts during extreme heat events or extended hot periods, especially when combined with high workloads.

4.2.5 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 4-19: 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 4-23 shows the details of Vulnerability assessment for all hazards.

Table 4-23: Vulnerability Assessment

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
Flooding for Project Equipment and Infrastructure	Low	Low	**Low**
Extreme heat for Project Equipment and Infrastructure	Medium	Medium	**Medium**
Extreme heat for Project Personnel	High	Medium	**High**
Extreme cold for Project Equipment and Infrastructure	Medium	Medium	**Medium**
Extreme cold for Project Personnel	High	Medium	**High**
Drought for Project Equipment and Infrastructure	Low	Medium	**Low**
Severe storms for Project Equipment and Infrastructure	Medium	Low	**High**
Extreme precipitations for fProject Equipment and Infrastructure	Medium	Medium	**Medium**
Wildfires for Project Equipment and Infrastructure	Low	Medium	**Low**
Water stress for Project Equipment and Infrastructure	High	Medium	**High**
Water stress for Project Personnel	High	Medium	**High**
Heat stress for Project Equipment and Infrastructure	High	Medium	**High**
Heat stress for Project Personnel	High	Medium	**High**

4.3 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 4-20: Risk Matrix

A summary of the outcomes is presented in Table 4-24.

Table 4-24: Risk Assessment

Hazard	Vulnerability	Hazard Class	Risk
Flooding for Project Equipment and Infrastructure	Low	Medium	**Medium**
Extreme heat for Project Equipment and Infrastructure	Medium	High	**High**
Extreme heat for Personnel	High	High	**High**
Extreme cold for Project Equipment and Infrastructure	Medium	Low	**Low**
Extreme cold for Personnel	High	Low	**Medium**
Drought for Project Equipment and Infrastructure	Low	High	**Medium**
Severe storms for Project Equipment and Infrastructure	High	High	**High**
Extreme precipitations for Project Equipment and Infrastructure	Medium	Medium	**Medium**
Wildfires for Project Equipment and Infrastructure	Low	High	**Medium**
Water stress for Project Equipment and Infrastructure	High	High	**High**
Water stress for Personnel	High	High	**High**
Heat stress for Project Equipment and Infrastructure	High	High	**High**
Heat stress for Personnel	High	High	**High**

4.4 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.
- 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 Extreme Cold for Equipment and Infrastructure

- 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.

Risk of Extreme Heat and Extreme Cold for Project Personnel

- Rescheduling working hours during extremely hot and cold periods to ensure the safety and efficiency of staff working in outdoor areas.
- Providing proper clothing and PPEs in accordance with the weather conditions.

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.
- Use waterproof materials and coatings on all equipment.
- 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 Kemerhisar and Niğde Special Provincial Administration to better understand the contents of their plan to mitigate the effects of the rains. Trying to identify shared measures and strategies to reduce and prevent disruptions in case of extreme precipitations.
- Ensure all panels and equipment are securely fastened.

Risk of Wildfires

- Organize awareness programs and personnel availability to deal with potential fires, possibly in collaboration with the Fire Department in Niğde.
- Implement an early warning system for firefighting and make provision for a direct connection with any existing early warning systems at local or regional level to guarantee information on fire are monitored and shared.
- Verify the adequacy of the maintenance program of all prevention and fire emergency systems.

Risk of Water Stress for Equipment and Infrastructure

- Implement dry cleaning methods for solar panels to reduce water usage.
- Train staff in water conservation practices to promote efficient usage.
- Collaborate with local authorities for shared water management strategies.

Risk of Water Stress for Project Personnel

- Ensure adequate on-site water storage, use water-saving measures, and coordinate with local suppliers to secure a reliable supply to the project personnel.

Heat Stress for Equipment and Infrastructure

- Install shading structures to protect equipment and reduce heat exposure.
- Use materials that can withstand high temperatures.
- Implement cooling systems to manage heat stress on equipment

Water Stress for Project Personnel

- Adjust work hours to cooler times,
- Provide shaded rest areas and drinking water, and
- Train workers to recognize heat-related symptoms.

4.5 Implementations of Mitigation Actions and Residual Risks

The table given below outlines all identified climate-related hazards, associated risks, their initial risk ratings, proposed mitigation and adaptation measures, implementation status, and residual risk levels. As it can be seen from this table, design-related actions have already been integrated into the Project design, while operational and procedural measures are being implemented throughout the project lifecycle. Related plans for the management of these mitigation measures are addressed below.

The residual risk assessment indicates that all high and medium risks have been effectively mitigated to medium and low levels, respectively. Relevant measures have also been cross-referenced with the applicable management plans such as the Emergency Preparedness and Response Plan (EPRP) and Water Management Plan (WMP), where applicable.

Table 25: Residual Risks Table

Risk No	Hazard	Identified Risk	Gross Risk Level	Preventive / Adaptive Measure	Implementation Status	Residual Risk Level	To Be Included in Management Plan(s)?
R1	Flooding	Damage/disruption to equipment & infrastructure	Medium	Stormwater drainage, waterproof coatings, clean manholes, cooperation with local authorities	Integrated into design	Low	EPRP, WMP
R2	Extreme Heat (Equipment)	Overheating, malfunction	High	Cooling systems in inverters, reflective building materials in panels, regular maintenance	Integrated into design	Medium	EPRP
R3	Extreme Heat (Personnel)	Heat stress, health risks	High	Shift adjustments, PPE, shaded rest areas, awareness training	Ongoing implementation throughout project lifecycle	Medium	EPRP
R4	Extreme Cold (Equipment)	Equipment inefficiency	Low	Periodic inspections	Integrated into design	Low	EPRP
R5	Extreme Cold (Personnel)	Cold-related health issues	Medium	Shift scheduling, appropriate winter PPE	Ongoing implementation throughout project lifecycle	Low	EPRP
R6	Drought	Reduced water availability	Medium	Dry cleaning of panels	Integrated into design	Low	N/A
R7	Severe Storms	Physical damage, power failure	High	Lightning rods in switchyard,	Integrated into design	Medium	N/A
R8	Extreme Precipitation	Flooding, erosion, ecological impact	Medium	Drainage improvements, waterproof materials, cooperation with municipality	Integrated into design	Low	N/A
R9	Wildfires	Fire damage, emergency response	Medium	Fire awareness programs, collaboration with fire department	When necessary, throughout project lifecycle	Low	EPRP

Risk No	Hazard	Identified Risk	Gross Risk Level	Preventive / Adaptive Measure	Implementation Status	Residual Risk Level	To Be Included in Management Plan(s)?
R10	Water Stress (Equipment)	Equipment underperformance, overheating	High	Dry cleaning of panels	Integrated into design	Medium	WMP
R11	Water Stress (Personnel)	Lack of potable water	High	Adequate storage, water conservation training, reliable supply	Ongoing implementation throughout project lifecycle	Medium	EPRP, WMP
R12	Heat Stress (Equipment)	Decreased equipment lifespan	High	Shade structures, cooling systems in inverters, heat-resistant materials in panels and cables	Integrated into design	Medium	N/A
R13	Heat Stress (Personnel)	Health risks due to heat exposure	High	Shift adjustments, hydration, shaded rest, training	Ongoing implementation throughout project lifecycle	Medium	EPRP

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APPENDIX D

List of Species

Flora Species

Family	Species	Global IUCN Status	Local IUCN Status	End./ RR	Lit./ Obs.*
Asteraceae	*Taraxacum farinosum*	NE	-	-	O 2023
Amaranthaceae	*Camphorosma monspeliaca*	NE	-	-	O 2023
Amaranthaceae	*Halocnemum strobilaceum*	NE	-	-	O 2023
Amaranthaceae	*Salsola crassa*	NE	-	-	O 2023
Amaranthaceae	*Salsola inermis*	NE	-	-	O 2023
Amaranthaceae	*Salsola nitraria*	NE	-	-	O 2023
Amaranthaceae	***Salsola stenoptera***	NE	VU	Widespread endemic	O 2023
Amaranthaceae	*Halimione verrucifera*	NE	-	-	O 2023
Amaranthaceae	*Petrosimonia brachiata*	NE	-	-	O 2023
Asteraceae	*Achillea wilhelmsii*	NE	-	-	O 2023
Asteraceae	*Artemisia santonicum*	LC	-	-	O 2023
Asteraceae	***Onopordum davisii***	NE	NT	Regional Endemic	O 2023
Caryophyllaceae	***Gypsophila oblanceolata***	NE	VU	Regional Endemic	O 2023
Frankeniaceae	*Frankenia hirsuta*	NE	-	-	O 2023
Nitrariaceae	*Peganum harmala*	NE	-	-	O 2023
Plumbaginaceae	*Limonium globuliferum*	NE	-	-	O 2023
Plumbaginaceae	*Limonium iconicum*	NE	LC	Widespread endemic	O 2023
Plumbaginaceae	*Limonium lilacinum*	NE	-	Widespread endemic	O 2023
Plumbaginaceae	***Limonium tamaricoides***	NE	EN	Regional endemic	O 2023
Poaceae	*Puccinellia koeieana subsp. anatolica*	NE	LC	Widespread endemic	O 2023
Poaceae	*Aeluropus littoralis*	LC	-	-	O 2023
Scrophulariaceae	***Verbascum helianthemoides***	NE	VU	Widespread endemic	O 2023
Zygophyllaceae	*Zygophyllum album*	NE	-	-	O 2023
Amaryllidaceae	*Allium sieheanum*	NE	LC	Regional Endemic	L, H
Asteraceae	*Cousinia birandiana*	NE	LC	Regional Endemic	L, H
Asteraceae	*Cousinia iconica*	NE	LC	Regional Endemic	L, H
Brassicaceae	*Lepidium caespitosum*	NE	VU	Regional Endemic	L, H
Plumbaginaceae	*Limonium lilacinum*	NE	LC	Regional Endemic	L, H

Family	Species	Global IUCN Status	Local IUCN Status	End./ RR	Lit./ Obs.*
Fabaceae	*Sphaerophysa kotschyana*	NE	LC	Regional Endemic	L, H
Amaranthaceae	*Petrosimonia triandra*	NE	LC	-	L, H
Asteraceae	*Xanthium spinosum*	NE	-	Alien Invasive Species	O, 2024

*L:Literature, O: Observation, H: Habitat, A: Interview with locals

Herpetofauna species

Family	Species	Global IUCN Status	Lit./ Obs.*
Ranidae	*Pelophylax ridibundus*	LC	O-L
Bufonidae	*Bufotes variabilis*	DD	O-L
Lacertidae	*Ophisops elegans*	LC	O-L
Lacertidae	*Parvilacerta parva*	LC	O-L
Agamidae	*Stellagama stellio*	LC	L
Scincidae	*Heremites vittatus*	LC	L
Gekkonidae	*Mediodactylus orientalis* **	LC	L
Colubridae	*Natrix natrix*	LC	O-L
Colubridae	*Platyceps najadum*	LC	L
Colubridae	*Elaphe sauromates*	LC	L
Testudinidae	*Testudo graeca*	VU	O-L
Viperidae	*Montivipera xanthina*	LC	L
Lacertidae	*Ophisops elegans*	LC	L
Lacertidae	*Lacerta media*	LC	L
Typhlopidae	*Xerotyphlops vermicularis*	LC	L
Agamidae	*Trapelus lessonae*	LC	L

*L: Literature, O: Observation, H: Habitat, A: Field G: Interview with locals
** Based on syn. *Mediodactylus kotschyi*

Aves Species

Family	Species	Turkish Name	English Name	Global IUCN Status	Lit./Obs.
Accipitridae	*Aegypius monachus*	Kara Akbaba	Black Vulture	NT	O
Accipitridae	*Circaetus gallicus*	Yılan Kartalı	Short-Toed Eagle	LC	O
Accipitridae	*Circus aeruginosus*	Saz Delicesi	Marsh Harrier	LC	H
Accipitridae	*Circus cyaneus*	Gökçe Delice	Hen Harrier	LC	H
Accipitridae	*Circus macrourus*	Bozkır Delicesi	Pallid Harrier	NT	H
Accipitridae	*Accipiter nisus*	Atmaca	Sparrowhawk	LC	O
Accipitridae	*Buteo rufinus*	Kızıl Şahin	Long-Legged Buzzard	LC	O
Accipitridae	*Aquila nipalensis*	Bozkır Kartalı	Steppe Eagle	**EN**	H
Accipitridae	*Aquila heliaca*	Şah Kartal	Imperial Eagle	VU	H
Accipitridae	*Aquila chrysaetos*	Kaya Kartalı	Golden Eagle	LC	O

Family	Species	Turkish Name	English Name	Global IUCN Status	Lit./Obs.
Accipitridae	*Hieraaetus pennatus*	Küçük Kartal	Booted Eagle	LC	H
Falconidae	*Falco naumanni*	Küçük Kerkenez	Lesser Kestrel	LC	H
Falconidae	*Falco tinnunculus*	Kerkenez	Kestrel	LC	O
Falconidae	*Falco cherrug*	Ulu Doğan	Saker Falcon	**EN**	H
Falconidae	*Falco peregrinus*	Gök Doğan	Peregrine	LC	H
Phasianidae	*Alectoris chukar*	Kınalı Keklik	Chukar	LC	A
Otididae	*Otis tarda*	Toy	Great Bustard	VU	A
Charadriidae	*Charadrius leschenaultii*	Büyük Cılıbıt	Greater Sand Plover	LC	O
Charadriidae	*Vanellus vanellus*	Kızkuşu	Lapwing	NT	H
Pteroclidae	*Pterocles orientalis*	Bağırtlak	Black-Bailled Sandgrouse	LC	H
Columbidae	*Columba livia*	Kaya Güvercini	Rock Dove	LC	O
Columbidae	*Streptopelia decaocto*	Kumru	Collared Dove	LC	O
Strigidae	*Athene noctua*	Kukumav	Little Owl	LC	O
Apodidae	*Apus apus*	Ebabil	Swift	LC	O
Meropidae	*Merops apiaster*	Arıkuşu	Bee-Eater	LC	O
Upupidae	*Upupa epops*	İbibik	Eurasian Hoopoe	LC	O
Alaudidae	*Melanocorypha calandra*	Boğmaklı Toygar	Calandra Lark	LC	O
Alaudidae	*Calandrella brachydactyla*	Bozkır Toygarı	Short-Toed Lark	LC	O
Alaudidae	*Calandrella rufescens*	Çorak Toygarı	Lesser Short-Toed Lark	LC	H
Alaudidae	*Galerida cristata*	Tepeli Toygar	Crested Lark	LC	O
Hirundinidae	*Hirundo rupestris*	Kaya Kırlangıcı	Crag Martin	LC	O
Hirundinidae	*Hirundo rustica*	Kır Kırlangıcı	Swallow	LC	O
Hirundinidae	*Delichon urbicum*	Ev Kırlangıcı	House Martin	LC	O
Motacillidae	*Anthus campestris*	Kır İncirkuşu	Tawny Pipit	LC	H
Muscicapidae	*Oenanthe isabellina*	Boz Kuyrukkakan	Isabellina Wheatear	LC	O
Laniidae	*Lanius collurio*	Kızıl Sırtlı Örümcekkuşu	Red-Backed Shrike	LC	O
Corvidae	*Pica pica*	Saksağan	Magpie, Black-billed Magpie	LC	O
Corvidae	*Corvus monedula*	Küçük Karga	Jackdaw, Eurasian Jackdaw	LC	O
Corvidae	*Corvus frugilegus*	Ekin Kargası	Rook	LC	O
Corvidae	*Corvus cornix*	Leş Kargası	Hooded Crow	LC	O
Sturnidae	*Sturnus vulgaris*	Sığırcık	Starling	LC	O
Passeridae	*Passer domesticus*	Serçe	House Sparrow	LC	O
Fringillidae	*Carduelis carduelis*	Saka	Goldfinch	LC	O
Fringillidae	*Carduelis cannabina*	Ketenkuşu	Linnet	LC	O
Emberizidae	*Emberiza hortulana*	Kirazkuşu	Ortolan	LC	O

Family	Species	Turkish Name	English Name	Global IUCN Status	Lit./Obs.
Emberizidae	*Emberiza melanocephala*	Karabaşlı Kirazkuşu	Black-Headed Bunting	LC	O
Emberizidae	*Miliaria calandra*	Tarla Kirazkuşu	Corn Bunting	LC	O
Strigidae	*Athene noctua*	Kukumav	Little Owl	LC	O
Ardeidae	*Ardeola ralloides*	-	Squacco Heron	LC	L
Ciconiidae	*Ciconia ciconia*	-	White Stork	LC	L
Accipitridae	*Clanga clanga*	-	Greater Spotted Eagle	VU	L
Accipitridae	*Clanga pomarina*	-	Lesser Spotted Eagle	LC	L
Sylviidae	*Curruca communis*	-	Common Whitethroat	LC	L
Sylviidae	*Curruca curruca*	-	Lesser Whitethroat	LC	L
Glareolidae	*Glareola pratincola*	-	Collared Pratincole	LC	L
Gruidae	*Grus grus*	-	Common Crane	LC	L
Recurvirostridae	*Himantopus himantopus*	-	Black-winged Stilt	LC	L
Acrocephalidae	*Iduna pallida*	-	Eastern Olivaceous Warbler	LC	L
Muscicapidae	*Irania gutturalis*	-	White-throated Robin	LC	L
Laniidae	*Lanius minor*	-	Lesser Grey Shrike	LC	L
Fringillidae	*Linaria cannabina*	-	Common Linnet	LC	L
Muscicapidae	*Luscinia megarhynchos*	-	Common Nightingale	LC	L
Anatidae	*Mareca strepera*	-	Gadwall	LC	L
Anatidae	*Marmaronetta angustirostris*	-	Marbled Duck	NT	L
Alaudidae	*Melanocorypha bimaculata*	-	Bimaculated Lark	LC	L
Phalacrocoracidae	*Microcarbo pygmaeus*	-	Pygmy Cormorant	LC	L
Accipitridae	*Neophron percnopterus*	-	Egyptian Vulture	EN	L
Anatidae	*Netta rufina*	-	Red-crested Pochard	LC	L
Muscicapidae	*Oenanthe finschii*	-	Finsch's Wheatear	LC	L
Muscicapidae	*Oenanthe oenanthe*	-	Northern Wheatear	LC	L
Oriolidae	*Oriolus oriolus*	-	Eurasian Golden Oriole	LC	L
Anatidae	*Oxyura leucocephala*	-	White-headed Duck	EN	L
Pelecanidae	*Pelecanus crispus*	-	Dalmatian Pelican	NT	L
Phalacrocoracidae	*Phalacrocorax pygmeus*	-		LC	L
Phoenicopteridae	*Phoenicopterus roseus*	-	Greater Flamingo	LC	L
Threskiornithidae	*Plegadis falcinellus*	-	Glossy Ibis	LC	L
Pelecanidae	*Pelecanus onocrotalus*	-	Great White Pelican	LC	L
Threskiornithidae	*Platalea leucorodia*	-	Eurasian Spoonbill	LC	L
Laridae	*Sternula albifrons*	-	Little Tern	LC	L

Family	Species	Turkish Name	English Name	Global IUCN Status	Lit./Obs.
Apodidae	*Tachymarptis melba*	-	Alpine Swift	LC	L
Anatidae	*Tadorna ferruginea*	-	Ruddy Shelduck	LC	L
Turdidae	*Turdus viscivorus*	-	Mistle Thrush	LC	L
Muscicapidae	*Oenanthe oenanthe*	-	Northern Wheatear	LC	L
Charadriidae	*Vanellus spinosus*	-	Spur-winged Lapwing	LC	L

*L:Literature, O: Observation, H: Habitat, A:Field G: Interview with locals

Mammal species

Family	Species	Turkish Name	English Name	Global IUCN Status	Lit./Obs.*
Erinaceidae	*Erinaceus concolor*	Kirpi	Southern White-breasted Hedgehog	LC	O
Soricidae	*Crocidura leucodon*	Çiftrenkli Böcekçil	Bicolored Shrew	LC	H, L
Vespertilionidae	*Myotis mystacinus*	Bıyıklı Yarasa	Whiskered Myotis	LC	H, L
Vespertilionidae	*Myotis blythii*	Farekulaklı Küçük Yarasa	Lesser Mouse-eared Myotis	LC	H, L
Vespertilionidae	*Pipistrellus pipistrellus*	Adi Yarasa	Common Pipistrelle	LC	H, L
Vespertilionidae	*Eptesicus serotinus*	Genişkanatlı Yarasa	Serotine Bat	LC	H, L
Vespertilionidae	*Plecotus macrobullaris*	Uzunkulaklı Kafkas Yarasası	Mountain Long-eared Bat	LC	H, L
Molossidae	*Tadarida teniotis*	Kuyruklu Yarasa	European Free-tailed Bat	LC	H, L
Leporidae	*Lepus europaeus*	Yaban Tavşanı	European Hare	LC	O
Sciuridae	*Spermophilus xanthophyrmnus*	Anadolu Yersincabı	Asia Minor Ground Squirrel	NT	O
Cricetidae	*Mesocricetus brandti*	Türk Hamsteri	Brandt's Hamster	NT	O
Cricetidae	*Microtus anatolicus*	Anadolu Tarlafaresi	Anatolian Vole	DD	O
Cricetidae	*Nannospalax xanthodon*	Anadolu Körfaresi	Nehring's Blind Mole Rat	DD	O
Muridae	*Mus macedonicus*	Sarı Evfaresi	Macedonian Mouse	LC	H
Dipodidae	*Allactaga williamsi*	Araptavşanı	William's Jerboa	NT	O
Canidae	*Canis lupus*	Kurt	Gray Wolf	LC	A
Canidae	*Vulpes vulpes*	Kızıl Tilki	Red Fox	LC	O
Mustelidae	*Vormela peregusna*	Alaca Sansar	European Marbled Polecat	VU	O
Mustelidae	*Meles meles*	Porsuk	Eurasian Badger	LC	A
Leporidae	*Lepus europaeus*	Yabani Tavşan	European Hare	LC	H, L
Cricetidae	*Microtus guentheri*	-	Günther's Vole	LC	H, L
Muridae	*Meriones tristrami*	-	Tristram's Jird	LC	H, L
Mustelidae	*Martes foina*	-	Beech Marten	LC	H, L

O: From direct observation in the field, L: From Literature, A: From public survey, interviews and questionary, H: From habitat Suitability

Signature Page

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