MOTT MACDONALD

Harmancık Wind Power Plant (WPP) Project

Environmental and Social Impact Assessment (ESIA) Report

June 2024

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Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	December 2023	ESIA Team	Hande Hatipoglu	Neslihan Ayvaz Ozen	Draft ESIA Report
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Contents

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Glossary

AFAD	Disaster and Emergency Management Authority
AIS	Alien Invasive Species
AN	Ammonium Nitrate
ANFO	Ammonium Nitrate / Fuel Oil
Ann I	Annex I
AoI	Area of Influence
APCV	Air Pollution Contribution Values
App II	Appendix II
AQMP	Air Quality Management Plan
BATs	Best Available Techniques
BAP	Biodiversity Action Plan
BERN	The Convention on the Conservation of European Wildlife and Natural Habitats
BMP	Biodiversity Management Plan
CBD	Convention on Biological Diversity
CCKP	Climate Change Knowledge Portal
CCRA	Climate Change Risk Assessment
CDP	Carbon Disclosure Project
CHA	Critical Habitat Assessment
CHIA	Cultural Heritage Impact Assessment
CHS	Community Health and Safety
CIA	Cumulative Impact Assessment
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLS	Community Level Survey
CLO	Community Liaison Officer
CMB	Capital Markets Board
CoC	Code of Conduct
COD	Commercial Operation Deployment
CRM	Collision Risk Model
CR	Critically Endangered

ÇEKÜL	Foundation for the Protection and Promotion of Environmental and Cultural Values
ÇEV-KOR	Environmental Protection and Research Foundation
DAI	Directly Affected by The Project
Dba	Decibel
DEM	Digital Elevation Model
DFC	Development Finance Corporation
DGCONA	Directorate for the Conservation of Natural Resources
DSI	State Hydraulic Works
EAAA	Ecologically Appropriate Area of Analysis
EBAs	Endemic Bird Areas
EBRD	European Bank for Reconstruction and Development
EF	Emission factor
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EKAD	Ecological Research Society
ELC	European Landscape Convention
ELT	end-of-life tires
ELV	end-of-life vehicles
EMI	Electromagnetic Interference
EMR	Electromagnetic Radiation
EMRA	Energy Market Regulatory Authority
EN	Endangered
END	Environmental Noise Directive
EnerjiSA	Enerjisa Enerji Üretim Anonim Şirketi
EP IV	Equator Principles IV
EPAP	Equator Principles Action Plan
EPFIs	Equator Principles Financial Institutions
EPRP	Emergency Preparedness and Response Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESP	Environmental and Social Policy
ESPP	Environmental and Social Policy and Procedures
ETL	Energy Transmission Line

EU	European Union
EUNIS	European Nature Information System
EUROBAT	Association of European Automotive and Industrial Battery Manufacturers
EW	Extinct in the Wild
EX	Extinct
FAO	Food and Agriculture Organization
FIs	Financial Intermediaries
FO	Fuel Oil
FS	Full Spectrum
FTA	Federal Transit Administration
GBIF	Global Biodiversity Information Facility
GBVH	Gender-Based Violence and Harassment
GHG	Greenhouse Gas
GIIPs	Good International Industry Practices
GIS	Geographical Information System
GLC	Ground Level Concentrations
GLVIA	Guidelines for the Landscape and Visual Impact assessment
GPP	Geothermal Power Plant
GPS	Geographical Positioning System
GWD	Groundwater Directive
HAWTs	Horizontal Axis Wind Turbines
HH	Hub Height
HLS	Household Level Survey
HR	Human Resources
HRIA	Human Rights Impact Assessment
IAS	Invasive Alien Species
IBAs	Important Bird and Biodiversity Areas
ICH	Intangible Cultural Heritage
ICNIRP	International Commission on Non- Ionizing Radiation Protection
ICOMOS	International Council on Monuments and Sites
IEA	International Energy Agency
IEC	International Electrotechnical Commission
IFIs	International Financial Institutions
ILO	International Labour Organisation

IS-KUR	Turkish Employment Agency
ISO	International Standardisation Organisation
ISRIC	International Soil Reference and Information Centre
IUCN	International Union for the Conservation of Nature
JPM	J.P. Morgan
KPI	Key Performance Indicator
KBAs	Key Biodiversity Areas
L	Literature
LC	Least Concern
LCPP	Local Content and Procurement Procedure
LUC	Land Use Capability
LULC	Land Use and Land Cover
MA	Millennium Ecosystem Assessment
MARPOL	The International Convention for the Prevention of Pollution from Ships
MBT	Mechanical Biological Treatment
MoAF	Ministry of Agriculture and Forestry
MoCT	Ministry of Culture and Tourism
MoENR	Ministry of Energy and Natural Resources
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MoLSS	Ministry of Labour and Social Security
MoTI	Ministry of Transport and Infrastructure
NA	Not Applicable
NE	Not Evaluated
NGOs	Non-governmental Organisations
NMP	Noise Management Plan
NRMCA	National Ready Mixed Concrete Association
NT	Near Threatened
NTS	Non-Technical Summary
O	Observation
OECD	Organisation for Economic Co-operation and Development
OG	Official Gazette
OHS	Occupational Health and Safety
OHSRA	Occupational Health and Safety Risk Assessment
OUV	Outstanding Universal Value

PAA	Project Affected Area
PAHs	Polycyclic Aromatic Hydrocarbons
PAPs	Project Affected Persons
PAS 2080	Publicly Available Specification 2080
PAS	Project Affected Settlements
PBF	Priority Biodiversity Features
PCFM	Post Construction Bird Fatality Monitoring
PGA	Peak Ground Acceleration
PID	Project Information Document
PM	Particulate Matter
PPE	Personal Protective Equipment
PPV	Peak Particle Velocity
PR	Performance Requirements
PS	Performance Standard
RAMSAR	The Convention on Wetlands of International Importance especially as Waterfowl Habita
RAP	Resettlement Action Plan
RCAPOI	Regulation on the Control of Industrial Source Air Pollution
REC	Resource, Environment and Climate Association
RENC	Regulation on Environmental Noise Control
REPA	Türkiye Energy Potential Map
RQD	Rock Quality Indicator
SASF	Social Assistance and Solidarity Foundation
SD	Scaled Distance
SDoD	Shut-down on Demand
SEFIA	Association for Sustainable Economics and Finance Research
SEP	Stakeholder Engagement Plan
SME	Medium-Sized Enterprise
SRTM	Shuttle Radar Topography Mission
SuTP	Syrians under temporary protection
TABS	Hazardous Waste Declaration System
TBMM	Turkish Grand National Assembly
TEİAŞ	Turkish Electricity Transmission Corporation
TEMA	Türkiye Foundation for Combating Erosion, Afforestation and Protection of Natural Assets

TFEU	Treaty on the Functioning of the European Union
the Consultant	Mott MacDonald Türkiye
the Project	Harmancık Wind Power Plant Project
TIA Decisions	Technical Interaction Analysis Decisions
TOBB	The Union of Chambers and Commodity Exchanges of Turkey
TOX	Total Organic Halogen
TPH	Total Petroleum Hydrocarbons
TSKB	Industrial Development Bank of Türkiye
TS	Transformer Substation
TSP	Total Suspended Particulate
TUÇEV	Turkish Environmental Protection Foundation
TurkStat	Turkish Statistical Institute
TÜREB	Türkiye Wind Energy Association
TVOC	Total Volatile Organic Compound
UEP	Urgent Expropriation Procedure
UIP	Under International Protection
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNGC	United Nations Global Compact
UN SDGs	United Nations Sustainable Development Goals
VEC	Valued Environmental and Social Component
VP	Vantage Point
VU	Vulnerable
WBG	World Bank Group
WEEE	Waste Electrical and Electronic Equipment
WEF	Wind Energy Facilities
WEPs	Women's Empowerment Principles
WFD	Water Framework Directive
WH	World Heritage
WHO	World Health Organization
WLCA	Whole Life Carbon Assessment
WP	Working Period
WPP	Wind Power Plant

WWF	World Wide Fund for Nature
WWTP	Wastewater Treatment Plant
YEKA	Renewable Energy Resource Area
ZVI	Zones of Visibility

1 Introduction

1.1 Background and Objective

Enerjisa Üretim Santralleri Anonim Şirketi has been awarded to invest in the Çanakkale Connection Region on 30 May 2019 within the scope of “Renewable Energy Resource Areas (YEKA) Regulation” and “Allocation of Wind Energy Based Renewable Energy Resource Areas (YEKA) and Total Connection Capacities”[1]. Upon this award, a “YEKA Use Rights Agreement” was signed between Enerjisa Üretim Santralleri Anonim Şirketi and Ministry of Energy and Natural Resources (MoENR) on 09 March 2020. Subsequently, the "YEKA Use Rights Agreement" signed by Enerjisa Üretim Santralleri Anonim Şirketi for the Çanakkale Connection Region was transferred to Enerjisa Enerji Üretim Anonim Şirketi (“Enerjisa Üretim” or “the Project Company”) with the transfer agreements signed on 03 June 2021.

Harmancık Wind Power Plant (WPP) Project (“the Project”) with 10 turbines and 42 MW_m/42 MW_e total installed power, is planned to be established by Enerjisa Üretim in Çanakkale Province, Merkez and Lapseki Districts, Yukarıokçular, Kızılkeçili, Üçpınar and Hacıgelen Neighbourhoods. The Project components consist of 10 turbines, a switchyard, Project roads (i.e., access and site roads), a 68.75 tonnes/hour capacity mobile crashing and screening facility[2], to be used as necessary, as well as an energy transmission line (ETL) as a Project associate facility (please refer to Section 2.3: Project Components for details). The Project is part of a nine-project wind energy investment package initiated by Enerjisa Üretim which has a 750 MW total installed power from a total of 180 wind turbines located in Aegean and Marmara Regions of western Türkiye; aiming to evaluate and utilize the wind energy potential of the region and contribute to the national strategy and regional economy.

The Project area is one of the areas declared[3] as a YEKA within the scope of the YEKA Regulation[4]. The Project Company has secured the preliminary license, which is valid for 24 months, from the Energy Market Regulatory Authority (EMRA) with the board decision dated 3 March 2022. Pre-license refers to the permission granted to the Project Company for a certain period of time (i.e., 24 months) to obtain required approvals, permits, and licenses to commence investments in energy generation activities. Within the pre-license period the Project Company is obliged to fulfil the requirements listed in Article 17 of Electricity Market License Regulation. These include, among others; securing the land ownership right or land tenure, securing the zoning plan approvals, applying the relevant electricity distribution company for connection approvals and securing National Environmental Impact Assessment (EIA) approval. According to the information shared by the Project Company, the construction period of the Project will be 16 months and the operation period will be 49 years as stated in the National EIA Report.

The construction of the Project has been initiated in the fourth quarter of 2023 with the construction of Project roads and is planned to be completed by the first quarter of 2025. For detailed Project construction schedule, please refer to Section 2.5.1.

The Project is subject to conducting a National EIA Study in regard with the Regulation on Environmental Impact Assessment[5] of Türkiye. According to the Regulation, the Project is covered under Article 41 -Wind power plants- of *Annex-1: List of Projects Subject to*

[1] Published in the Official Gazette Date/No: 07.11.2018/30588

[2] 68.75 tonnes/hour capacity mobile crashing and screening facility is included in the National Environmental Impact Assessment (EIA) Study.

[3] The declaration was published in the Official Gazette Date/No.: 21.03.2021/31430

[4] Published in the Official Gazette Date/No.: 09.10.2016/29852

[5] Published in the Official Gazette Date/No: 29.07.2022/31907

Environmental Impact Assessment, and Article 45-e - Facilities that perform at least one of the crushing, screening, washing, drying and ore preparation processes- of *Annex-2: Projects Subject to Pre-review and Assessment of Environmental Impact*. In this sense, a National EIA Report was prepared for the Project by an environmental consultancy company, namely Savra (with a competency certificate dated 13 July 2019 and numbered 332). The Final National EIA Report was submitted in January 2023 by Savra. Upon submission of the Final National EIA Report to the Ministry of Environment, Urbanization and Climate Change (MoEUCC) General Directorate of Environmental Impact Assessment, Permit and Inspection, the "EIA Positive" decision for the Project was secured on 07 March 2023 by the MoEUCC. Upon submission of Final EIA Report, there was an additional amendment regarding relocation of the wind turbines. In this sense, the amendment on National EIA process is reported by the Project Company to be ongoing at the time of preparation of this Draft ESIA Report.

During the 24-month pre-licence period, the nominal power of used proposed wind turbines as well as the location of several wind turbines has changed in accordance with the official opinions of relevant authorities, leading to a change of the Project installed power capacity. Upon this change, a request was submitted to the MoENR for the revision of pre-licence in regard with the change in the Project design and the revised pre-licence was secured. According to this change, the Project will consist of 10 wind turbines, each with a unit power of 4.2 MWm/4.2 MWe; and it is projected that the WPP will have a 147,268,800 kWh/year of annual electricity generation capacity with a total installed power of 42 MW_m/ 42 MW_e. Please refer to Section 2.6 for detailed information on this design changes.

The Project Company has secured the "49-year Electric Power Generation Licence" (Licence No. EÜ/12461-1/06113, dated 22 February 2024) from EMRA for the Harmancık WPP with 10 turbines. Please refer to Section 2.5.1.3 for detailed information for the generation licence.

The Project Company is seeking international finance loan from the International Financial Institutions (IFIs) for implementation of the Project under the nine-project package and proposed the Project to the potential IFIs for financing. The relevant Project parties are described in Section 1.2.

The IFIs seek compliance with internationally accepted environmental and social standards. Therefore, they require the Project Company to conduct the ESIA study which help to identify and assess the potential environmental and social effects of a proposed project, evaluate alternatives, and design appropriate mitigation, management, and monitoring measures to compensate adverse impacts, provide benefits, and improve decision making.

This document represents the Final Draft ESIA Report, which has been prepared in line with the requirements of the Performance Standards (PSs) of International Finance Corporation (IFC), Performance Requirements (PRs) of the European Bank for Reconstruction and Development (EBRD), Environmental and Social Policy and Procedures (ESPP) of U.S. International Development Finance Corporation (DFC) and the Equator Principles IV (EP IV), as well as national environmental and social legislation along with other Applicable Standards as summarized in *Chapter 3: Legal and Policy Framework*.

1.2 Project Parties

This Section presents the parties of the Project and the organisational capacity defined for performing the Project.

1.2.1 Project Company

The Project is planned to be implemented by "Enerjisa Üretim" or the "Project Company" as a leading private sector energy producer in Türkiye. The total installed capacity of the Company's power generation portfolio is approximately 3,748 MW, of which 9.4% consists of six wind power

plants with a total installed capacity of 352.8 MW. The Project Company's goal is to complete 1,000 MW YEKA-2 project investments by early 2026 and increase their total installed capacity to 5,000 MW. They will focus on flexible and high-efficiency generation units and expanding the utilization of renewable energy resources potential in the upcoming years.[6]

1.2.2 The Consultant

As part of the financing process and achieving the sustainable outcomes within the Project, Mott MacDonald Türkiye ("the Consultant") has been appointed by Enerjisa Üretim to undertake an ESIA Study to identify the impacts that are likely to occur due to implementation of construction and operation activities under the Project and to comply with the requirements set by the IFIs.

The Consultant is preparing an ESIA Report for the Project, as well as the Environmental and Social Management Plan (ESMP), Resettlement Action Plan (RAP), Human Rights Impact Assessment (HRIA), Biodiversity Management Plan together with construction and operation phase environmental and social sub-management plans in reference with the subjects and potential impacts covered in the ESIA report.

1.2.3 Project Lenders

The nine-project package loan is seeking to be funded by a group of development finance institutions and commercial lenders and with partial coverage by the German ECA Euler Hermes Aktiengesellschaft ("EH"). The lenders altogether are defined as "Project Lenders" in this Final Draft ESIA Report. The Project Lenders set requirements to manage potential environmental and social risks, and impacts associated with the projects for achieving sustainable outcomes in the financed projects as per their commitments for financing a project.

1.2.4 Project Organisational Capacity

The Project includes several parties involved within various Project-related activities. In this sense, as well as its own Project team, the Project Company has appointed several consultant companies to gain support during the National EIA process. The consultancy activities included social studies undertaken by Adam & Smith, and biodiversity monitoring studies for the National EIA undertaken by Nartus.

Furthermore, the Project Lenders have appointed Lenders' Independent Environment & Social Consultant (IESC), namely Ramboll UK Limited (Ramboll) and ACE Consulting and Engineering Inc (ACE), for monitoring of the Project in line with the Lenders' standards and requirements. Figure 1-1 indicates to the organisational chart of the Project.

[6] Enerjisa Üretim. (n.d.). *Energy Generation Strategy*. Retrieved November 15, 2023, from Energy Generation Strategy | Enerjisa Üretim (enerjisauretim.com.tr)

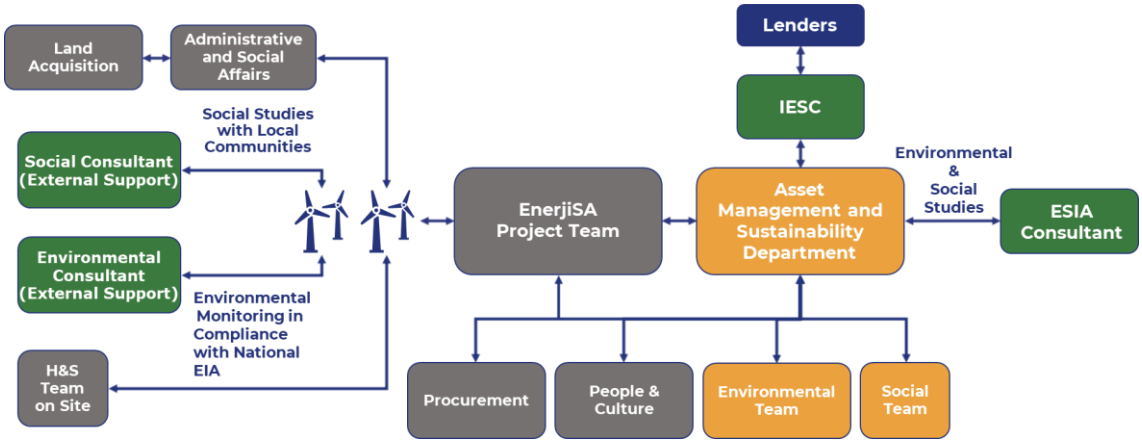

Figure 1-1: Project Organisational Chart

Source: Provided by the Project Company on 16 October 2023.

1.3 ESIA Scope and Objectives

The outputs of the performed National EIA Study are evaluated by the Consultant, and the gaps were analysed in order to assess the Project's compliance with the applicable national and international environmental, health, safety and social standards as presented below in *Chapter 2: Project Description*. The identified gaps outline any additional data that should be collected, and any additional assessments required for the Project to meet the applicable standards within the scope of the ESIA study. The Consultant has carried out required work for collecting additional data and conducting additional assessments required for the Project within the scope of ESIA. The findings, assessment results and evaluation remarks are presented in this Final Draft ESIA Report, providing the Project's potential impacts as well as the proposed mitigation measures to address these impacts.

Accordingly, the primary objectives of ESIA for the Project are determined as listed below:

- Identification of potential environmental and social impacts that may arise throughout construction and operation phases of the Project,
- Complying with applicable standards which are specified in *Chapter 3: Legal and Policy Framework*,
- Engaging with relevant stakeholders including local communities, governmental bodies, non-governmental organisations (NGOs) and other interested parties to gather their perspectives, concerns, and feedback regarding the Project,
- Identification of potential risks associated with the Project activities and proposing mitigation measures to minimize or eliminate adverse impacts on the environment and communities,
- Evaluation of potential impacts of the Project activities on local flora and fauna and proposing measures for protection of biodiversity,
- Assessment of potential impacts of the Project activities on air and water quality, noise levels, emissions, and potential contamination, and proposing measures to mitigate any adverse impacts,
- Evaluation of potential impacts of the Project activities on cultural heritage sites, social structures, and local communities; and proposing measures to preserve cultural and social heritage,
- Evaluation of potential impacts of the Project activities on community health and safety, including the impact of noise and visual effects, and proposing measures to ensure wellbeing of the local communities,

- Assessment of economic and social benefits that the Project may bring to local communities and broader region.

In line with the above-mentioned objectives, the ESIA for the Project aims to ensure that the Project is developed and operated in an environmentally and socially responsible manner, minimising or eliminating adverse impacts and maximizing positive contributions to the surrounding communities and the ecosystem.

1.4 Project Timeline

The tasks undertaken to support the ESIA include baseline data collection, public consultation, and detailed assessment as noted below:

- The detailed design phase of the Project has commenced.
- The National EIA Positive decision secured in March 2023.
- Primary ESIA baseline data collection performed from October 2023 to December 2023.
- Draft ESIA Report submitted in May 2024.
- The disclosure period of the Final Draft ESIA in planned to start in June 2024.
- Final ESIA Report to be submitted in August 2024.

1.5 Report Structure

The main ESIA report includes the technical chapters which describes the scope of assessment, the regulatory framework, the assessment methodology, baseline conditions, predicted impacts, proposed mitigation measures, and residual impacts as well as cumulative impacts. Supporting documents, which form a part of the ESIA, are presented in the Appendices. References to the appendix documents are provided in the main text of the ESIA Report, where referred to. The structure and content of this Final Draft ESIA Report and Appendices are presented in Table 1-1.

The ESIA study is structured as follows:

- Non-Technical Summary (NTS),
- The Draft ESIA Report (this document), including figures and associated appendices, and
- Environmental and Social Management Plan (ESMP) including Commitment Register as an appendix to ESIA Report

In addition to the ESIA, the following documents will be prepared for the Project by the Consultant:

- Environmental and Social Management System (ESMS) Plans and Procedures,
- Stakeholder Engagement Plan (SEP)
- Resettlement Action Plan (RAP),
- Community Level Assistance Program (CLAP) Methodology, and
- Human Rights Impact Assessment.

1.5.1 Non-Technical Summary

The NTS provides a description of the ESIA process and describes the Project and main findings in a way that is easily understood by the general public. This is a standalone document alongside this Final Draft ESIA Report.

1.5.2 Structure of the ESIA Report

The structure and content of this Final Draft ESIA Report is shared in Table 1-1.

Table 1-1: Structure of the Final Draft ESIA Report

Chapter	Title	Description of Content
Chapter 1	Introduction	Presentation of a brief overview and purpose of the ESIA study and this Final Draft ESIA Report.
Chapter 2	Project Description	Describes the Project, its main components and activities for pre-construction, construction, and operation; as well as the Project alternatives considered in reaching the final design decisions.
Chapter 3	Legal and Policy Framework	Defines key national policy and legislation, and international requirements and guidelines applicable to the Project, as well as key national institutions and IFIs.
Chapter 4	ESIA Scope and Methodology	Sets out the stages of the ESIA study, key assumptions and methodologies for undertaking the study.
Chapter 5	Water Quality, Hydrology and Hydrogeology	Presentation of technical assessments undertaken within the ESIA study. Includes a summary of baseline conditions developed by the use of quantitative and qualitative primary and secondary data sources and fieldwork, the presentation of potential environmental impacts and suggested mitigation measures. In this context, direct and indirect impacts, temporary and permanent impacts of reversible or irreversible natures are identified, along with the mitigation measures to be implemented in order to reduce the level of resulting effects on the environment. Furthermore, the significance of - residual (post-mitigation) effects is presented.
Chapter 6	Land Use, Soil and Geology	
Chapter 7	Air Quality	
Chapter 8	Climate & Greenhouse Gases (GHG)	
Chapter 9	Noise and Vibration	
Chapter 10	Landscape and Visual	
Chapter 11	Waste and Resources	
Chapter 12	Biodiversity	
Chapter 13	Social Environment	
Chapter 14	Occupational Health and Safety	
Chapter 15	Community Health and Safety	
Chapter 16	Cultural Heritage	
Chapter 17	Cumulative Impacts	The assessment of cumulative impacts represents the combination of multiple impacts that may result when the Project is considered alongside with other proposed projects, including those currently under development, in the same geographic area or with similar development timetable. Multiple impacts upon the same receptor of the Project are identified and assessed.
Chapter 18	Information Disclosure and Consultation	Outlines the information disclosure, consultation and participation activities that have been undertaken as part of the ESIA process.
Chapter 19	References	Presentation of the references used during preparation of this Final Draft ESIA Report.
Appendices		

1.5.3 Environmental and Social Management Plan (ESMP)

The primary aim for formulating and implementing the ESMP, which will be in the form of an ESIA commitment register, is to safeguard the environment, Project personnel and the local population against Project activities which may cause harm or nuisance. For the purposes of the ESMP, “management” will be the control or mitigation measures and procedures required in managing key environmental and social effects. In addition, the ESMP will outline monitoring requirements, and these will be defined as monitoring, measurement, site inspection and audit.

The Environmental and Social Management Plan, which focuses on assessment of potential environmental and social impacts associated with the activities performed in the construction and operation phases of the Project, is not available yet. The Consultant will prepare a framework ESMP in accordance with Terms of Reference that will be based on the assessment of baseline conditions and expected impacts.

The ESMP will:

- Present the Lenders' standards, guidelines and legal requirements that should be adopted during construction and operation (including any additional environmental permitting requirements) and also be structured in line with International Standardisation Organisation (ISO) Standards;
- Set out the institutional framework for implementing the measures including where further strengthening is required or where the proponent may be required to put additional measures in place;
- Describe the proposed measures, including their timing and implementation arrangement;
- Define responsibilities for implementing the proposed measures, including for monitoring and evaluation;
- Establish the environmental and social monitoring and evaluation plan for construction and operation phases;
- Identify monitoring activities and key performance indicators that the Project should aim to achieve;
- Present construction guidelines that address how contractors should incorporate environmental and social considerations in their overall work. These would be presented as an Environmental and Social Checklist during the construction phase; and
- Provide a framework for the management of emergency situations during construction and operation.

The ESMP is a live document and will require regular review by the Project Company, as set out within it; hence it is subject to future modification if required. Further detailed sub-management plans that are listed below, will be developed for the construction and operation phases by the Consultant in accordance with the policies, guidelines and legislation.

The environmental and social (E&S) management plans as well as corporate E&S Policies of Enerjisa Uretim (Please refer to Section 14.2.3.3 Project Standards and Section 18.2.2.3 Applicable Policies and Management Systems of the Project Company) will be communicated to and adopted by contractors. As such,

- Once the ESMP and sub-management plans are finalized, necessary clauses indicating the contractors' obligations to comply with these documents will be included in their contracts.
- Sub-management plans will be included as appendix to their contract. They will be advised to either develop their own E&S management plans/procedures or comply with the Project Company's documents.
- On site implementation will be monitored by Enerjisa Üretim Team (inspections, audits, etc.) by adhering to the monitoring requirements specified in subject-specific management plans as part of the ESMS.
- Trainings will be provided to both Enerjisa Uretim and contractors' personnel in order to increase the capacity and awareness.

The Project Company holds the ultimate responsibility for the environmental and social performance including the performance of its contractors and overall accountability for the compliance of the Project activities during both construction and operation phases. It is the responsibility of the Project Company to oversee and monitor the implementation of relevant ESMP elements by subcontractors during the construction phase. This includes auditing and assessing subcontractors implementation of the relevant aspects of the ESMP, ensuring that corrective actions are taken when necessary to maintain ESHS performance in line with international standards and good international industry practice (GIIP).

The Project Company is responsible for developing the ESMS which outlines the systems and processes established to manage the environmental and social issues and revising relevant environmental and social management plans. The ESMS will establish policies for the Project and provide more details on the management at an organisational level in order to implement the ESMP and align with other management system requirements. The detailed roles and responsibilities within the Project Company organization is provided in HR & Worker Management Plan including Workers' Accommodation Plan.

1.5.4 Environmental and Social Management System (ESMS) Plans and Procedures

The ESMS plans and procedures which will be prepared by the Consultant for both construction and operation phases of the Project are listed below.

- Landscape and Visual Impacts Management Procedure
- Noise Management Plan
- Biodiversity Management Plan
- Waste and Wastewater Management Plan
- Air Quality Management Plan
- Occupational Health and Safety Management Plan
- Community Health and Safety Plan
- Emergency Preparedness and Response Plan
- Cultural Heritage Management Plan (including Chance Find Procedure)
- HR & Worker Management Plan (including Workers' Accommodation Plan)
- Erosion Control Management Plan (including Drainage and Sediment Management Procedure)
- Water Quality Management Procedure
- Procurement and Local Content Procedure
- Contractor Selection, Evaluation and Management Procedure
- Security Management Procedure
- Traffic Management Procedure
- GHG Assessment Procedure
- Associated Facilities Management Procedure
- Change Management Procedure

1.6 Limitations and Uncertainties

This ESIA Study is based on documents and information provided by the Project Company between September and December 2023, as well as the information gathered, and visual observations made during the site visits performed by the Consultant during this time period.

The limitations and uncertainties involved within the scope of ESIA study are listed below.

- Due to the limited timescale, it is not possible to undertake the biodiversity baseline surveys, and the biodiversity assessment is mainly a desktop study that relies on National EIA and other available white and grey literature, which poses significant limitations to the biodiversity component of the ESIA study due to field data quality or quantity. All Project specific biodiversity information available from National EIA was incorporated for the assessment, and an exhaustive use of available desktop components was employed as described in Section 12.2.4.1. Additional baseline collection will be undertaken to enhance the available data in alignment with the Project's international requirements and standards as described in Section 12.7.

- The changes in environmental and social regulations after the ESIA study may introduce uncertainties regarding the compliance requirements of the Project.
- Identifying cumulative impacts on the identified Valued Environmental and Social Components (VECs) such as ecosystems that include species of conservation concern and communities being affected by various different projects may be challenging due to complex interactions and dependencies. There is a significant gap in baseline data in the Project area. This makes difficult to evaluate impacts on ecosystems and species, both in terms of project impacts and cumulative impacts. Reliable assessment of impacts is dependent on the results of additional studies. Applying the recommended monitoring methodology for additional studies will result in a robust assessment of the magnitude of impacts. Additionally, there are a number of similar activities (in terms of habitat loss and collision risk) around the Project area that need to be assessed for impacts. Determining the cumulative impact of various projects thus becomes intricate due to the uncertainty on the specific species groups affected by each project.

The several limitations and uncertainties associated with the third-party work related to ESIA study are listed below.

- The predictive models used for air quality, noise, shadow flicker, and visual impact assessment may have limitations in capturing real world conditions accurately.
- The assessment of potential impacts on human health from noise, electromagnetic fields, etc. may have limitations due to acquiring scientific understanding and variations in individual sensitivity.

It essential to acknowledge these limitations and uncertainties to provide a realistic and transparent assessment. The Consultant has applied several studies and strategies to decrease and eliminate these challenges for ensuring more robust and reliable outcomes within the scope of ESIA study, as listed below.

- Conducting field studies to gather real-time and accurate data.
- Developed mechanisms to ensure ongoing effectiveness of mitigation measures, such as constant monitoring, assessment and adjustment of mitigation measures involving the integration of real-time data collection; continuous risk assessment; and adaptive management strategies.
- Established a robust monitoring plan to verify effectiveness of mitigation measures during the construction and operation phases and ensure any deviations from the predicted impacts are promptly identified and addressed, reducing uncertainties associated with the long-term effects of the Project.

Any limitations and uncertainties associated with impact prediction or the sensitivity of receptors due to the absence of data are explicitly stated in relevant chapters of this Report. Where applicable, the ESIA makes commitments concerning measures that should be put in place with monitoring and/or environmental or social management plans to deal with such uncertainties.

2 Project Description

2.1 Project Overview

This Chapter provides a detailed description of the Project regarding its need, location, components, and overview of the proposed Project activities which are to take place during the planning, construction and operation phases.

2.1.1 The Project

As described in Section 1.1, Enerjisa Üretim has been awarded to construct and operate a wind power plant, namely Harmancık WPP Project. The Project comprises of 10 turbines, each having 4.2 MW_m unit power and a total installed power of 42 MW_m/42 MW_e A mobile crushing and screening facility with a capacity of 68.75 tonnes/hour will be established during the construction phase in order to size and reuse the excess excavation material resulting from the ground loosening activities to be carried out within the scope of construction activities.

The Project will involve the following works:

- Construction of 10 wind turbines and related parts (e.g., the cabling systems), a switchyard, an administrative building, access and site roads, and the ETL for the Project; and
- Operation of 10-turbine Harmancık WPP.

According to the Project schedule, the construction phase is expected to be 16 months, and the duration of operation phase will be 49 years. It is expected that the total number of workforce for the construction phase will be 106 at peak times, while this number is expected to be five during the operation phase. Further details on the Project are provided throughout this Chapter.

2.1.2 Need for the Project

Energy has a major role in production processes as well as for human settlements, and demand to energy increases drastically with the increased population and industrial activity. Therefore, energy use is one of the key indicators of economic and social development and growth potential of a country. Due to the need for widespread use of electrical energy in daily life, the amount of electrical energy usage in countries is considered as an important indicator of social development [7,8]. With the Covid-19 outbreak and the latest news around the globe regarding energy crisis, the criticality of secure, affordable and people-centred transition in energy generation and use is once more sparked.

The need for primary energy[9] is constantly growing in the World, as well as in Türkiye. Considering that the primary energy use is currently dominated by non-renewable energy resources worldwide, mostly by the fossil fuels, the reliability of non-renewable resources points out significant question mark for today's World and for the future generations. Moreover, the extraction and use of fossil fuels directly contribute to global climate change, resulting in changes in the aquatic and terrestrial ecosystems, threatening human life on Earth. On the contrary, renewable energy resources are clean, reliable and sustainable when comparing with

[7] World Bank, 2023. Energy Overview. Accessed from https://www.worldbank.org/en/topic/energy/overview#1 on 02 November 2023.

[8] McKinsey&Company, 2019. The decoupling of GDP and energy growth: A CEO guide. Accessed from https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/the-decoupling-of-gdp-and-energy-growth-a-ceo-guide#/ on 02 November 2023.

[9] Primary energy is defined by the International Energy Agency (IEA) as "energy that has not been subjected to any conversion or transformation process". (2017)

fossil fuels. Utilization of renewable energy resources plays an important role in eliminating dependence on other countries for the supply of primary energy and improving sustainable development.

Utilizing renewable energy resources such as wind, solar, biomass, wave, and current in Türkiye with its high potential and integrating these resources to the economy has a strategic importance in terms of ensuring resource diversity. It is aimed with the Project to ensure more efficient use of public resources in Türkiye by increasing the number of renewable energy power plants; and as a result, supporting local renewable energy resilience and potential by diversifying the energy mix of the country.

Wind power is one of the fastest-growing energy sources in the world, and it offers many benefits for national socio-economic development and energy security. The Project is of critical importance since it will contribute to reaching national renewable energy generation targets and minimizing the external energy dependency by utilization of Türkiye's already existing wind energy potential. Furthermore, the Project is aimed to contribute combatting climate change by decreasing dependency on fossil fuels by utilization of wind power.

2.2 Project Location

2.2.1 Location and Layout

The Project licence area falls within Çanakkale province of Türkiye which is located in the Marmara region. Figure 2-1 illustrates the location of Çanakkale.

Figure 2-1: Çanakkale Province of Türkiye where the Project License Area Falls within

Source: Mott MacDonald

According to the Wind Power Plants Report published by Türkiye Wind Energy Association (TÜREB), considering the share of wind power plants in operation in the Aegean Region, Çanakkale ranks third with an installed capacity of 917.35. MWm (8.26% share). With the Project, it is aimed to contribute to the national energy strategy targets as well as regional economy by utilizing the wind potential of Çanakkale province.

The locations of main Project components (i.e., turbines access roads, switchyard), as well as the associated facility (i.e. ETL) are listed below:

- Turbines T1, T2, and T5 are located in Merkez District, Çanakkale;
- Turbines T3, T4, T6, T7, T8, T9 and T10 are located in Lapseki District, Çanakkale
- Access road is located in Çanakkale Province, connecting the turbine area from Lapseki District.
- Switchyard area (including the administration building) is located in Lapseki District, Çanakkale.
- ETL of the Project is located in Lapseki District, Çanakkale; connecting the Project substation to the existing Üçpınar Transformer Substation.

In addition, the need for on-site access roads which will provide access to the Project area will be met by opening new roads and/or improving/expanding the existing roads around the Project area.

2.2.2 Climate and Wind Conditions

Mediterranean climate is predominantly observed in the Aegean region of Türkiye; with warm and dry summers, and warm and rainy winters. The Mediterranean climate is more common in the coastal areas than the inland areas.

2.2.2.1 Climate

The average daytime temperature in the region is 25.1°C in August, while the coldest month is January with an average maximum daytime temperature of 9.6°C. The number of hours of sunshine per day is highest in July with 11.9 hours of sunshine. The relative humidity in the region averages 79.8% in January, while it is easier to endure in July. Meteorological data of Çanakkale Province, where the Project licence area is located, are provided in Table 2-1,

Table 2-1: Meteorological Data of Çanakkale Province (1929 – 2022 Measurement Period)

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean Temperature (°C)	6.3	6.7	8.4	12.6	17.6	22.3	25.1	25.1	21.1	16.3	12.1	8.5	15.2
Mean Highest Temperature (°C)	9.6	10.3	12.5	17.3	22.7	27.8	30.8	30.7	26.4	20.8	16	11.8	19.7
Mean Lowest Temperature (°C)	3.2	3.4	4.7	8.3	12.7	16.6	19.4	19.6	16.1	12.2	8.6	5.4	10.8
Mean Daily Sunshine Exposure (hour)	3.2	4.4	5.3	7.3	9.1	10.9	11.9	11.2	9	6.4	4.3	3.1	7.2
Average Number of Rainy Days	12.4	10.43	9.73	7.88	5.59	4.13	1.72	1.35	3.28	6.42	8.8	12.32	84.1
Mean Monthly Total Precipitation (mm)	91.8	72.8	65.5	45	29.9	25.4	14.8	10.9	24.7	55	83.7	104.9	624.4
Highest Temperature (°C)	20.6	21.3	27.3	30.8	38.9	38.5	39.1	39.7	35.9	31.8	26.2	22.9	39.7
Lowest Temperature (°C)	-11	-11.5	-8.5	-1.6	2.3	6.6	11.2	9.4	5.9	0.4	-7	-10.5	-11.5

Source: Provincial General Statistical Data. Ministry of Environment, Urbanization and Climate Change, General Directorate of Meteorology. Retrieved 7 February 2024, from https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=undefined&m=CANAKKALE

Meteorological information gathered from Çanakkale Meteorology Station (for the 1929 – 2021 period) under the National EIA studies are listed below:

- The annual average pressure is measured as 886.5 hPa, the daily maximum pressure is 903 hPa and the daily minimum pressure is 861.8 hPa. The month with the maximum pressure was Februrary with 1049.7 hPa, and the month with the minimum pressure was December with 861.8 hPa.
- The annual average temperature is 11°C, the daily maximum temperature is 39.7 °C, and the daily minimum temperature is -11.5 °C. The month with the maximum temperature was August with 39.7 °C, and the month with the minimum temperature was February with -11.5 °C.
- The annual total precipitation average is 625.5 mm. The month with the maximum precipitation was November with 137.8 mm.
- The annual average humidity is 73.1%. The monthly relative humidity average is 80.3% in December and the monthly minimum relative humidity average is 27.3% in August.
- The average number of annual foggy days is 9.08, the average number of hail days is 3.05, the average number of frost days is 6.65, the number of thunderstorm days is 7.27, whereas the number of snowy days is 5.7, and the number of snow-covered days is stated as 4.58.
- The maximum snow depth was observed in February with a maximum of 97 cm.
- The highest annual average total open surface evaporation was observed in July with 272.6 mm.

2.2.2.2 Wind Conditions

Wind roses are used for characterizing the speed and direction of winds at a specific location. Wind rose diagram is an important tool for the WPP projects as they pave the way for understanding the site wind characteristics, energy production potential, microclimates and wind variability; whereas helping efficient design and operation of wind power projects. The wind rose diagram of Çanakkale Province are provided in Figure 2-2.

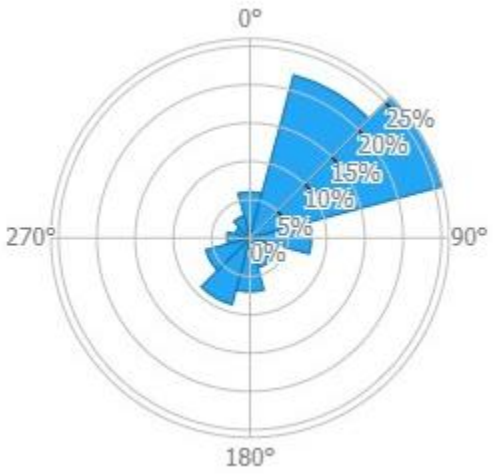

Figure 2-2: Wind Rose Diagram of Çanakkale Province

Source: Global Wind Atlas. Retrieved 8 February 2024, from https://globalwindatlas.info/en/area/Turkey.

According to the official wind measurement data specific to the Project area, it has been reported that the annual average wind speed of the Project area is approximately 6-7 m/s.

Figure 2-3 below shows the annual average wind speed distribution of Çanakkale. In this sense, the Project area is defined to be one of the regions with the maximum wind speed of the provinces where it is located in.

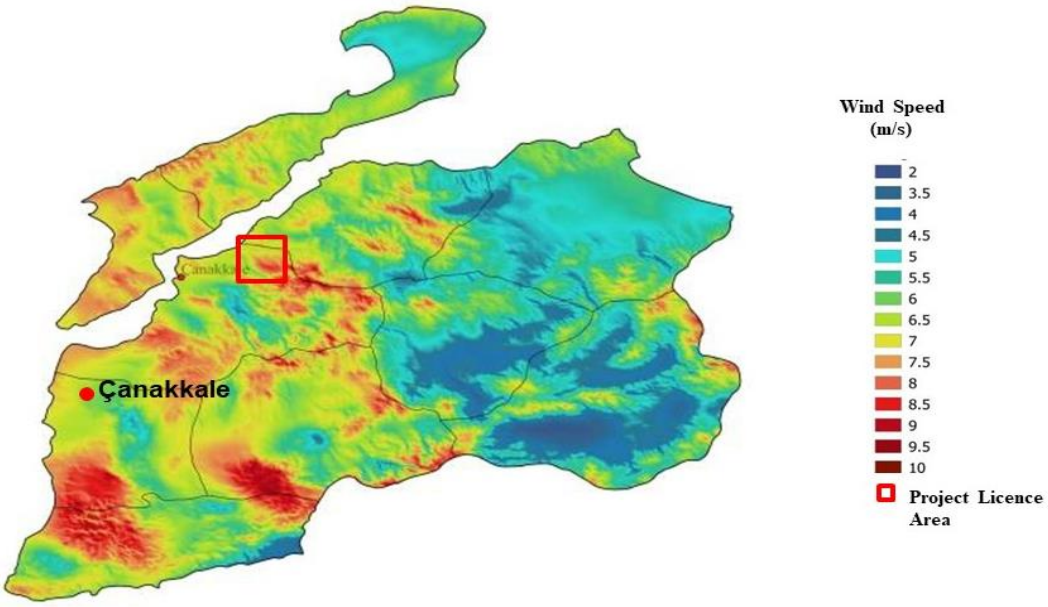

Figure 2-3: Annual Average Wind Speed Distribution of Çanakkale Province[10]

For extreme climatic conditions, the wind turbine has certain emergency systems. Please refer to Section 2.3.1 for detailed information on emergency systems of the wind turbine.

2.2.3 Layout

The general illustration of Project license area is presented in Figure 2-4 and a smaller scale representation of the Project area consisting of turbine locations is provided in Figure 2-5. According to the 1/100,000 scale Master Plan (ÇDP in *Turkish*) prepared by General Directorate of Spatial Planning of MoEUCC, some sections of the Project licence area, Project units, turbine points and the access roads fall within "Forest Area" representations. In this context, the Project has an obligation to secure the Forest Final Permit. Outside of the Project license area, an ETL is to be constructed within the scope of the Project as presented in Figure 2-6. According to the Project Summary document prepared by the Project Company for the ETL for TEIAS, including 1/100,000 Scale ÇDP, the ETL route falls within “Forest Area”. The summary of legislative obligation regarding the master plan are provided in Table 2-2.

It is noted that the locations of wind turbines have changed from their initially designed locations (please refer to Section 2.6.2 for detailed information).

[10] Ministry of Energy and Natural Resources. Accessed from repa.enerji.gov.tr on 8 November 2023.

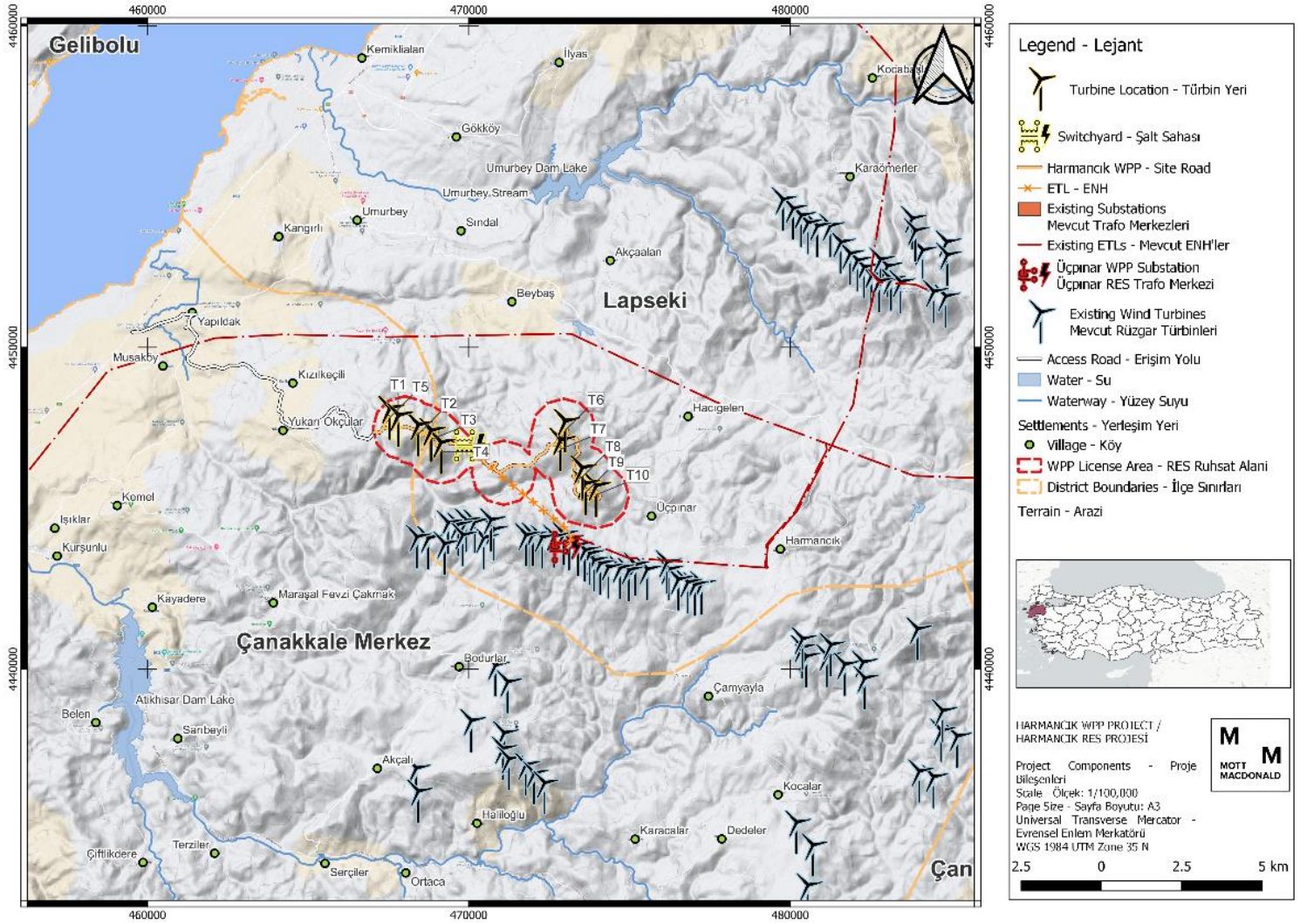

Figure 2-4: 1/100.000 scale Representation of the Project Licence Area

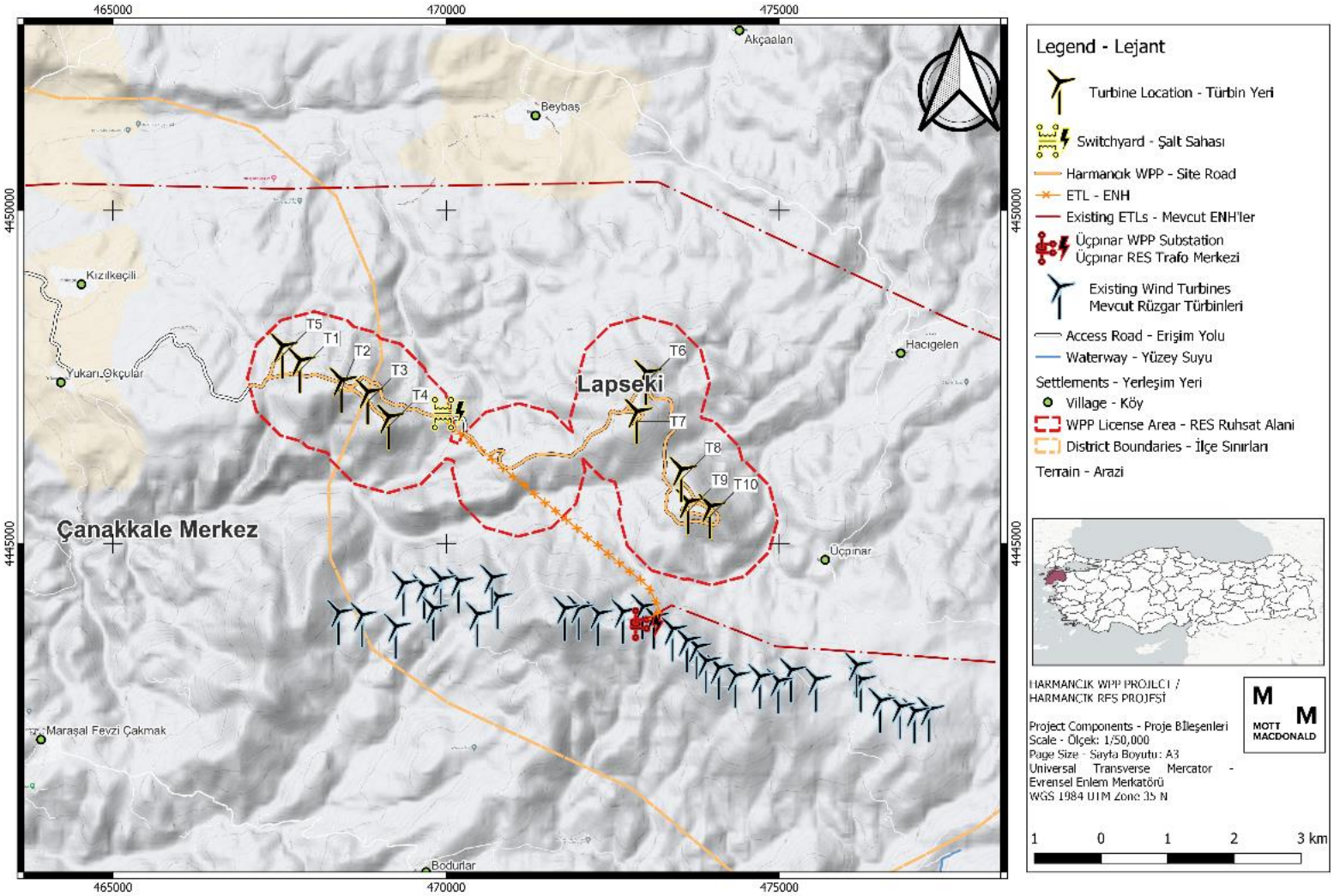

Figure 2-5: 1/50.000 scale Representation of the Project Licence Area

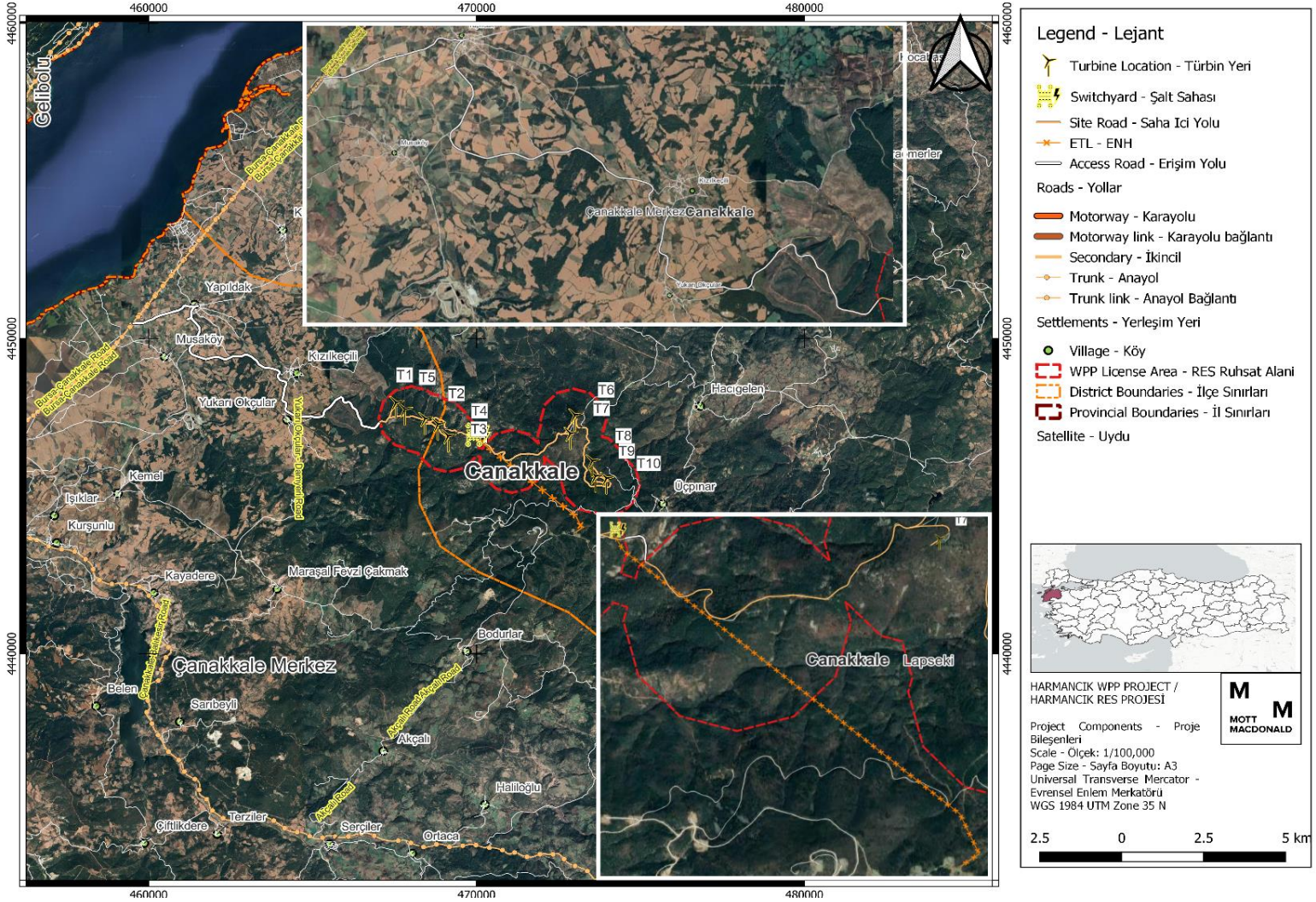

Figure 2-6: Project components including the Access Roads and ETL

Table 2-2: Project Summary Table within the Scope of 1/100,000 Scale Master Plan

Demonstration Area within the Scope of ÇDP	Do Project Units Remain in the ÇDP Demonstration Area?					Basis of the Obligation	Are the Units in the Area Subject to Permit?
	Power Plant	Turbine	Switchyard	Access Road	ETL		
Forest Land	Yes	Yes	Yes	Yes	Yes	Regulation on Implementation of Articles 17/3 and 18 of the Forest Law, Article 17 of the Forest Law (6831)	Yes

Source: Project National EIA Report, January 2023 and Eltemtek, 2023, ETL Project Final Project Description Document.

2.3 Project Components

The Project comprises the construction and operation of 10 horizontal axis wind turbines to provide a maximum licensed power capacity of 42 MW_m to be delivered to the national grid system. Table 2-3 provides a summary of design parameters determined and accepted for the Project in accordance with the types of turbines used.

Table 2-3: Project Design Parameters

Design Parameter	Enercon GmbH[11]
General	
Project generation capacity	42 MW
Technology type	Horizontal-Axis Wind Turbine (HAWT)
Number of wind turbines	10
Type of wind turbine	ENERCON E-138 EP3
Nominal power	4200 kW
Wind class (IEC)	S
Design service life	25 years
Cut-in wind speed	2.5 m/s
Cut-out wind speed	28 m/s
Cut-back-in wind speed	2,0 m/s – 28 m/s
Rotational speed	10.8 rpm
Ambient temperature for normal operation	-10 °C to +40 °C
Sound power level	99.0 – 106.0 dB(A)
Rotor	
Number of Rotor Blades	3
Rotor Diameter	138.6 m
Swept Area	15,085 m^2
Rotor Axis Angle	7°
Total Blade Length	69 m
Rotor Blade Material	Composite fibreglass
Tower	
Hub Height (HH)	111 m
Tip Height	179.25 m

The Project consists of 3 main units and an associated facility (i.e., the Energy Transmission Line) subject to this Final Draft ESIA Report (please refer to Section 2.4). The main units are; the basic component "turbine" which will be the main unit for energy production, the “switchyard”

[11] ENERCON GmbH. (2021). *ENERCON E-138 EP3 wind energy converter Technical Description.*

which will transmit the energy produced from the turbines to the national grid, and the “access roads” which will serve for the transportation purposes to the turbines and the switchyard area of the Project. The general layout of all project components including the associated facilities are presented in Figure 2-4 and Figure 2-5 in 1/100,000 and 1/50,000 scales.

2.3.1 Wind Turbines

Wind turbines are the main structural elements of wind power plants, and work on a simple principle which is converting the kinetic energy of moving air first into mechanical energy and then to electrical energy. The wind rotates the turbine blades two or three times around the rotor. The rotor is connected to the main shaft, which turns a generator to produce electricity. Horizontal axis wind turbines (HAWTs) typically have two or three blades. The HAWTs mainly include a foundation, tower, nacelle (containing a machine house and yaw drives), generator, rotor hub, and rotor blades.[12]

In the scope of the Project, 10 horizontal axis wind turbines with the following main design properties will be used[13]:

- Type: 4.2 MW Enercon E-138
- Hub Height: 111 m
- Rotor Diameter: 138.6 m
- Nominal Power: 4.2 MW_m/4.2 MW_e
- Swept Area: 15,085 m^2

The design parameters of the wind turbines to be used within the Project is provided in Table 2-3. The ENERCON E-138 wind turbine is a direct-driven wind energy converter with a 3-bladed rotor, active pitch control, carriable speed operation and a nominal power of 4,200 kW. The gearless concept (the hub and the rotor of the annular generator are directly interconnected without a gear to form one solid unit) of wind turbine helps reducing mechanical strain and increases the technical service life.

The wind turbine is equipped with a number of safety devices in order to keep the wind turbine within a constantly safe operating range. These safety devices include components for safe stopping of the wind turbine as well as a system of sensors. The sensor system records all relevant operating states of the wind turbine and feeds the information into the Scada remote system of ENERCON. The safety equipment and sensor systems of the wind turbine are emergency stop button, main switch, redundant sensors, speed monitoring, air gap monitoring, oscillation monitoring, temperature monitoring, nacelle-internal noise monitoring, and cable twisting monitoring systems.

In order to avoid any problems when the temperature falls outside the design thresholds, a temperature monitoring system is utilized. The temperature monitoring system is one of the safety systems of the wind turbine. Some components of the wind turbine are cooled. Temperature sensors continuously measure components that need to be protected from high temperatures. If the temperature is too high, the power of the wind turbine is reduced or stopped if necessary. The wind turbine cools down and usually restarts automatically when the temperature falls below a pre-defined limit. Some monitoring stations are equipped with additional overtemperature switches, which can also stop the wind turbine if the temperature exceeds a certain limit and in certain situations without automatic restart after cooling down. At

[12] ENERCON GmbH, n.d. WEC Components. Accessed from https://www.enercon.de/en/technology/wec-components/ on 02 November 2023.

[13] Data accessed from the Project Prelicense Report on 11 November 2023.

low temperatures, some assemblies are heated to keep them operational, e.g. the energy storage system for the hazard beacon and the generator.

The ENERCON E-138 wind turbines have three operating modes:

- Full load operation mode at wind speed above 15 m/s. The turbine uses pitch control to maintain the rotor speed at a certain value for limiting power to the nominal value of 4,200 kW.
- Partial load operation mode at wind speeds between 2 m/s and 15 m/s. The maximum power is aimed to be extracted from the wind by determination of the rotor speed and power output.
- Idle mode at wind speed below 2 m/s. At wind speeds below 2 m/s, no power can be fed into the grid. The turbine and the rotor turn slowly or stop (if there is no wind at all) since slow movement of rotor blades puts less strain on the rotor than longer periods of complete standstill.

2.3.2 Switchyard

The wind turbines will be connected at the switchgear panels through a cross linked cabling system to the Switchyard located within the Project area. The connection between the turbines and the switchyard will be made using underground transmission cables buried in ground. The cables are selected as AL core XLPE insulated underground MV cables. The connection between the switchyard and substation will be provided by 154 kV 4.5 km transmission line with 1272 MCM conductor.

2.3.3 Access Roads and Site Roads

There are two types of Project roads, namely - access roads and site roads. Access roads cover the path between the end of existing transport road and the beginning of site roads while site roads cover the path along the wind turbines in the Project area.

As reported by the Project Company and mentioned in the Project National EIA Report, there will be need for opening additional roads for access to the Project area (i.e., the area outside the Project licence area) during the construction phase; and if found necessary, improvements will be made to the existing roads. Furthermore, it was noted that connection to the Project area will be provided through D200 Highway (Çanakkale-Refahiye Road) Connection and connection roads through Yukarıokçular and Kızılkeçili Neighbourhoods. According to National EIA, within the scope of the Project, it is planned to use 14,061 m of road, the majority of which is part of existing roads. During construction phase, widening and improvements for approximately 9,655 m roads will be carried out and new roads will be constructed of approximately 4,406 m in accordance with the development plans. These connection roads are defined as “access roads” in this Final Draft ESIA Report prepared by the Consultant.

As mentioned, it is anticipated that road construction will be performed inside and the outside the Project licence area. The road construction to be performed within Project licence area is mentioned to be the site roads, which will provide connection between the wind turbines. In addition, roads will be constructed outside of the Project area providing connection between D200 Highway and Project area for transportation purposes.

Figure 2-7 provides a detailed representation of the access road according to the current design of the Project.

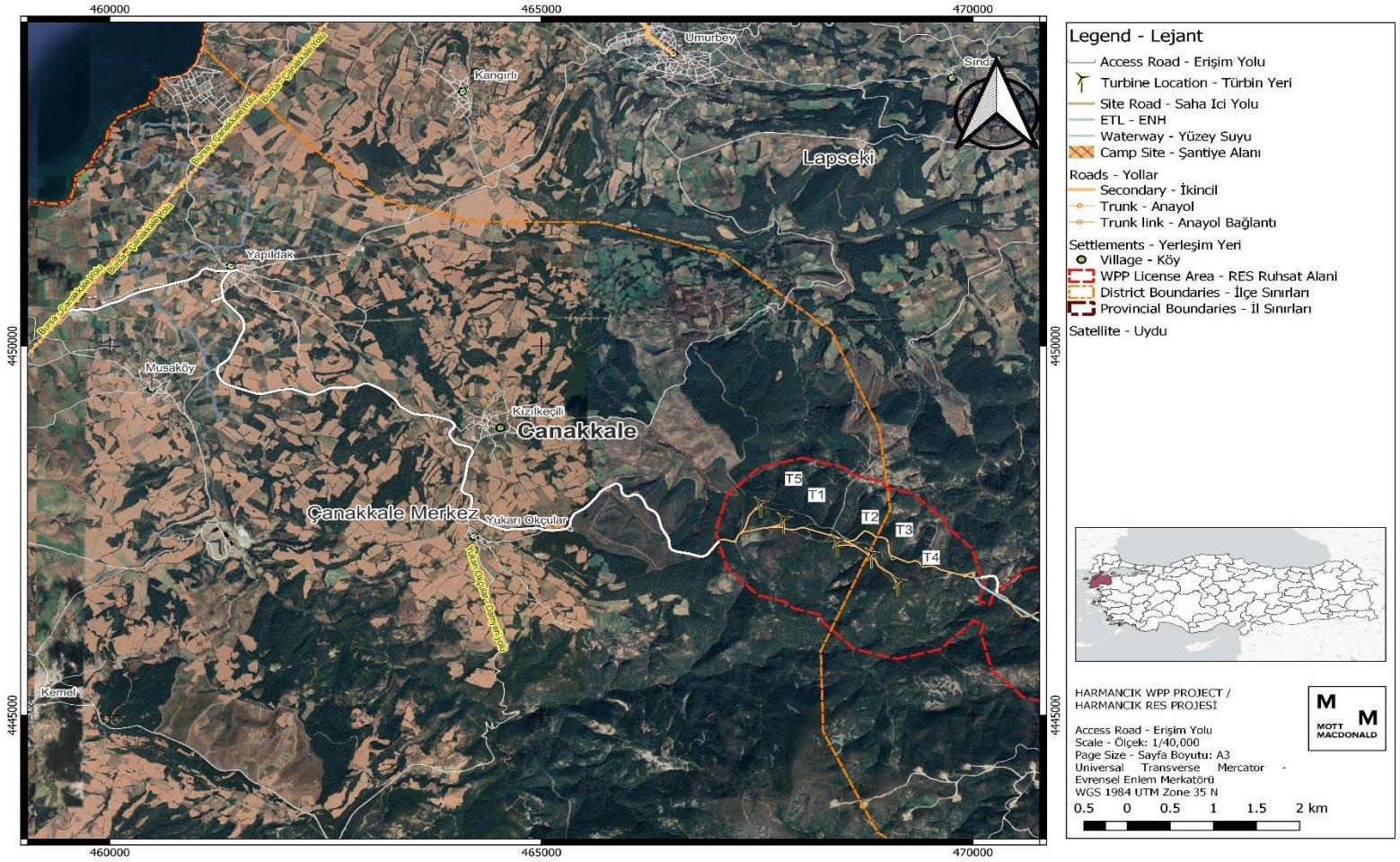

Figure 2-7: Detailed view of access road of current design of the Project

2.3.4 Mobile Crushing and Screening Facility

Within the scope of the Project, a part of the excess excavation material to be removed during the construction of the turbines will be temporarily stored in turbine platform areas and reused for backfilling works.

A mobile crushing and screening facility with a capacity of 68.75 tonnes/hour will be established during the construction phase, if necessary, in order to size and reuse the excess excavation material resulting from the ground loosening activities to be carried out within the scope of construction activities. Transportation of the material taken from the mobile crushing and screening facility will be provided by trucks. Treated soil materials will be reused as structural fill materials under roads and in the levelling of turbine platform areas. In case the reuse of excess excavation soil is not feasible (i.e., more soil material is excavated than is needed for filling or untreated soil materials could not be reused for any purpose), it will be managed as excavation waste, which will be stored in turbine platform areas onsite and be transferred and disposed of in the licensed excavated soil disposal areas operated by the municipalities. Please see Section 11.4.1.2 for more details on the subject.

2.3.5 The Administration Building

An administration building will be constructed in the Switchyard area for the Project. The administration building will consist of the ENERCON SCADA[14] system room, a working station for the monitoring of the Project, and facilities for maintenance personnel as deemed necessary as well as storage areas. The administration building is designed to deploy full operataional staff, not only technical but also administrative staff.

2.4 Project Associated Facility

In addition to the Project components, the Project activities also cover construction of the ETL for connection of the generated electricity to the national grid. The ETL will be constructed by Enerjisa Üretim, but the ownership will be under to Turkish Electricity Transmission Corporation (TEiAŞ) once connection is completed. The Consultant has been informed that permitting process for the ETL is being managed by TEIAS.

Document provided from Türkiye Ministry of Energy and Natural Resources, General Directorate of Turkish Electricity Transmission Corporation (TEİAŞ) comprises of 154 kV single-circuit transmission line of approximately 4.5 km for connection to Üçpınar Transformer Substation (TS) which is currently operated by TEIAS. Therefore, the ETL is exempt from the National EIA and further information regarding the exemption is provided in Section 2.5.1.3. There will be no expropriation for ETL.

At this stage, the ETL is the only facility identified as an Associated Facility to the Project. There will not be any other facility considered as a project associated facility such as quarries, borrow pits, wastewater treatment plant, landfilling site, etc.

2.5 Project Activities

Project activities are planned to consist of three phases:

- Pre-construction phase, encompassing the completion of necessary design measurements and permitting processes.
- Construction phase, involving site preparation, infrastructure, and assembly operations as well as commissioning test studies.

[14] Supervisory Control and Data Acquisition

- Operation phase, where the connection to the interconnected system is established through temporary-final acceptance processes, enabling electricity production.

Blasting activities will be conducted for the turbine locations and new roads to be constructed as specified by the Project Company, and a mobile crushing and screening plant will be established for sizing the materials obtained from the blasting.

The activities will be carried out simultaneously in each stage. The timeline for the Project which was provided by the Project Company on 11 November 2023 is presented with Table 2-4.

Table 2-4: Harmancık WPP Project Timetable

Activity Category	Activity Name	2023												2024												2025											
		Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
Permitting	EIA Process and Approval																																				
	EIA Process for the Energy Transmission Line (exemption decision)																																				
	Forestry Pre-Permit																																				
	Pre-Construction Permit for Drilling and Engineering																																				
	Zoning Plan Approval Process																																				
	Land Acquisition (Forestry Final Permit etc.)																																				
	Obtaining Production License																																				
Civil Construction Works	Roads																																				
	Crane Pads and Foundations																																				
Electrical Construction Works	Medium Voltage Cabling Installation																																				
	Switchyard Construction Works																																				
Control Building	Control Building Construction Works																																				
Energy Transmission Line Construction Works																																					
Turbine Works	Turbine Mechanical Erection																																				
	Turbine Commissioning and Test																																				
Planned Commercial Operation Deployment (COD)																																					

Source: Provided by the Project Company on 31 May 2024.

2.5.1 Pre-licence (Permitting) Phase

Pre-licence phase covers the activities performed during the timeframe between announcement of the YEKA competition and obtaining of the energy production licence. Pre-licence phase activities include the following steps:

1. Announcement of the YEKA competition
2. YEKA competition stage
3. Announcement of the YEKA projects in the Official Gazette
4. Securing the pre-licence for the Project
5. EIA process and approval
6. Securing the relevant official authority permits (e.g., forestry, culture, zoning)
7. Land Acquisition

2.5.1.1 Site selection

There are several factors considered during the site selection process to ensure minimal environmental impact and optimal energy generation.

- Legal requirements: Within the scope of the "Competition Announcement for the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Wind Energy" published in the Official Gazette dated 7 November 2018 and numbered 30588, Enerjisa Enerji Üretim A.Ş. was selected for the Çanakkale region by the Ministry of Energy and Natural Resources on 30 May 2019. The YEKA contract was signed on 9 March 2020, and the region where the Project is located was transferred to Enerjisa Energy Production Plants A.Ş. on 21 March 2021. Accordingly, the Project area has been determined by the General Directorate of Energy Affairs of the Ministry of Energy and Natural Resources.
- Access to and within the Project area: The Project Company confirmed during the Consultant’s site visit that the existing roads will be used for access to the Project area to the extent possible, and where found necessary, improvements and additions will be made to the existing roads. The ease and readiness of access is one of the factors that made the Project area favourable for this investment.
- Wind Potential of the Project area: The Project Company plans to install 10 turbines in Çanakkale. The Türkiye Energy Potential Map (REPA) indicates a maximum wind speed of 9.86 m/s in Çanakkale, with average of 6.14 m/s. Project-specific wind measurements indicates an annual average speed of approximately 6-7 m/s.
- Avoiding designated ecological and cultural heritage sites: While selecting the locations of Project components within the license area, the designated ecological and cultural heritage sites are taken into consideration and avoided to minimize the impacts. During site selection process national authorities do not consider Key Biodiversity Areas (KBAs) as a factor since those are not nationally recognized, however KBAs are internationally recognized areas that carry ecological significance and the Project overlaps Biga Mountains KBA.
- Avoiding physical displacement regarding land acquisition: While determining the lands needed for the Project, criteria that will minimise the negative social and economic impacts arising from land acquisition have been taken into consideration by avoiding resettlement as much as possible. For this purpose, in the determination of the Project area, state lands were preferred by avoiding private parcels and physical displacement, especially living areas with buildings, as much as possible where technical conditions are suitable. Collective findings indicate that the Project aligns with the existing land use patterns and regulatory frameworks, fostering socially responsible land acquisition process that Project Affected Persons (PAPs) are approached in a sensitive manner.

2.5.1.2 Land Acquisition

In the close proximity of the Project area, there are settlements as well as agricultural and pasture lands. According to information provided by the Project Company and nearby communities, it is understood that there will be a land acquisition process prior to the construction activities for the realization of the Project. The acquisition processes are performed by the Project Company together with the support of the appointed social consultancy company. Site visit findings and the cadastral checklist provided by the Project Company point out that lands planned to be acquired are privately-owned agricultural lands overlapping access road design to the Project area.

According to the information received from the Project Company, areas are needed on 60 parcels located in five settlements in two district and one province for the seven of them are public lands and 461,081.44 m^2 forestland. All the activities will be performed as per the Turkish Law on Expropriation No. 2942.

In the process followed in land registration procedures, separate steps are followed for private parcels and state lands. Individual parcels define the parcels that have title deeds in the name of real or legal persons. In these parcels, necessary procedures are carried out at the Land Registry Directorate to ensure the registration of the title deed in the land registry in the name of the Project Company and to issue an official title deed. All fees and expenses to be incurred during the title deed procedures shall be borne by the Project Company.

An application is made to EMRA/Ministry of Agriculture and Forestry as state lands in the use of third parties (refers to real or legal persons who use the land without any real or personal right) belong to state institutions (Treasury of Finance/Pastureland/Forestry). The applications are carried out by the Map Expropriation Unit for the Treasury of Finance/Pastureland. Applications for forest lands are carried out by the Project / Operation / Power Plant Manager in coordination with the Mapping and Expropriation Unit.

In addition, for the time-limited operations to be carried out on state lands, in order to start the construction works of the Project without delay on the lands that were cultivated by the citizens before the cadastre was carried out but later allocated as Forest / Treasury / Pasture land by the cadastre, firstly, the prices of the buildings and / or trees and / or crops are paid. The amounts to be paid are determined by the assessments of experts licensed by the Capital Markets Board (CMB) as will be explained in detail in the RAP document to be prepared. Payments are made by obtaining "Consents" from the landowners and with these consents, the Project construction starts. In this case, the right holders are paid for the buildings and/or trees and/or products with a "Record" and "Letter of Commitment".

Settlement negotiations with landowners are conducted by the "Land Acquisition Commission" with the participation of the relevant Survey Engineer, Procurement Officer, Project / Operation / Power Plant Manager and/or persons deemed appropriate by these persons. Before the settlement negotiations begin, the Map Expropriation Unit informs the landowners participating in the negotiations about the Project, the areas affected by the Project and the land acquisition processes. In this context, important regulatory information such as how the negotiations will work, what needs to be done and the necessary documents when a compromise is reached, and the legal expropriation procedure to be followed in cases where no compromise is reached are shared.

When the information is completed, settlement negotiations are carried out by meeting with the landowners one by one in front of the public within the scope of the transparency policy. Negotiations are completed in a way to remain loyal to the minimum and maximum prices previously determined within the company. At the end of the negotiations, the list of parcels on which a final agreement is reached is printed out and signed by the team conducting the negotiations and the Project / Operation / Power Plant Manager.

During the stakeholder engagement activities held by the Consultant on 30 and 31 October 2023, it was observed that the PAPs in some neighbourhoods have limited knowledge on the Project's land acquisition activities. The right holders interviewed do not have clear information about the scope of the process to be carried out on their lands. Relevant information was provided to all consulted PAPs both by the Project Company representatives and the Consultant during these consultations.

Please refer to *Chapter 13: Social Environment* for detailed information on land acquisition.

2.5.1.3 Permitting

The Project Company secured a pre-license for the Project on 3 March 2022, which was issued by the Energy Market Regulatory Authority (EMRA) and is valid for twenty-four months; however, after the revision of the location of wind turbine, pre-license has been changed on 17 June 2022. Pre-licence of the Project comprises of one ETL line; 154 kV single-circuit transmission line for connection to Üçpınar TS. The pre-license has been subject to an amendment due to the changes in Project design criteria. Therefore, positive consent letter was obtained from MoENR on 7 September 2023 regarding this change.

The Production Licence was granted to Enerjisa Üretim by EMRA with the decision dated 22 February 2024 and numbered EÜ/12461-1/06113 by EMRA in accordance with the Electricity Market Law No. 6446 and the relevant legislation for the Harmancık WPP production facility to be established in Çanakkale province for 49 years starting from 22 February 2024.In order to carry out the necessary pre-construction activities for the connection of the Project's electrical transmission line to the 154 kV Üçpınar TS, the Project Company has signed the Pre-construction Works Protocol with the Republic of Türkiye Ministry of Energy and Natural Resources, General Directorate of TEİAŞ, on 16 March 2023. According to Annex 2 of the EIA Regulation, the ETL with a voltage of 154 kV (kilovolt) and above and a continuous length of 5 km or more is subject to be evaluated under the National EIA Regulation. Since the length of The ETL is less than 5 km, the ETL is exempt from the National EIA and the exemption letter prepared by Çanakkale Governorship Provincial Directorate of Environment, Urbanization and Climate Change was received on 20 September 2023. At the stage where TEİAŞ gives its connection opinion, approximate routes are stated. When the project implementation phase of the lines begins, final routes are determined according to the opinions of a number of authorities and land conditions. As a result of the field investigation and the opinions of the authorities, the ETL was shortened by 500 m compared to the projected length.

The Project Company has applied to the relevant authorities to obtain the necessary decision under the Environmental Impact Assessment Regulation and obtain the Technical Interaction Permit document for the Project. Technical Interaction Analysis Decisions (TIA Decisions) were received from the relevant institutions and their opinions were reported to the MoENR General Directorate of Energy Affairs. According to TIA decision conveyed by the Ministry of National Defence, it was indicated that the Project might have an impact on the existing systems. As for turbines T1 - T10, it was proposed that they could be conditionally allowed, provided that their blades were fixed initially, and then they were brought down and disassembled directly when requested during crises, tensions, and war situations. If the preference is to install the turbines according to the provided wind turbine information, the amendment of the relevant preliminary license by the Energy Market Regulatory Authority is required. Please refer to Section 2.5 for detailed information on the amendment on pre-licence.

In accordance with the relevant provisions of the national regulations governing National EIA studies, the baseline environmental and social studies for the Project were conducted. An Environmental Consultancy Company named Savra, with a competency certificate to prepare National EIA Report, prepared the National EIA Report, which was submitted to the MoEUCC on 19 January 2023 to MoEUCC. Upon submission of the Final EIA Report to the MoEUCC

General Directorate of Environmental Impact Assessment, Permit and Inspection, the EIA Positive Decision for the Project was published on 7 March 2023 by the MoEUCC.

Upon the submission of Final EIA Report, there was an additional amendment regarding relocation of the wind turbines. In this sense, the amendment on National EIA process is reported by the Project Company to be ongoing at the time of preparation of this Final Draft ESIA Report.

Following the completion of the National EIA process, the Project requires obtaining the following permits within the scope of relevant national regulations:

- Necessary permits has been secured for the forest areas from the General Directorate of Forestry regarding the Article 17 of Law No. 6831 and Regulation on Implementation of the Article 17 Particle 3 of the Forest Law. According to the information provided by the Project Company, Forest Pre-permit has been obtained on 14 August 2023. Application submitted for Forestry Final Permit on 08 May 2024 evaluation by General Directorate of Forestry is ongoing.
- Zoning plans has secured on 23 January 2024, in accordance with Law No. 3194 on Urban Planning and related legislation, submission to the Ministry of Environment, Urbanization, and Climate Change's Directorate General of Spatial Planning.
- Submitting applications for 'Workplace Opening and Operating Permits' in accordance with the “Regulation on Workplace Opening and Operating Permits” after obtaining property and other relevant permits.
- EMRA Expropriation Permit has been secured on 20 October 2023.
- EMRA Rent Permit was obtained on 20 October 2023.
- EMRA Easement Permit is not applicable.

The number of trees to be cut is specified in National EIA Report as 20,132. There will be loss of 20,132 trees due to both the expansion of existing forest roads and the opening of new roads for access. By Law, compensatory replanting is compulsory. According to the Forestry Law, number of trees to be cut is determined by the forestry administration after the final forestry permit has been secured; and the investors are required to pay the replacement cost for these trees, whereas replanting will be performed by the Regional Forestry Directorate. The Project Company secured the forestry pre-permit on 11 August 2023 which is valid until 3 March 2024. The application for the forestry permit will be made after the zoning plans are finalized.

The Project Company projects the timeline to complete pre-construction permit for drilling and engineering activities by the beginning of Q3 of 2024, which has been reported to be completed and by the Project Company during preparation of this report. The Project Company reported that the zoning plans are approved by Çanakkale Special Provincial Administration.The timetable for the permitting activities of the Project is presented in Table 2-4.

2.5.2 Construction Phase

2.5.2.1 Timeline

The construction of the Project has been initiated in the third quarter of 2023 with the construction of Project roads and is planned to be completed by the first quarter of 2025. The Project construction schedule is provided in Table 2-4.

2.5.2.2 Method

Construction phase, also called as the Licence Phase, includes land preparation, excavation, infrastructure and installation activities within the Project licence boundaries. Construction phase activities include the following steps:

1. Clearing of vegetation, tree cutting and topsoil stripping for the turbine pads and access roads
2. Construction of site roads and access roads for access to and between turbines and/or rehabilitation of existing roads
3. Excavation/Earthwork operations (Turbine Towers, Cabling, Switchyard and Administration Building)
4. Transport of wind turbine parts to the Project area
5. Installation of wind turbine towers
6. Installation of other turbine parts (e.g., rotor hub, nacelle, rotor blades)
7. Cabling, installation of electrical systems
8. Turbine commissioning and tests

For the ETL to be constructed within the scope of the Project, excavation works will be performed to open the pits where the pylons will be placed. A total of four pits, each with a depth of 3 m and a surface area of 9 m^2, will be dug for each pylon. Excavated materials will be stored nearby storage area and used to backfill the excavated pits. Therefore, there will be no surplus excavation material to be transported outside of the construction site.

Site Preparation

Site preparation includes clearing of vegetation, tree cutting, topsoil stripping, compaction of soil, filling of low areas with imported fill/excavation soil and grading the entire area of the site to the required ground levels and slopes as required.

During the construction phase, the Project entails the provision of essential resources, including temporary warehouses, vehicles, and equipment. Additionally, a temporary firefighting and alarm system will be established. Temporary site drainage and wastewater collection in a septic tank will be provided as needed for site. The Project also includes the installation of temporary site fencing, including gates, and the implementation of a first aid, site safety, and security system. Furthermore, temporary offices will be set up by the Project Company.

It is important to engage with local communities and stakeholders during the pre-construction phase. A Project-specific SEP covering the pre-construction, construction and operation phases has been prepared by the Consultant upon the completion of the ESIA studies. The Project will commit to the SEP for all stakeholder engagement and consultation activities. In addition, a Project-specific grievance mechanism has been established for long-term communication between the Project and the stakeholders. Both the stakeholder engagement process and management of the grievance mechanism that will be followed throughout the Project lifecycle will be described in *Chapter 18: Stakeholder Engagement, Information Disclosure and Consultation* of this Final Draft ESIA Report.

Ground Loosening (Blasting) Activities

Within the scope of the Project, in cases where geological conditions are not suitable, ground loosening (blasting) activities will be carried out at the Project areas such as turbine areas, roads, etc. (only during the construction phase and if found necessary). The blasting method was chosen as the “Olofsson Method” and the type of explosive material will be ANFO as reported in the Project National EIA Report. ANFO is a mixture of ammonium nitrate (AN) and fuel oil (FO) which is widely used in mining and quarrying operations for blasting activities. It was also noted in the National EIA Report that the ANFO and dynamite to be used during blasting activities will be supplied from the Gendarmerie on a need basis, will not be stored on site and the explosions will be carried out under the control of the Gendarmerie. The nearby communities will also be informed by Community Liaison Officers (CLOs) prior to blasting activities.

The ground loosening activities are to be carried out in accordance with the Regulation on the Procedures and Principles of Production, Import, Transportation, Storage, Sale, Use, Destruction and Inspection of Unmonopolized Explosive Substances, Hunting Equipment and Similar Products[15].

Mobile Crushing and Screening Facility

Moreover, a mobile crushing and screening facility with a capacity of 68.75 tonnes/hour will be established as necessary, in order to size and reuse the excess excavation material resulting from the soil loosening activities to be carried out within the scope of construction activities. The workflow associated with the mobile crushing and screening facility is provided below:

1. Establishment of the mobile facility
2. Excavation of ground material
3. Unloading the material to be dimensioned into the bunker of the mobile facility
4. Feeding the material to be sized to the vibrating feeder
5. Passing the material from the feeder through the primary crusher
6. Feeding the crushed material to the vibrating screen with the conveyor
7. Transport of the screened material to the final destination

2.5.2.3 Construction Hours

The construction period is projected to last for 16 months, working 312 days annually, with each working day consisting of 10 hours and two shifts.

It is to be noted that the construction activities will be carried out within the allowable construction hours in accordance with Regulation on Environmental Noise Control as well as IFC Environmental, Health and Safety (EHS) Guidelines. As confirmed by the Project Company, no night work shifts will be planned during the construction phase.

2.5.2.4 Equipment & Machinery

The types and quantities of construction equipment with respect to various construction works are listed in Table 2-5.

Table 2-5: Construction Equipment to be used for the Project

Equipment	Number
Concrete mixer	18
Loader	2
Crawler Dozer	2
Excavator	12
Truck	6
Crane	4
Generator	1
Welder	1
Water Tank	2
Grader	1
Rock Drill	1
Iron Cutting	1
Iron Bending	1

[15] Published in the Official Gazette Date/No: 29.09.1987/19589

Mobile Crushing and Screening Facility	1

Source: National EIA Report

There will not be any concrete batching plant to be established in either the Project area and/or in its close vicinity. The ready-mixed concrete and aggregate will be supplied from sources outside the Project.

2.5.2.5 Workforce Accommodation & Mobilisation

Mobilisation area of the Project is located in Merkez district of Çanakkale province, where there is also camp site for workers. The mobilisation area is located at the location where site access road is connected to the existing transport road, near the D200 highway connection as presented in Figure 2-8. Human Resource & Worker Management Plan for the construction phase will include Workers' Accommodation Plan to ensure that necessary camp management actions are applied within the Project's mobilization areas in line with the Lenders' standards and requirements. The assessment of environmental and social conditions of all mobilization areas will be undertaken with respect to the specified requirements.

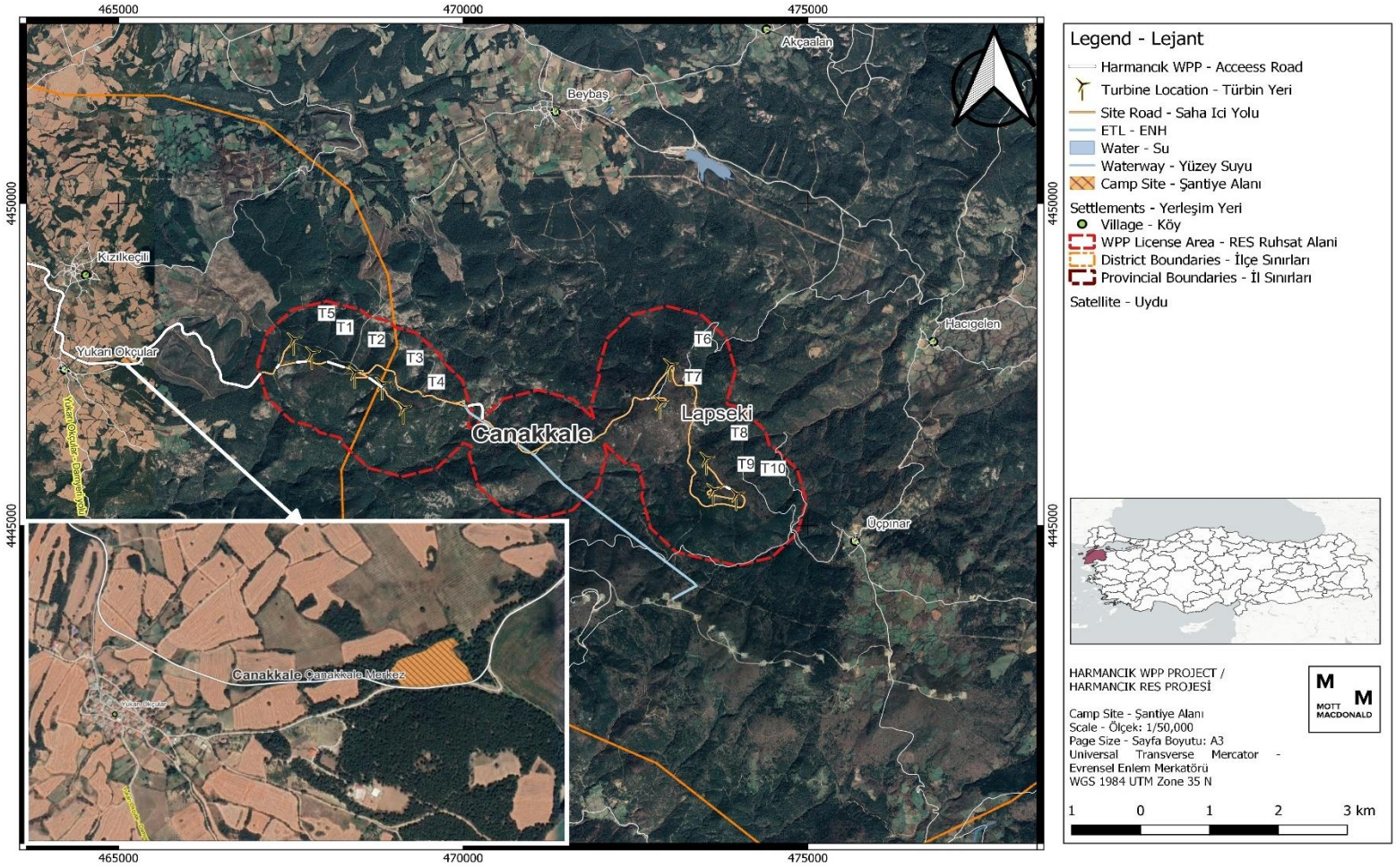

Figure 2-8: Project Mobilisation Area (1/50,000 scale)

2.5.2.6 Resource Use

Within the scope of the Project, the fuel will be used due to the use of construction equipment and machinery and during the transportation of Project workers during the construction phase. The fuel will be stored in above-ground storage tanks located in the mobilization areas. Moreover, the utility water to be supplied from the licensed water supp contractor will be used during the construction phase to meet the personnel needs as well as to prevent generation of dust during construction activities. According to the information shared by the Project Company, the amount of water to be supplied is within the capacity of the local water suppliers and will not have a major impact on the local water sources. The water used for dust control will remain within the soil structure, hence generation of wastewater is not anticipated. Domestic wastewater generated during the construction phase of the Project will be collected in septic tanks. The septic tanks will be emptied by vacuum trucks when they reach 80% capacity to be disposed to the local sewer network in accordance with the “Water Pollution Control” regulation published in the Official Gazette (OG) dated 31 December 2004 and numbered 25687.

The electricity to be used in the Project construction area will be supplied from the national grid or diesel-fired generators.

Excavated surplus material will be reused for filling purposes. The excess amount (i.e. the difference between the cut and fill amounts) will be stored within the Project site at designated areas. The details are discussed in *Chapter 11: Waste and Resources*.

2.5.2.7 Construction Workforce

Within the scope of the Project, a total of 106 people, six Enerjisa Üretim employees and 100 subcontractor employees, are expected to work in the Wind Power Plant during the construction phase. The breakdown of workforce (e.g. national/international, gender etc.) will be monitored and reported during construction phase.

2.5.3 Operation Phase

Operation phase, also called as the Production Licence Phase, is the period in which electricity production is carried out after connection to the national grid system. Operation phase starts with the commissioning of the power plant and initiation of electricity generation. After that, the produced electricity will be connected to the substation and to the national interconnected grid.

2.5.3.1 Project Life

According to Article 9 of the Electricity Market Licensing Regulation, published in the Official Gazette dated 2 November 2013 and numbered 28809, licenses are granted for a minimum of 10 and a maximum of 49 years, considering the nature of the activity.

2.5.3.2 Permits to be Granted after Construction

Electricity generation licence will be obtained once the electricity generation is started and connection to the national grid system is carried out.

Commercial Operation Deployment (COD) will be granted with a declaration of the Commercial Operation Date, indicating that the Project is officially in commercial operation and is delivering electricity to the grid for commercial purposes. The Project Company plans the process to obtain the acceptance in a timeline specified in Table 2-4.

2.5.3.3 Power Connection

The power produced by the annular generator of the wind turbine is fed into the distribution or transport grid through grid feed system. The annular generator is not directly connected to the

receiving power grid of the utility company; instead, it is completely coupled to the grid through the grid feed system, as shown in Figure 2-9. Optimum power transmission is aimed to be achieved by this system. For instance, any sudden changes in wind speed are translated into controlled changes in the power fed into the grid. Also, any disruptions from the grid are aimed to have no virtual effect on the mechanics of the wind turbine. The power fed in by the turbine can be regulated from 0 kW to 4,200 kW.

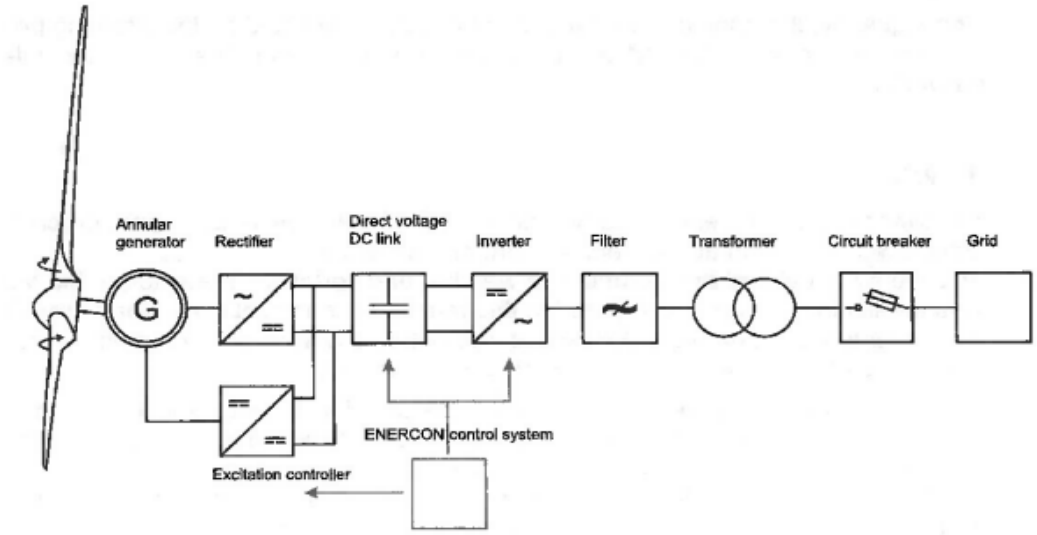

Figure 2-9: Simplified electric diagram of an E-138 EP3 wind turbine

The energy generated by wind turbines will be elevated to the medium voltage level in the transformers and transferred to the control area through a medium-voltage cable network. Medium-voltage cables connecting the wind turbines, grounding cables, and communication cables (generally fibre optic) will be routed within the same cable channel. For the Project, the responsibility of operation and maintenance of the transmission line will be under TEİAŞ.

2.5.3.4 Operational Workforce

Within the scope of the Project, a total of five people, three Enerjisa Üretim employees and two subcontractor employees, are expected to work in the Wind Power Plant during the operation phase.

2.5.3.5 Resource Use

Within the scope of the Project, utility water to be supplied from the licensed water supp contractor will be used during the operation phase to meet the personnel needs. According to the information shared by the Project Company, the amount of water to be supplied is within the capacity of the local water suppliers and will not have a major impact locally. Domestic wastewater generated during the operation phase of the Project will be collected in the septic tank. The septic tank will be emptied by vacuum trucks when the septic tank reaches 80% capacity to be disposed to the local licensed wastewater treatment plant in accordance with the “Water Pollution Control” regulation was published in the Official Gazette dated 31 December 2004 and numbered 25687.

During the maintenance and repair of the turbines within the Project, chemical substances are employed. The utilized chemical materials will be temporarily stored in dedicated storage areas provided with secondary containment and then sent for disposal through licensed companies. The necessary measures to prevent contamination of surface and underground water sources

and avoid soil pollution, and to ensure safe storage of chemicals, are presented in *Chapter 11: Waste and Resources*.

During the maintenance and repair processes of the machinery and equipment used in the operation phase of the Project, potentially generated hazardous waste such as contaminated materials (e.g., oily rags, empty lubricating oil containers, used filters from machinery) will be accumulated separately in leak-proof containers labelled with the relevant hazardous waste symbol. All wastes with hazardous characteristics will be stored separately in the hazardous waste storage area. Necessary measures presented for hazardous waste management are presented in *Chapter 11: Waste and Resources*.

The social and technical infrastructure needs of the Project personnel during the operational phase will be met through the planned Administrative Building. Electricity to run the Administration Building will be supplied from the grid with diesel-fired emergency generators as back-up. Accommodation for the personnel will be arranged in the nearby settlements, with the use of the nearest health centres and hospitals in case of emergencies.

2.5.3.6 Operation and Maintenance

The operation and maintenance periods and contents of wind turbines vary depending on type and technology of the wind turbine. For the Project, four maintenance activities are expected to be performed annually with three-month intervals for wind turbines. Additionally, comprehensive mechanical maintenance will be performed every four or five years. The maintenance activities conducted at three-month intervals include lubrication maintenance, electrical maintenance, and mechanical maintenance.

Maintenance of the electrical infrastructure equipment in wind turbines, including medium-voltage cables, will be conducted annually. Additionally, equipment that could be integrated into the system, such as radio links, emergency generators, and batteries, will undergo annual maintenance. Furthermore, electrical equipment will be stored redundantly in case of potential malfunctions.

All maintenance activities at the Power Plant will be carried out by the turbine manufacturer. The turbine manufacturer will be responsible for all periodic maintenance and interventions in case of malfunctions. Additionally, it will provide a parts guarantee throughout the contract period. If preferred by the Project Company, its maintenance team will be created by training its own staff and obtaining international certifications. This would necessitate a separate unit for the replacement of spare parts and malfunctioning components. During the operation phase of the Project, turbine oil maintenance will be conducted annually.

During the operation phase, turbine blades that are not in use due to potential malfunctions or maintenance reasons will also be temporarily stored on turbine platforms. These blades will be retrieved from the site by the turbine manufacturer, as stipulated in the contract, and subsequently sent for recycling and/or disposal.

2.6 Analysis of Alternatives

In order to make sure that the goals of the proposed Project have taken into account social, environmental, economic, and technological choices, it is necessary to evaluate different project designs and activity alternatives in accordance with best practises for ESIA. During the feasibility stage, the following project alternatives were taken into account:

- No Project Alternative;
- Location Alternatives; and
- Design Alternatives.

2.6.1 No Project Alternative

If the "No Project" scenario is implemented, the expected adverse effects that have been described throughout this ESIA will not happen. However, these impacts are not anticipated to present serious risks, and they can be sufficiently managed by putting the mitigation strategies as given in this report.

The favourable effects and advantages such as the increase in renewable energy resources in Türkiye, minimized dependency on externally generated energy and increased resilience to energy crisis with enhanced energy mix, reduced carbon emissions and dependence on conventional non-renewable power sources, employment and training opportunities in the field of wind and renewable energy and encouraging the use of alternative energy sources in line with the national technological, environmental and economic targets, as well as creating opportunities for local technology production, that the Project's operation will bring about would not happen if the No Project alternative was implemented.

As a result, the Project's implementation will contribute to the development of utilities and increase renewable energy being supplied to the Turkish grid.

2.6.2 Location Alternatives

The YEKA contract was signed on 9 March 2020, and the region, where the Project is located, was transferred to Enerjisa Üretim on 21 March 2021. Therefore, the Project area has been determined by the General Directorate of Energy Affairs of the Ministry of Energy and Natural Resources.

In addition to the location alternative of the Project, the location of the Project components within the Project area is also of importance. The locations of wind turbines were determined during the pre-license application stage. Upon securing the pre-licence for the Project, during the National EIA process, detailed evaluation of locations of Project components was conducted in terms of various environmental and social factors including avoidance of designated sites, cultural heritage aspects, bird migration routes, community health and safety aspects as well as community acceptance, conditions of physical displacement etc. The Project overlaps known migratory routes of large soaring species, which was taken into consideration by national authorities during permitting process. Accordingly, the turbine coordinates planned at the beginning of the Project were changed. The change was notified to the Ministry of Energy and Natural Resources, General Directorate of Energy Affairs on 17 June 2022 and was stated in the Pre-License as "Pre-Amendment Situation" and "Post-Amendment Situation". Accordingly, the National EIA Report was prepared based on last declared locations.

During the determination of access routes for the Projects, various factors are considered. Field exploration is conducted to assess potential routes based on specific criteria. Once routes are identified, communication is established with relevant authorities such as General Directorate of Highways to confirm route suitability. Furthermore, Enerjisa Üretim collaborates with pertinent departments to evaluate the permit and construction status of planned access roads. Factors such as insufficient bridge and electrical cable heights along the route, as well as restrictions imposed by relevant units, are taken into account. Additionally, adherence to transportation specifications outlined by turbine manufacturers while considering time and cost constraints is essential. Physical obstacles such as DSİ Canals, DSİ Dams, forest lands, and certain village roads that may impede heavy load transportation are also considered during route planning.

As a result of the amendments made in wind turbine locations, the Project area and turbine locations subject to this Final Draft ESIA Report have been selected as the most favourable locations for realisation of the Project.

It should be noted that, the final design decisions regarding the ETL including the final route details, which is assessed as an associated facility for the Project, lie with TEİAŞ and is outside the control of the Project Company. Therefore, no location alternatives are assessed by the Project Company for the ETL.

2.6.3 Design Alternatives

2.6.3.1 Resource Alternatives

With the Project, electrical energy will be produced from wind power, and it is already considered as an alternative energy compared to power plants with fossil-based energy production. For this reason, no alternative has been determined in terms of energy resources for the Project.

2.6.3.2 Technology Alternatives

The following turbines were taken into consideration for the Project:

- 4.2 MW Enercon E-138
- General Electric GE5.8-158 / S

Turbine types have been selected according to the electrical capacity to be installed in each connection region and minimum localization rate as per “YEKA Use Rights Agreement” signed by the Project Company and the number of turbines has been selected according to the wind efficiency and investment cost of the Project. Moreover, the below criteria also contributed to the selection of 4.2 MW Enercon E-138 model for the current layout:

- The noise level is lower than other turbine types,
- Turbines can be adjusted according to the climatic conditions of the region where they will be installed,
- They are designed to facilitate service maintenance,
- Having a remote monitoring and intervention system,
- Ability to use wind more effectively,
- Ability to produce energy even in low level winds,
- Wind characteristics of the Project area,
- Economic life and warranties of turbines.

Table 2-6 indicates the technological details of two different type of wind turbines considered for the Project.

Table 2-6: Project Technology Alternatives

Design Parameter	GE Energy[16]	Enercon GmbH[12]
Project power generation capacity	58 MW	42 MW
Technology type	HAWT	HAWT
Number of Turbines	10	10
Wind turbine model	General Electric GE5.8-158 / S	ENERCON E-138 EP3
Nominal Power	5,800 kW	4,200 kW
Wind class (IEC)	S	S
Number of Rotor Blades	3	3
Rotor Diameter	158 m	138.6 m

[16] GE Renewable Energy. (n.d.). Cypress Onshore Wind Turbine Platform. https://www.ge.com/renewableenergy/wind-energy/onshore-wind/cypress-platform

Design Parameter	GE Energy[16]	Enercon GmbH[12]
Swept Area	19,607 m^2	15,085 m^2
Total Blade Length	79 m	69 m
Hub Height (HH)	121 m	111 m
Tip Height	200 m (x8) 179 m (x2)	179.25

As seen in Table 2-6, different hub heights have been examined within the scope of the Project. The following criterias are followed during the selection process of turbine hub heights:

- Effects of increase in hub-heights on efficiency of energy production,
- Permissive restrictions for increase in hub-heights,
- Constructional challenges for increase in hub heights.

2.7 Previously Conducted Environmental and Social Activities

2.7.1 Permitting Process

The outputs of the completed National EIA studies have been evaluated by the Consultant, and the gaps were analysed in accordance with legal and policy framework, which is presented in Chapter 3. The Consultant conducted a gap analysis to assess the Project's compliance with the applicable national and international environmental, health, safety and social standards specified in Section 3.3. The identified compliance gaps including any additional data that should be collected and any additional assessments required for the Project to meet the applicable standards.

Correspondence / Opinion Letters

The names of the authorities, which were communicated for their opinions on the Project during the National EIA process, are shared below:

- Ministry of Environment, Urbanization and Climate Change,
  - General Directorate of Environmental Impact Assessment, Permit and Inspection
  - General Directorate of Meteorology, Presidency of Observation Systems Department
  - General Directorate of the Protection of Natural Assets
- Ministry of Energy and Natural Resources,
  - General Directorate of Energy Affairs
- Ministry of Agriculture and Forestry
  - General Directorate of Forestry, Permit and Easement Department
- General Directorate of Highways, Survey, Project and Environment Department, Environmental Branch Directorate
- General Directorate of State Airports Administration, Department of Electronics
- General Directorate of Forestry Çanakkale, Permit and Easement Branch Directorate

According to the received opinion letters, a number of important concerns are noted as described below.

Ministry of Agriculture and Forestry, General Directorate of State Hydraulic Works (DSİ) has concerns related to the Project's impact on water sources and riverbeds. They emphasize the importance of preserving structures and maintaining minimum distances between the turbines and riverbeds.

Ministry Of Culture and Tourism, General Directorate of Cultural Heritage and Museums, Çanakkale Cultural Heritage Preservation Regional Board Directorate has reported that there

were no cultural assets in the license area. However, during physical and construction interventions in the area, if any discovery of cultural heritage items or remains of cultural heritage significance subject to the Law No. 2863 is made, it is mandatory to immediately halt the activities and report this discovery to the nearest Museum Directorate within three days, in accordance with the "Obligation to Notify" under the mentioned law.

General Directorate of Highways 14th Regional Directorate approval has been granted provided that Project area does not intersect with the routes within the responsibility of the Authority. In addition, within the scope of the Project activities, it was specified in the Authority's internal directive that "the minimum distances that wind energy power plants should have to the highway boundary line are as follows: on highways ... B: 1.5 * (H+L); on State and Provincial Roads ... B: 1.25 * (H+L), B: distance (m), H: tower height (m), L: blade length (m)." It was emphasized that these minimum distances should be adhered to, transportation within the Project should be carried out in accordance with the 2918 Road Traffic Law, and the permits specified in the legislation should be obtained in advance for such transportation. It was also required that no new connections to the roads should be established, except for the existing connections within the Project area. Furthermore, if a connection is to be made from the Project area to a public road, it is necessary to apply to the Authority with detailed projects, taking into account the provisions of the 2918 Road Traffic Law and the regulations issued in connection with it.

Ministry of Energy and Natural Resources, General Directorate of Mining and Petroleum Affairs, Special Areas and Map Department has emphasized that, the examination of the Project area has concluded with a favourable evaluation of the Project. As a result, the Project has been registered in the Authority's system as "Harmancık WPP Special Permit Area" under number ER: 3421571, as identified within the provided coordinates. Therefore, it is noted that there is no objection from the Authority to the finalization of the Project.

Ministry of Agriculture and Forestry General Directorate of Nature Conservation and National Parks has emphasized that, a commitment from the Project Company is required regarding measures to eliminate or minimize the potential negative impacts included in the ecosystem assessment report, ornithological assessment report and bat monitoring report. In addition, during operational phase of the Project, the effects of the Project on birds shall be monitored, evaluated and reported by an ornithology expert for a period of 3 years. The work should be carried out in the field for a maximum of 3 consecutive days, 30 days each during both migratory periods, between 15 August and 15 October for autumn, and between 15 March and 15 June for spring migration. Furthermore, during operational phase of the Project, the effects of the Project on bats shall be monitored, evaluated and reported by a bat expert for 5 days/night every month, from end of March to October.

Çanakkale Special Provincial Administration License and Inspection Directorate has reported that Project area is located in areas designated partly as surface water and partly as forest land in the 1/100,000-scale Balıkesir-Çanakkale Master Plan. Following the National EIA process, it is necessary to apply to the Çanakkale Special Provincial Administration License and Inspection Directorate for the sub-scale plans that need to be made for the area in question in accordance with the Zoning Law No. 3194 and the relevant legislation.

Çanakkale Special Provincial Administration Water and Canal Services Directorate notes that there are drinking water transmission lines belonging to the neighbourhoods in the Project license area. The damaged units, needs to be repaired by the Project Company in case any damage occurs as a result of Project activities.

Canakkale Special Provincial Administration Road and Transportation Services Directorate has concerns about the Project's impact on neighbourhoods road traffic safety. The approval has been granted provided that all traffic measures regarding the use of village roads are taken for transportation operations and traffic safety is ensured.

In conclusion, various authorities have raised concerns about different aspects of the proposed Project. These concerns include safety, environmental impact, and compliance with legislation. The authorities have outlined specific requirements and recommendations for the Project's development. The official correspondences conducted within the scope of environmental and social studies were provided in the final National EIA Report which was shared with the Consultant.

The provisions of the 1/100,000 scale Master Plan prepared specifically for Balıkesir-Çanakkale provinces by General Directorate of Spatial Planning at the MoEUCC dated 31 December 2021 are listed as follows:

- In accordance with the Local Environmental Board Decision dated 3 December 2013, decisions expanding on energy production and storage areas cannot be made.
- Environmental impact assessments are conducted for investments related to energy production and storage within the scope of this plan, taking into account existing facilities.
- Environmental measures in compliance with the relevant regulations are mandatory for the establishments to be built.
- Before the approval of this plan, previously approved lower-scale zoning plans remain valid.
- Lower-scale plans related to these plans will be executed in accordance with the opinions of the relevant institutions and organizations without requiring changes in this plan. The size and structural conditions of the uses to be located in these areas are determined in lower-scale plans. However, a positive environmental impact assessment decision is required for implementation in these areas.
- In YEKA areas, subject to obtaining approvals from relevant authorities and licenses issued by the EPDK, and upon receiving the favourable opinion of the MoEUCC, zoning plans prepared in accordance with the opinions of the relevant authorities will be put into practice without requiring changes in this plan following their approval by the relevant administration.
- When lower-scale plans are prepared, the opinions of the relevant authority are sought for natural gas pipelines, energy transmission lines, energy transmission facilities, and drinking water pipelines.

Additional Studies During National EIA Studies

Within the scope of the National EIA studies, social impact assessment studies were conducted as well. The public participation meeting was carried out in Çanakkale, Lapseki District, Üçpınar Neighbourhood province within the scope of the National EIA Studies. Public participation meetings were conducted on 13 December 2021. These meetings aimed to engage with the public, provide information about the Project, and gather their feedback regarding the Project. The minutes of the public participation meetings and information for the stakeholder engagement meetings will be reviewed and shared as part of the ESIA studies. (please refer to *Chapter 18: Stakeholder Engagement, Information Disclosure and Consultation and Participation* for detailed information)

Furthermore, within the scope of the National EIA studies, biodiversity assessment studies were also conducted, details of which are shared below:

- Nartus conducted fieldwork for the examination of the Project activity area on 15 and 23 October 2021 in Çanakkale. Nartus also conducted fieldworks in and around the Project area to assess the ecological structure, flora and fauna study in October 2021 over 8 days.
- For ornithological studies, surveys were conducted in 2021 autumn and 2022 spring migratory seasons in the Project area. Monitoring studies were carried out at intervals between 18 August - 27 October 2021 and 24 March - 7 April 2022 for 15 visits each period.

- Bat surveys were conducted in August 2021, September 2021 and October 2021 for a total of 6 day/nights.
- The observations and examinations were conducted in and around the Project area to assess the presence of honeybees in late Autumn and Spring 2021-2022.

In the scope of the National EIA studies, there were baseline environmental measurements/analyses conducted, and measurement reports were provided in the final National EIA report. The environmental measurements/analyses conducted are provided below:

- The environmental noise measurement assessments and modelling were carried out in April 2022 considering predicted noise emissions during the construction and operation phase of the Project and the existing environmental noise measurements at three points along the Project area which were conducted on 4 April 2022.
- The air quality modelling study for the construction phase of the Project was conducted in August 2022, focusing on the PM pollutant parameters and within the impact area selected as a square with side lengths are 5250 m x 5250 m.
- The measurement of electromagnetic pollution, which the Project may cause in the vicinity, was carried out in between 27 and 28 March 2022.

2.7.2 Gap Analysis

Parameter	Relevant International Standard	Harmancik WPP EIA Report Biodiversity Reports Temporary Stakeholder Engagement Plan (SEP)	Gap Analysis	Recommended Actions / Studies
License and permitting				
EIA Decision	IFC PS1	EIA decision has been obtained for 10 turbines of 5,8 MWm/4,04 MW_E	After obtaining the EIA decision, the capacities of the turbines were revised. Accordingly, new capacity for each turbine has been changed to 4,2 MWm/ 4,2 Mwe. In this sense, the amendment on National EIA process is reported by the Project Company to be ongoing at the time of preparation of this Final Draft ESIA Report. The ETL is exempt from the EIA process.	• An approval letter for the turbine capacity change shall be obtained from MoEUCC.
Water Quality, Hydrology and Hydrogeology				
Groundwater sampling	IFC PS3 IFC General EHS Guidelines: Environmental Wastewater and Ambient Water Quality	No sampling was done.	Baseline status of the groundwater shall be assessed considering national and international standards.	• To identify the existing ambient conditions as described in IFC PS3, sampling has been carried out. • Groundwater sampling has been carried out at two points; one in Üçpınar Neighbourhood and other one is in Kızılkeçili Neighbourhood.
Land, Use; and Geology				
Soil Quality	IFC PS3 IFC General EHS Guidelines: Environmental Land Contamination	No sampling was done.	Baseline status of the soils shall be assessed considering national and international standards.	• A sampling study has been carried out in accordance with international guidelines as well (Dutch Pollution Standards). • 1 sampling in Switchyard, 2 samplings in Turbine Locations, 1 sampling in Mobilization Area.

Parameter	Relevant International Standard	Harmancik WPP EIA Report Biodiversity Reports Temporary Stakeholder Engagement Plan (SEP)	Gap Analysis	Recommended Actions / Studies
Climate Change				
Climate change risks	EP4 Principle 2 EP4 Principle 10	No study or report on determination of risks and impacts was conducted as part of National EIA.	Climate change risks and impacts shall be evaluated.	• As part of the ESIA, risks associated with the climate change have been evaluated both for the construction and operation phases.
Air Quality				
Particulate Matter	IFC PS3 IFC General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality	No sampling was done. Impact on air quality was assessed with a modelling study.	Impact assessment with a modelling and without a background baseline data is not in line with international standards.	• Particulate Matter (PM_{10} & PM2.5) sampling was carried out for a 30-day survey to understand the long-term conditions. Both national and international standards have been addressed.
Greenhouse Gases				
Greenhouse gas emissions	IFC PS3	As part of the National EIA, only avoided GHG emissions associated with the Project operations were assessed.	Construction-related GHG emissions shall be calculated to comply with the applicable standards and guidelines. Although there is no anticipated significant operational GHG emissions associated with the Project activity due to the nature of the Project (i.e., renewable energy investment), potential carbon sources shall be identified for their effective management.	• As part of ESIA, construction-related and operational GHG emissions have been assessed based on the identified carbon sources during construction and operation phases.
Noise and Vibration				
Noise level measurement	IFC PS3 IFC PS4 IFC PS6 EBRD PR3 EBRD PR4 EBRD PR6	During the National EIA studies, for the noise impact during construction activities, noise levels of the construction equipment/machinery were calculated with respect to distance to the construction area, and noise distribution modelling was	The duration of the baseline noise measurements conducted during National EIA studies was between 5-15 minutes which is not in line with IFC General EHS Guidelines: Environmental Noise Management.	• A separate baseline noise measurements lasting 48 hours has been conducted, and the results were compared with the noise level limits set by the IFC-World Bank group (WBG) and

Parameter	Relevant International Standard	Harmancik WPP EIA Report Biodiversity Reports Temporary Stakeholder Engagement Plan (SEP)	Gap Analysis	Recommended Actions / Studies
		conducted based on the baseline noise levels. According to the results, the Project is expected to comply with the national noise limit values defined in the Regulation on the Assessment and Management of Environmental Noise (RAMEN) during the construction phase.		EU Environmental Noise Directive (END).
Waste and Resources				
Waste management	IFC PS3 IFC General EHS Guidelines: Environmental Waste Management	Waste generation amount was calculated properly. Current capability of the available waste management facilities in each province was not identified.	Impact significance on waste management facilities shall be assessed.	• Information regarding the current capacities of existing waste management facilities were investigated and the significance of the impact on the current waste management practices are assessed.
Landscape and Visual				
Shadow flicker	IFC PS3 IFC General EHS Guideline for Wind Energy	The impact of shadow flicker was not assessed.	Shadow flicker impact was not assessed.	• Shadow flicker assessment shall be conducted according to internationally recognised methodologies i.e., WindPro shall be used. • The shadow flicker assessment has been conducted as part of the ESIA.
Biodiversity				
Legally Protected and Internationally Recognised Areas	IFC PS6	The Project is located within Biga Mountains Key Biodiversity Area (KBA). Baseline biodiversity surveys targeting the trigger flora species were conducted as part of National EIA.	IFC GN6 clearly states that in the case of an overlap with an international recognised area a critical habitat assessment may be required. In order to establish the optimal mitigation hierarchy, no net loss or net gain targets, and other conservation	• Supplemental baseline bat, avifauna, terrestrial fauna, flora studies (discussed in their own items of this table) • Critical Habitat Assessment • Develop management and biodiversity monitoring plans

Parameter	Relevant International Standard	Harmancik WPP EIA Report Biodiversity Reports Temporary Stakeholder Engagement Plan (SEP)	Gap Analysis	Recommended Actions / Studies
			aims, a robust biodiversity baseline is necessary.	
Ecosystem services	IFC PS6	National EIA has a chapter on beekeeping. However, there is no evidence of a systematic ecosystem services analysis.	IFC PS6 clearly states that if risks and impacts pertaining to ecosystem services are identified, a thorough systematic review to identify priority services will be required in terms of (1) negative impact on affected communities and (2) direct reliance on ecosystem services. During stakeholder interviews, it was understood that there was mushroom collecting in the area. It was stated that these collection activities were not commercial. Additionally, it was informed that ecotourism activities were carried out in the area.	• High Level Ecosystem Service Assessment
Avifauna Baseline	IFC PS6 Post-Construction Bird and Bat Fatality Monitoring For Onshore Wind Energy Facilities In Emerging Market Countries	Avifauna surveys were conducted as part of national EIA.	In order to establish the optimal mitigation hierarchy, no net loss or net gain targets, and other conservation aims, a robust biodiversity baseline is necessary. The deficiencies identified in the National EIA Avifauna survey methodology are as follows: • Locations and number of vantage points were changed completely between the two survey seasons • The viewing angles and visual coverage of the turbines from the VPs was not provided	• Bird surveys need to run for at least 2 years and provide a CRM (using NatureScot methodology) to account for year-to-year variations in environmental parameters and fauna activity as is scientific and industry best practice. • If the construction timeline does not impose limitations, 2 years of baseline during pre-operation will be obtained • If, due to constraints imposed by construction schedules, 2 years of baseline during pre-operation can not be obtained, in order to avoid impairment to operational monitoring, baseline collection will be necessary from nearby similar habitats outside of the AoI during operational phase. • The surveys should establish baseline migrant and resident/breeding bird

Parameter	Relevant International Standard	Harmancik WPP EIA Report Biodiversity Reports Temporary Stakeholder Engagement Plan (SEP)	Gap Analysis	Recommended Actions / Studies
			• Survey effort at each VP was not quantified • Breeding bird survey using EBBA methodology was not conducted • Target species list was not defined or provided • The surveys did not cover significant time periods for migration: the month of October, which is the busiest migratory month for the Canakkale province in autumn, and May-early June, which is when young White Stork migration peaks. • Environmental parameters and survey conditions of each survey date were not provided • Resident / migrant differentiation was not made for each encounter • Risk height was not designated and categorized for field surveys • Number of birds entering risk height and distance (risk zone) was not provided • Flight routes maps with respect to turbine buffers was not provided • Only one year of VP studies were conducted which does not account for year-on-year differences in activity and abundance (2 years needed)	populations and activity, locations that support different parts of the life cycles of significant species (nesting and feeding locations etc), levels of activity within the collision risk zone, a robust collision risk assessment produced by an expert with demonstrated skills which can inform CHA, mitigation hierarchy and adaptive management decisions. • Second year of pre-operational surveys should aim to improve the deficiencies identified with the first-year surveys. • Develop CHA. • Develop management plans • Operational phase bird monitoring (migration, breeding bird, and bird fatality) • Operational phase monitoring design will take into consideration Nature Conservation and National Parks (DKMP) opinion on survey timing and length (both migratory seasons for 3 years, 30 days each season, 3 consecutive days on each visit), in addition to internationally accepted methodology (NatureScot).

Parameter	Relevant International Standard	Harmancik WPP EIA Report Biodiversity Reports Temporary Stakeholder Engagement Plan (SEP)	Gap Analysis	Recommended Actions / Studies
			• Collision Risk Assessment is not available	
Bat Baseline	IFC PS6 Post-Construction Bird and Bat Fatality Monitoring For Onshore Wind Energy Facilities In Emerging Market Countries	Bat surveys were conducted as part of National EIA.	The optimal mitigation hierarchy, no net loss or net gain targets, and other conservation aims, a robust biodiversity baseline is necessary. The deficiencies identified in the National EIA bat survey methodology are as follows: • Roost survey methodology was not detailed and results not clearly shown • Locations of static sampling points and justification for selection not provided • Details regarding static sampling are not sufficiently provided • Details regarding transect sampling are not sufficiently provided • Bat Activity Index not available • Heat maps are not available • Surveys only cover one season (autumn). At least 3 seasons need to be covered. • Environmental parameters and survey conditions of each date were not provided • Information regarding important areas for roosting, feeding etc. not provided.	• The surveys should establish baseline bat populations and activity levels with reference to turbines, and a bat activity index which can inform, CHA, mitigation hierarchy and adaptive management decisions. • Second year of pre-operational surveys should aim to improve the deficiencies identified with the first-year surveys. • Develop CHA. • Develop biodiversity management plans • Operational phase bat monitoring (acoustic study, bat fatality monitoring with genetic component) • Operational phase monitoring design will take into consideration Nature Conservation and National Parks (DKMP) opinion on survey timing and length (monthly visits, 5 day/nights, between March and October), in addition to internationally accepted methodology (NatureScot 2021).

Parameter	Relevant International Standard	Harmancik WPP EIA Report Biodiversity Reports Temporary Stakeholder Engagement Plan (SEP)	Gap Analysis	Recommended Actions / Studies
			• Transect locations, distances and effort durations not provided. • Only one year of studies were conducted which does not account for year-on-year differences in activity and abundance (2 years needed)	
Flora Baseline	IFC PS6	Baseline flora survey was conducted as part of National EIA.	The results of the flora study are sufficient for baseline assessment.	• Develop critical habitat assessment and biodiversity management plan
Terrestrial fauna baseline	IFC PS6	Terrestrial fauna surveys were covered as part of National EIA.	In order to establish the optimal mitigation hierarchy, no net loss or net gain targets, and other conservation aims, a robust biodiversity baseline obtained prior to operational phase is necessary. The deficiencies identified in the National EIA terrestrial fauna survey methodology are as follows: • Survey time, effort and duration was not quantified. • Data pertaining to species observations were not quantified. • Transect locations were not provided and spatial coverage was not quantified. • Environmental parameters of survey dates were not provided.	• The surveys should provide robust quantitative and spatial information pertaining to terrestrial fauna. • Second year of pre-operational surveys should aim to improve the deficiencies identified with the first-year surveys. • Develop CHA. • Develop biodiversity management plan.
Deforestation	IFC PS6	The types of forest areas and the number of trees to be cut are specified in the National EIA.	Compensatory tree planting carried out by the local authority is considered within the scope of "no let loss". However, if the areas where tree	• No additional study is foreseen at this stage. The number of trees given in National EIA can be accepted as the number of trees to be cut down.

Parameter	Relevant International Standard	Harmancik WPP EIA Report Biodiversity Reports Temporary Stakeholder Engagement Plan (SEP)	Gap Analysis	Recommended Actions / Studies
			cutting will be done are considered critical habitat, “net gain” will need to be provided. This may include planting additional trees or rehabilitating a damaged similar forest area.	• Since tree cutting will be within the boundaries of KBA, net gain should be provided.
Social Environment				
Stakeholder Engagement	IFC PS 1	A temporary SEP prepared prior to the ESIA process is in place since October 2023. The temporary document summarizes the previous stakeholder engagement activities. Accordingly, within the scope of the National EIA study, a Public Participation Meeting was held on 13 December 2021 at the Village Coffee House in Üçpınar Neighbourhood , Lapseki District, Çanakkale Province. During the meetings, technical details of the Project were presented to the stakeholders/local communities and their opinions and suggestions were recorded.	After public participation meeting, some technical details of the Project changed. However, as per the national and international requirements, it is not clear that stakeholders/local communities are well informed about latest changing details and social impacts related to these.	• A public participation meeting should be held to disclose current information and receive the opinions of neighbourhood residents as well as other relevant stakeholders.
External Communications and Grievance Mechanism	IFC PS 1	The Project Company has a grievance mechanism for the Project’s stakeholders with various communication channels.	There is no formalized and written Project Grievance Mechanism Procedure to manage the grievances in line with the international standards.	• There should be a formalized and written Project Grievance Mechanism Procedure that involves the principles of the mechanism (including anonymity), available channels with contact details of the CLOs, defined timeframes and management and resolution process together with the assigned responsible Project staff to comply with the international standards.
On-going Reporting to Affected Communities	IFC PS 1	Ongoing reporting practices to the affected communities were assessed	No records or log were kept of the stakeholder activities described. Providing periodic reports to the	• Stakeholder engagement and consultation activities should be

Parameter	Relevant International Standard	Harmancik WPP EIA Report Biodiversity Reports Temporary Stakeholder Engagement Plan (SEP)	Gap Analysis	Recommended Actions / Studies
		with a site visit and documentations shared by the Project Company. The temporary SEP also describes the Project's affected communities and future engagement requirements.	affected communities is essential under the scope of the SEP.	conducted throughout the Project's pre-construction, construction and operation phases and recorded into a central log with relevant details (i.e., stakeholder group, consultation subject, and outcomes of the consultation). The Project Company should provide stakeholder engagement reports on annual basis.
Land Acquisition and Resettlement	IFC PS 5	It is stated in the National EIA that land acquisition will be carried out within the scope of the Project and this process will be carried out within the scope of the Expropriation Law numbered 2942.	The Project Company could not disclose the extent of land acquisition to the affected communities during the National EIA process and did not address the magnitude of impact. Additionally, the Project Company did not identify and collect socio-economic data of the people who will experience economic displacement due to land acquisition.	• In compliance with IFC PS 5, a Resettlement Action Plan (RAP) should be developed. This Plan should also incorporate strategies to mitigate the impact of economic displacement.
Cultural Heritage				
Tangible Cultural Heritage Assets	IFC PS 8	Potential impacts on cultural heritage might occur especially during the construction phase, due to the activities such as land preparation and construction of the Project components (i.e., the access road). A Cultural Heritage Management Plan will be prepared and implemented during construction and operation phases. It was indicated in the National EIA Report that no registered cultural heritage area is located within the Project area.	Notification of the detected unregistered tangible cultural heritage asset has not been made to Çanakkale Regional Council for the Conservation of Cultural Property.	• The notification should be made to the relevant authority. Upon notification, necessary measures must be taken when performing construction activities in the areas where tangible cultural heritage assets were identified since the National EIA Report does not include any recommendations or mitigation measures for protection of these cultural heritage assets.

3 Legal and Policy Framework

3.1 Introduction

This Chapter provides an overview of the national regulatory framework and applicable standards to the Project, which include the following:

- Relevant Turkish environmental, health, safety and social legislation relevant to the nature of the Project,
- Regional and international conventions and agreements applicable to the Project, and
- International requirements and standards.

3.2 National Legal and Policy Framework

The central government entities in Türkiye are set out below:

- The Presidency, including the presidential administrative offices and policy councils
- Turkish Grand National Assembly (TBMM)
- Ministries that create policies and perform compliance assurance functions. The Ministries also contain a number of general directorates and offices, which coordinate and supervise a range of specific activities.

The key national level institutions in Türkiye responsible of managing environmental and social aspects related to the proposed Project include the following:

- Ministry of Energy and Natural Resources (MoENR): MoENR carries out studies to encourage and coordinate studies on the research, development, operation, evaluation, control and protection of energy resources, to monitor and evaluate technological research and development activities on energy, and to identify and evaluate all energy resources, with a priority on the country's renewable energy resources.
  - MoENR General Directorate of Energy Affairs: sets out targets and studies to determine the country's short and long-term needs for energy and natural resources, to help determine the policies necessary for their supply, to assist in determination of general policy principles, to make the necessary investment programs, to prepare plans and projects or to have them prepared, in order to research, operate, develop, evaluate, control and protect energy and natural resources for the benefit of the country, in accordance with technical requirements and economic developments.
- Ministry of Environment, Urbanisation and Climate Change (MoEUCC): The MoEUCC sets principles and policies for protection of environment, monitors and audits implementation, and regulates settlements and environmental protection measures. MoEUCC is also the lead authority for domestic and international climate change policies and the implementation of the relevant strategy and action plan. It is made up of several directorates including the following:
  - MoEUCC General Directorate of EIA, Permit and Inspection: Along with its local governorates, this general directorate is the authority in charge of issuing environmental permits for emissions and discharges, as well as the environmental impact assessment decisions for projects.
  - MoEUCC General Directorate of Spatial Planning: Identifies the procedures and guidelines related to preparation of all kinds of physical spatial development plans and master plans at all scales, approving these plans and ensuring that those plans are implemented and monitored.

  - MoEUCC General Directorate of Environmental Management: This general directorate is the primary authority in environmental protection and monitoring procedures, holding the authority for assessment, supervision and sanctioning in coordination with governorate structures at the local level.
- Ministry of Agriculture and Forestry (MoAF): The MoAF establishes policies on protection and mobilization of the ecological resources in an effective, efficient and sustainable manner through ecological, vegetal and animal added value. Duties of the MoAF also include determining policies on conservation and sustainable use of water resources.
  - MoAF General Directorate of Forestry: Aims to manage forest resources in ecosystem integrity, together with plant and animal existence, taking into account their ecological, economic and socio-cultural benefits, to protect against irregular interventions, natural disasters, fires, to increase forest areas and services related to forests as well as to develop and rehabilitate the forest areas.
- Ministry of Labour and Social Security (MoLSS): The Ministry is responsible for labour and social security affairs, including coordination and monitoring of all aspects associated with occupational health and safety.
- Ministry of Culture and Tourism (MoCT): The Ministry is responsible for research, development, protection, preserving, evaluation, dissemination, promoting and adopting national, spiritual, historical, cultural and touristic values and thereby contribute to the strengthening of national integrity and economic development.
  - General Directorate of Cultural Heritage and Museums: Aims to ensure that movable and immovable cultural assets that need to be protected in Türkiye are revealed, protected, evaluated and promoted through archaeological research and excavations, and to take measures to prevent their destruction and smuggling.

Administratively, Türkiye is divided into a total of 81 provinces, which are further subdivided into administrative districts that may cover both rural and urban areas, of which there are 973 in total. The local level government entities include the following listed:

- Governorates: Each of the 81 provinces in Türkiye is administered by a governor appointed by the President. As the chief executive of the province and principal agent of the central government, each governor supervises other government officials assigned to carry out ministerial functions in his/her province. Each district is administered by an appointed sub-governor, who report directly to the governor and is responsible for a number of directorates including, amongst others; education, health, population, and security, which in turn are closely linked to the ministries of central government.
- Municipalities: All districts have municipalities, headed by an elected mayor, who administers a defined municipality area. The major services for which municipalities are responsible include urban planning, management of transportation systems, construction and maintenance of urban roadways and paths, and provision of water, sewerage and utility services, as well as waste collection/disposal.
- Mukhtars: The lowest level of government is the villages and neighbourhoods, headed by elected mukhtars taking care of specific administrative matters. The mukhtars are elected through local elections for five-year terms.

3.2.1 National Legislation

The Environmental Law No. 2872 is Türkiye's primary framework for environmental legislation and is supported by a series of laws, regulations, and communiques. It lays out the main responsibilities and requirements of the institutional authorities and the businesses regarding protection and preservation of the environment.

Labour, health and safety issues are collectively ruled by the Labour Law No. 4857, Occupational Health and Safety Law No. 6331 and related regulations. The main purpose of these laws is to regulate the employer's and the employee's duties, powers, responsibilities, work related rights, working conditions and obligations to provide occupational health and safety at work environment and improve the health and safety conditions.

In Türkiye, it is aimed to create large-scale renewable energy resource areas in public, treasury and privately owned real estate to create opportunities for efficient and effective use renewable energy resources in the country, to boost investment opportunities in renewable energy, to ensure that advanced technology components used in electrical energy production facilities based on renewable energy resources are produced or supplied nationally, and lastly, to contribute to technology transfer. In this context, Renewable Energy Resource Areas (YEKA) Regulation was published in the Official Gazette dated 09 October 2016 and numbered 29852. The regulation aims to determine the YEKA areas together with their electricity generation capacities and it defines all relevant procedures for the YEKA processes. The Project area is one of the areas declared as a YEKA within the scope of the regulation, with a declaration published in the Official Gazette dated 21 March 2021 and numbered 31430.

According to the National EIA Report, in terms of installed power and the number of turbines and the 68.75 tonnes/hour capacity mobile crashing and screening facility, the Project is reported to be within the scope of Environmental Impact Assessment Regulation Annex-1 "Article 41-Wind power plants" and "Article 45-e, Facilities performing at least one of the crushing, screening, washing, drying and ore preparation processes" respectively. The ETL to be constructed within the scope of the Project is exempt within the scope of Annex 1 - "Article 37 - Energy Transmission Lines" of the National Environmental Impact Assessment Regulation.

3.2.1.1 Applicable Legislation

The ESIA study is performed in accordance with the applicable national and international legislation as well as international standards for the Project.

According to the national laws and regulations the Project Company is required to secure certain permits and licenses prior to starting the active work on site. The list of laws and regulations applicable for the initial stage of the Project while gaining the development consent is provided in Table 3.1.

Table 3-1: National Legislation Applicable for the initial stage of the Project

Law/Regulation	OG date	OG number
Environmental Legislation		
Environmental Law (2872)	11.08.1983	18132
Regulation on Environmental Impact Assessment	29.07.2022	31907
Forest Law (6831)	08.09.1956	9402
Regulation on Implementation of the Article 17 Particle 3 of the Forest Law	30.11.2021	31675
Regulation on Implementation of the Article 18 of the Forest Law	30.11.2021	31675
Road Traffic Regulation	18.07.1997	23053
Legislation related to Land Acquisition		
Law on Expropriation (2942)	08.11.1983	18215
Zoning Law (3194)	09.05.1985	18749
Regulation on Immovable Property Transactions Carried Out by the Energy Market Regulatory Authority	02.11.2021	31647
Regulation Concerning Exploitation of Trees and Shrubs on Private-registered Immovables not Regarded as Forest	10.12.2020	31330

Law/Regulation	OG date	OG number
Law on the Use of Renewable Energy Resources for Electricity Production (5346)	18.05.2005	25819
Renewable Energy Resource Areas (YEKA) Regulation	09.10.2016	29852
Regulation on Renewable Energy Resource Guarantee Certificate in the Electricity Market	14.11.2020	31304
Regulation on Technical Evaluation of Wind-Based Electricity Generation Applications	20.10.2015	29508
Notification on Wind and Solar Measurements Applications for Pre-License Applications Regarding Wind and Solar Energy	17.06.2014	29033
Electricity Market License Regulation	02.11.2013	28809
Electrical Facilities Project Regulation	30.12.2014	29221
Mining Law (3213)	15.06.1985	18785
Mining Regulation	11.12.2022	32040
Road Transport Regulation	08.01.2018	30295

There are certain laws and regulations required to be followed during the construction and operation phase of the Project. These laws and regulations set the limits for certain parameters and actions for the management of environmental, health and safety and social issues and biodiversity conservation including waste management, water and wastewater management, air management and noise management, site safety and worker safety and stakeholder engagement. The great majority of the laws and regulations are applicable for both phases of the Project whereas some of them are applicable either construction or operation phase of the project. The detailed list is provided in Table 3-2.

Table 3-2: National Legislation Applicable for each phase of the Project

Law/Regulation	Official Gazette (OG) date	OG number
Laws and Regulations applicable to construction phase of the Project		
Regulation on Control of Excavation, Construction and Demolition Waste	18.03.2004	25406
Regulation on Occupational Health and Safety in Construction Works	05.10.2013	28786
Regulation on the Control of Dust Emissions	05.11.2013	28812
Regulation on Control of Industrial Air Pollution	03.07.2009	27277
Laws and Regulations applicable to operation phase of the Project		
Regulation on Environmental Permit and License	10.09.2014	29115
Workplace Opening and Permit Regulation	10.08.2005	25902
Laws and Regulations applicable to construction and operation phases of the Project		
Environmental Legislation		
Environmental Law (2872)	11.08.1983	18132
Regulation on Environmental Audit	12.06.2021	31509
Environmental Noise Control Regulation	30.11.2022	32029
Soil Conservation and Land Use Law (5403)	19/7/2005	25880
Regulation on Soil Pollution Control and Point-Source Contaminated Sites	08.06.2010	27605
Regulation on Water for Human Consumption	17.02.2005	25730
Regulation on the Protection of Drinking Water Basins	28.10.2017	30224
Surface Water Quality Regulation	30.11.2012	28483
Regulation on the Quality and Treatment of Drinking Water Supply	06.07.2019	30823
Water Pollution Control Regulation	31.12.2004	25687

Law/Regulation	Official Gazette (OG) date	OG number
Regulation on Control of Pollution Caused by Hazardous Substances in Aquatic Environment (76/464/AB)	26.11.2005	26005
Law on Groundwaters (167)	23/12/1960	10688
State Hydraulic Works (DSI) Groundwater Technical Regulation	23.06.1972	14224
Regulation on the Protection of Groundwater against Pollution and Deterioration	07.04.2012	28257
Flood and Sediment Control Regulation	03.05.2019	30763
Regulation on the Protection of Wetlands	04.04.2014	28962
Regulation on Assessment and Management of Air Quality	06.06.2008	26989
Regulation on Monitoring of Greenhouse Gas Emissions	17.05.2014	29003
Regulation on Waste Management	02.04.2015	29314
Regulation on Zero Waste	12.07.2019	30829
Regulation on Control of Waste Oils	21.12.2019	30985
Regulation on Control of Packaging Waste	26.06.2021	31523
Regulation on the Control of End-of-life Tires	25.11.2006	26357
Regulation on Control of End-of-Life Vehicles	30.12.2009	27448
Regulation on Control of Waste Vegetable Oils	06.06.2015	29378
Regulation on Control of the Waste Batteries and Accumulators	31.08.2004	25569
Regulation on Control of Waste Electrical and Electronic Appliances	26.12.2022	32055
Regulation on Control of Medical Waste	25.01.2017	29959
Legislation related to Health and Safety, Labour Practices		
Labour Law (4857)	10.06.2003	25134
Law on Trade Union and Collective Bargaining (6356)	18.10.2012	28460
Regulation on Working Duration Related to Labour Law	06.04.2004	25425
Regulation on Excess Work and Work in Excess Periods related to Labour Law	06.04.2004	25425
Regulation on Special Principles in Works Carried out by Employing Workers in Shifts	07.04.2004	25426
Regulation on Minimum Wage	01.08.2004	25540
Regulation on Suspension of Work in Workplaces	01.08.2004	28603
Regulation on Contractors and Subcontractors	27.09.2008	27010
Occupational Health and Safety Law (6331)	30.06.2012	28339
Occupational Health and Safety Services Regulation	29.12.2012	28512
First Aid Regulation	29.07.2015	29429
Regulation on Use of Personal Protective Equipment in Workplaces	02.07.2013	28695
Regulation on the Procedures and Principles of the Employee's Health and Safety Trainings	15.05.2013	28648
Regulation on Occupational Health and Safety Committees	18.01.2013	28532
Regulation on Occupational Health and Safety Risk Assessment	29.12.2012	28512
Regulation on Duties, Authority, Responsibilities and Trainings of Occupational Health and Safety Specialists	29.12.2012	28512
Regulation on Duties, Authority, Responsibilities and Trainings of Workplace Doctor and Other Health Personnel	20.07.2013	28713
Regulation on the Health and Safety Measures to be taken in Workplace Buildings and Additions	17.07.2013	28710
Regulation on Occupational Health and Safety in Temporary or Fixed Term Employment	23.08.2013	28744

Law/Regulation	Official Gazette (OG) date	OG number
Regulation on Environmental Noise Emission Generated by the Outdoor Equipment Used at Site	30.12.2006	26392
Regulation on the Protection of the Workers against Risks Relevant to Noise	28.07.2013	28721
Regulation on the Protection of the Workers against Vibration Risks	22.08.2013	28743
Exhaust Gas Emission Control Regulation	11.03.2017	30004
Türkiye Earthquake Regulation for Buildings	18.03.2018	30364
Regulation on the Emergency Situations in Workplaces	18.06.2013	28681
Regulation on Protection of Buildings from Fire	19.12.2007	26735
Law on People with Disabilities (5378)	07.07.2005	25868
Regulation on Accessibility Monitoring and Auditing	20.07.2013	28713
Regulation on Safety and Health Signs	11.09.2013	28762
Regulation on Manual Handling	24.07.2013	28717
Regulation on the Protection of Workers from the Dangers of the Explosive Media	30.04.2013	28633
Regulation on Health and Safety Measures in Working with Chemical Substances	12.08.2013	28733
Regulation on Health and Safety Measures for Working with Carcinogenic and Mutagenic Substances	06.08.2013	28730
Regulation on the Works in Which Workers shall Work Maximum Seven and Half Hours or Less in a Day in Terms of Health Rules	16.07.2013	28709
Legislation related to Stakeholder Engagement and Grievance Mechanism		
Law on Right to Information (4982)	24.10.2003	25269
Law on Preservation of Personal Data (6698)	07.04.2016	29677
Regulation on the Principles and Procedures for Enforcement of the Law on the Right to Information	27.04.2004	25445
Law on Use of the Right to Petition (3071)	10.11.1984	18571
Legislation related to Biodiversity Conservation		
Law on Natural Parks	11.08.1983	18132
Terrestrial Hunting Law (4915)	11.07.2003	25165
Law on Animal Protection	01.07.2004	25509
Forestry Law	08.09.1956	9402
Law on Pasture	28.02.1998	23272
Law on Fisheries	04.04.1971	13799
Pastureland Regulation	31.07.1998	23419
Regulation on Protection of Wildlife and Wildlife Development Areas	08.11.2004	25637
Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora	27.12.2001	24623
Regulation on Collection, Protection and Usage of Plant Genetic Resources	19.07.2012	28358
Legislation related to Cultural Heritage		
Law on the Conservation of Cultural and Natural Assets (2863)	23.07.1983	18113
Regulation on Detection and Registration of Immovable Cultural Assets and Sites That Need to be Protected	13.03.2012	28232
Legislation related to Energy		
Electrical High Current Facilities Regulation	30.11.2000	24246
Local Mechanical Parts Regulation	28.05.2021	31494
Regulation on Grounding in Electrical Installations	21.08.2001	24500

Source: Republic of Türkiye Legislation Information System. (n.d.). *Legislation Information System*. Presidency of Administrative Affairs General Directorate of Law and Legislation. www.mevzuat.gov.tr. Last accessed on 15 November 2023.

Table 3-1: National Legislation Applicable for the initial stage of the Project [17]

Law/Regulation	OG date	OG number
Environmental Legislation		
Environmental Law (2872)	11.08.1983	18132
Regulation on Environmental Impact Assessment	29.07.2022	31907
Forest Law (6831)	08.09.1956	9402
Regulation on Implementation of the Article 17 Particle 3 of the Forest Law	30.11.2021	31675
Regulation on Implementation of the Article 18 of the Forest Law	30.11.2021	31675
Road Traffic Regulation	18.07.1997	23053
Legislation related to Land Acquisition		
Law on Expropriation (2942)	08.11.1983	18215
Zoning Law (3194)	09.05.1985	18749
Regulation on Immovable Property Transactions Carried Out by the Energy Market Regulatory Authority	02.11.2021	31647
Regulation Concerning Exploitation of Trees and Shrubs on Private-registered Immovables not Regarded as Forest	10.12.2020	31330
Law on the Use of Renewable Energy Resources for Electricity Production (5346)	18.05.2005	25819
Renewable Energy Resource Areas (YEKA) Regulation	09.10.2016	29852
Regulation on Renewable Energy Resource Guarantee Certificate in the Electricity Market	14.11.2020	31304
Regulation on Technical Evaluation of Wind-Based Electricity Generation Applications	20.10.2015	29508
Notification on Wind and Solar Measurements Applications for Pre-License Applications Regarding Wind and Solar Energy	17.06.2014	29033
Electricity Market License Regulation	02.11.2013	28809
Electrical Facilities Project Regulation	30.12.2014	29221
Mining Law (3213)	15.06.1985	18785
Mining Regulation	11.12.2022	32040
Road Transport Regulation	08.01.2018	30295

There are certain laws and regulations required to be followed during the construction and operation phase of the Project. These laws and regulations set the limits for certain parameters and actions for the management of environmental, health and safety and social issues and biodiversity conservation including waste management, water and wastewater management, air management and noise management, site safety and worker safety and stakeholder engagement. The great majority of the laws and regulations are applicable for both phases of the Project whereas some of them are applicable either construction or operation phase of the project. The detailed list is provided in Table 3-2.

Table 3-2: National Legislation Applicable for each phase of the Project [18]

Law/Regulation	Official Gazette (OG) date	OG number
Laws and Regulations applicable to construction phase of the Project		
Regulation on Control of Excavation, Construction and Demolition Waste	18.03.2004	25406

[17] This table includes the up-to-date revisions of the documents as of 12 November 2023.

[18] This table includes the up-to-date revisions of the documents as of 12 November 2023.

Law/Regulation	Official Gazette (OG) date	OG number
Regulation on Occupational Health and Safety in Construction Works	05.10.2013	28786
Regulation on the Control of Dust Emissions	05.11.2013	28812
Regulation on Control of Industrial Air Pollution	03.07.2009	27277
Laws and Regulations applicable to operation phase of the Project		
Regulation on Environmental Permit and License	10.09.2014	29115
Workplace Opening and Permit Regulation	10.08.2005	25902
Laws and Regulations applicable to construction and operation phases of the Project		
Environmental Legislation		
Environmental Law (2872)	11.08.1983	18132
Regulation on Environmental Audit	12.06.2021	31509
Environmental Noise Control Regulation	30.11.2022	32029
Soil Conservation and Land Use Law (5403)	19/7/2005	25880
Regulation on Soil Pollution Control and Point-Source Contaminated Sites	08.06.2010	27605
Regulation on Water for Human Consumption	17.02.2005	25730
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Law on Preservation of Personal Data (6698)	07.04.2016	29677
Regulation on the Principles and Procedures for Enforcement of the Law on the Right to Information	27.04.2004	25445
Law on Use of the Right to Petition (3071)	10.11.1984	18571

Law/Regulation	Official Gazette (OG) date	OG number
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Terrestrial Hunting Law (4915)	11.07.2003	25165
Law on Animal Protection	01.07.2004	25509
Forestry Law	08.09.1956	9402
Law on Pasture	28.02.1998	23272
Law on Fisheries	04.04.1971	13799
Pastureland Regulation	31.07.1998	23419
Regulation on Protection of Wildlife and Wildlife Development Areas	08.11.2004	25637
Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora	27.12.2001	24623
Regulation on Collection, Protection and Usage of Plant Genetic Resources	19.07.2012	28358
Legislation related to Cultural Heritage		
Law on the Conservation of Cultural and Natural Assets (2863)	23.07.1983	18113
Regulation on Detection and Registration of Immovable Cultural Assets and Sites That Need to be Protected	13.03.2012	28232
Legislation related to Energy		
Electrical High Current Facilities Regulation	30.11.2000	24246
Local Mechanical Parts Regulation	28.05.2021	31494
Regulation on Grounding in Electrical Installations	21.08.2001	24500

Source: Republic of Türkiye Legislation Information System. (n.d.). *Legislation Information System*. Presidency of Administrative Affairs General Directorate of Law and Legislation. www.mevzuat.gov.tr. Last accessed on 15 November 2023.

3.2.2 National Strategy Documents

In addition to laws and regulations, Türkiye has prepared several strategy and action plans for sustainable development, environmental and ecological protection, and energy transition. The following plans and strategy documents will be taken into consideration during the ESIA studies for the Project:

- Türkiye National Energy Plan (2022)
- Climate Change Action Plan (2012)
- National Forestry Program (2004)
- Turkish National Action Plan against Desertification (2015)
- National Biological Diversity Strategy and Action Plan (2019)
- National Rural Development Strategy (2015)
- National Plan on on-site Protection of Plant Genetic Diversity (1998)

3.3 International Requirements and Standards

The works within the scope of the Project are designated to be implemented primarily in accordance with the IFC standards. The international E&S standards, requirements, standards and guidelines applicable to this ESIA study to be performed are listed below:

- IFC's Environmental and Social Policy & PSs (2012)
- Equator Principles IV (2020)
- EBRD's Environmental and Social Policy & Performance Requirements (2019)
- EIB's Environmental and Social Standards (2022)

- DFC's Environmental and Social Policy and Procedures (2020)
- Organisation for Economic Co-operation and Development (OECD) Recommendation of the Council on Common Approaches on the Environment and Officially Supported Export Credits – "The Common Approaches"
- IFC/EBRD's Guidance Note on Workers Accommodation: Processes and Standards (2009)
- IFC/KfW/EBRD Post-construction Bird and Bat Fatality Monitoring for Onshore Wind Energy Facilities in Emerging Market Countries - Good Practice Handbook (2023)
- ILO's fundamental conventions concerning the abolition of child labour, the elimination of discrimination at the workplace and forced/compulsory labour
- IFC's Environmental, Health and Safety (EHS) General Guidelines (2007)
- IFC's EHS Guidelines for Electric Power Transmission and Distribution (2007)
- IFC's EHS Guidelines for Wind Energy (2015)
- European Commission's Guidance Document on Wind Energy Developments and EU Nature Legislation (2020)
- European Union (EU) Environmental, Social, Occupational Health and Safety Directives including but not limited to:
  - EU Environmental Impact Assessment (EIA) Directive (2011/92/EU as amended by 2014/52/EU),
  - EU Council Directive 2008/98/EC (Waste Framework Directive) on waste and repealing certain Directives (2008),
  - EU Council Directive 89/391/EEC (The Occupational Health and Safety (OHS) Framework Directive) on the introduction of measures to encourage improvements in the safety and health of workers at work (1989),
  - EU Environmental Noise Directive (END) (i.e., Directive 2002/49/EC relating to the assessment and management of environmental noise),
  - EU Taxonomy definition and overall Do No Significant Harm concepts
- International Standardisation Organisation Standards (e.g., ISO 14001, ISO 45001, ISO 9001)
- International Electrotechnical Commission (IEC) IEC 61400-1:2019 Wind Energy Generation Systems Standard
- International best practice regarding the mitigation of impacts and consideration of minorities and vulnerable persons
- Applicable industry safety guidance
- Good International Industry Practices (GIIPs)

3.3.1 IFC Performance Standards (PSs)

The IFC PSs are listed below, and their relevance with the Project is detailed in Table 3-3.

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

- Performance Standard 8: Cultural Heritage

Table 3-3: IFC PSs Applicable to the Project

Performance Standard	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
PS 1: Assessment and Management of Environmental and Social Risks and Impacts	PS 1 emphasizes on the importance of: (i) an integrated assessment to identify the environmental and social impacts, risks and opportunities of the Project; (ii) effective community and stakeholder engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the Project Company's management of social and environmental performance throughout the life of the project through management programs, monitoring, and review.	Yes	Chapters 13,17, and 18
PS 2: Labour and Working Conditions	PS 2 recognises that a balance between economic growth and workers' fundamental rights is needed. The objectives are: (i) to promote a non-discriminative, equal working environment for workers; (ii) to maintain and improve the worker-management relationship; (iii) to ensure compliance with national labour and employment laws; (iv) to protect vulnerable workers; to promote a safe and healthy working environment and the health of workers; lastly, (v) to protect the workforce by addressing child labour and forced labour.	Yes	Chapter 13 and Chapter 14
PS 3: Resource Efficiency and Pollution Prevention	PS 3 emphasizes that increasing economic activity and urbanisation may result in increased levels of pollution to air, water, and land, and consume limited resources of the Earth; of which may threaten humans and the environment at the local, regional, and global levels. The main objectives are: (i) to avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities; (ii) to promote more sustainable	Yes	Chapters 5, 6, 7, 8, 9, 10, 11, 15 and 16

Performance Standard	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	use of resources including energy and water; and (iii) to reduce project-related greenhouse gas (GHG) emissions that contribute to climate change.		
PS 4: Community Health, Safety, and Security	PS 4 recognises that Project activities, equipment, and infrastructure may increase the vulnerability of communities to risks and impacts. The objectives are: (i) to anticipate and avoid adverse impacts on the health and safety of the affected community during the project life cycle; and (ii) to ensure that the safeguarding of personnel and property is carried out for the avoidance from or minimisation of risks to the affected communities.	Yes	Chapter 15
PS 5: Land Acquisition and Involuntary Resettlement	PS 5 recognises that project-related land acquisition and restrictions on land use may have adverse impacts on communities and persons who use this land. The objectives are: (i) to avoid or minimise involuntary resettlement wherever feasible by composing alternative project designs; (ii) to avoid or minimise adverse social and economic impacts of land acquisition by providing compensation for loss of assets and ensuring that resettlement activities are implemented with appropriate consultation and disclosure; lastly, (iii) to improve or at least restore the livelihoods and living conditions of displaced communities.	Yes	Chapter 13 and Chapter 18
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	PS 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are key pillars for ensuring sustainable development. The objectives are: (i) to protect and conserve biodiversity; maintain the benefits from ecosystem services; and (ii) to promote sustainably managed and used natural resources through best practices that	Yes	Chapter 12

Performance Standard	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	integrate conservation and development priorities.		
PS 7: Indigenous Peoples	PS 7 recognizes that Indigenous Peoples are more likely to become vulnerable to risks and impacts related to project operations. The main objectives are: (i) to anticipate and avoid, minimise or compensate adverse impacts of the project on Indigenous Peoples; (ii) to promote possible sustainable development benefits and opportunities; (iii) to establish and maintain an ongoing relationship with affected Indigenous Peoples throughout the life-cycle of the project; (iv) to ensure free, prior and informed consent of Indigenous Peoples; lastly, (v) to respect and preserve their culture, knowledge and practices.	No	-
PS 8: Cultural Heritage	PS 8 recognises the significance of cultural heritage for current and future generations. The main two objectives are: (i) to protect the cultural heritage from the possible adverse impacts of project activities and support its preservation; and (ii) to promote equitable sharing of benefits from cultural heritage.	Yes	Chapter 16

Source: International Finance Corporation (IFC). (2012). *Performance Standards on Environmental and Social Sustainability.* https://www.ifc.org/content/dam/ifc/doc/2010/2012-ifc-performance-standards-en.pdf

3.3.2 The Equator Principles (EP IV)

The Equator Principles are intended to serve as a common baseline and framework for financial institutions, namely Equator Principles Financial Institutions (EPFIs), to identify, assess and manage environmental and social risks when financing projects.

The Project compliance will be assessed upon the ten Equator Principles, which are listed below. Relevance of the Principles with the Project is detailed in Table 3-4.

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

- Principle 7: Independent Review
- Principle 8: Covenants
- Principle 9: Independent Monitoring and Reporting
- Principle 10: Reporting and Transparency

Table 3-4: Equator Principles Applicable to the Project

Performance Standard	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
Principle 1: Review and Categorisation[19]	According to Principle 1, the Project is categorised based on the magnitude of its potential environmental and social risks and impacts, including those related to Human Rights, climate change, and biodiversity. Such categorisation is based on the International Finance Corporation's (IFC) environmental and social categorisation process.	Yes	The Project is confirmed as Category A by the Lenders.
Principle 2: Environmental and Social Assessment	Principle 2 requires performing a process to address the relevant environmental and social risks and scale of impacts of the Project. The assessment is expected to propose measures to minimise, mitigate, and where residual impacts remain, to compensate/offset/remedy for risks and impacts to workers, Affected Communities, and the environment. Principle 2 also expects that assessments of potential adverse Human Rights impacts and climate change risks are included as part of the ESIA.	Yes	Chapters 5-17
Principle 3: Applicable Environmental and Social Standards	Principle 4 requires that compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues are addressed within the assessment. Principle 4 notes that the EPFI will evaluate the Project's compliance with the applicable standards; (i) for Projects located in Non-	Yes	Chapter 3

[19] **Category A:** Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented;

Category B: Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and

Category C: Projects with minimal or no adverse environmental and social risks and/or impacts.

Performance Standard	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	Designated Countries[20], compliance with the applicable IFC PSs and the WBG Environmental, Health and Safety Guidelines (EHS Guidelines)., and (ii) for projects located in Designated Countries[21], compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues.		
Principle 4: Environmental and Social Management System and Equator Principles Action Plan	Principle 4 recognizes that for all Category A and Category B Projects, the EPFI will require the client to develop and / or maintain an ESMS. Principle 4 requires that an ESMP will be prepared by the Client to address issues raised in the assessment process and incorporate actions required to comply with the applicable standards. Where the applicable standards are not met to the EPFI's satisfaction, the principle requires the Project Company and the EPFI to agree to an Equator Principles Action Plan (EPAP).	Yes	ESMP and ESMS Plans and Procedures
Principle 5: Stakeholder Engagement	Principle 5 recognizes that for all Category A and Category B Projects the EPFI will require the client to demonstrate effective Stakeholder Engagement, as an ongoing process in a structured and culturally appropriate manner, with Affected Communities, Workers and, where relevant, Other Stakeholders. For Projects with potentially significant adverse impacts on Affected Communities, the principle requires performing an Informed Consultation and Participation process. The Project Company is expected to tailor its consultation process to: (i) the risks and impacts of the project; (ii) the project's phase of development; the language	Yes	Chapter 13, Chapter 18 and SEP

[20] Non-Designated Countries are those countries not found on the list of Designated Countries on the Equator Principles Association website.

[21] Designated Countries are those countries deemed to have robust environmental and social governance, legislation systems and institutional capacity designed to protect their people and the natural environment.

Performance Standard	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	preferences of the Affected Communities; their decision-making processes; and (iii) the needs of disadvantaged and vulnerable groups.		
Principle 6: Grievance Mechanism	Principle 6 recognizes that for all Category A and, as appropriate, Category B Projects, the EPFI will require the Project Company, as part of the ESMS, to establish effective grievance mechanisms which are designed for use by Affected Communities and workers, as appropriate, to receive and facilitate resolution of concerns and grievances about the project's environmental and social performance.	Yes	Chapter 13 and SEP
Principle 7: Independent Review	For all Category A and, as appropriate, Category B Projects, Principle 7 requires that an Independent Environmental and Social Consultant to carry out an Independent Review of the Assessment process including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation.	Yes	
Principle 8: Covenants	Principle 8 recognizes that for all Projects, where a Project Company is not in compliance with its environmental and social covenants, the EPFI will work with the client on remedial actions to bring the Project back into compliance.	Yes	
Principle 9: Independent Monitoring and Reporting	Principle 9 recognizes that for all Category A and, as appropriate, Category B Projects, in order to assess Project compliance with the EP4, the EPFI will require independent monitoring and reporting.	Yes	
Principle 10: Reporting and Transparency	Principle 10 requires the Project Company to prepare the following: (i) A summary of the ESIA is accessible and available online and that it includes a summary of human rights and climate change risks and impacts when relevant; (ii) Annual GHG emission reporting (combined Scope 1 and	Yes	

Performance Standard	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	Scope 2 Emissions, and, if appropriate, the GHG efficiency ratio) during the operational phase for Projects emitting over 100,000 tonnes of CO_2 equivalent annually; (iii) Sharing of non-sensitive Project-specific biodiversity data with the Global Biodiversity Information Facility (GBIF) and relevant national and global data repositories, using formats and conditions to enable such data to be accessed and re-used in future decisions and research applications.		

Source: Equator Principles. (2020). *The Equator Principles*. https://equator-principles.com/app/uploads/The-Equator-Principles_EP4_July2020.pdf.

3.3.3 EBRD Performance Requirements (PRs)

There are ten identified performance requirements within the 2019 Environmental and Social Policy of EBRD. Each PR and their applicability condition to the Project is determined in Table 3-5.

Table 3-5: EBRD PRs Applicable to the Project

Performance Requirement	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
PR 1: Assessment and Management of Environmental and Social Risks and Impacts	PR 1 emphasizes on the significance of integrated assessment to identify the environmental and social impacts and issues associated with the Project and the Client's management of environmental and social performance throughout the life cycle of the Project.	Yes	Chapters 5 - 17
PR 2: Labour and Working Conditions	PR 2 recognises that workforce is a valuable asset for the Client and its business activities, and that effective human resources management and a reliable worker-management relationship based on respect for workers' rights, including freedom of association and right to collective bargaining, are key pillars for ensuring the sustainability of business activities.	Yes	Chapter 13 and Chapter 14
PR 3: Resource Efficiency and Pollution Prevention and Control	PR 3 emphasizes on the importance of a holistic approach to climate impacts and greenhouse emissions, resource management and pollution prevention and control regarding the Project	Yes	Chapters 5, 6, 7, 8, 9, 10, 11, 15 and 16

Performance Requirement	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	operations. The Project related risks and impacts associated with resource use, and the generation of waste and emissions need to be assessed in the context of Project location and local environmental conditions. Appropriate mitigation measures, best available techniques (BATs) and GIIP should be adopted for efficient and effective resource use, pollution prevention and control and avoidance, minimisation, and reduction of greenhouse gases (GHG) emissions. PR 3 also recognises the emerging concept and practice of Circular Economy and recovery of resources to generate value from products that is viewed as waste in a linear economy.		
PR 4: Health, Safety and Security	PR 4 recognises the significance of managing health, safety, and security risks (including project-related gender-based violence risks of sexual harassment, sexual exploitation and abuse) to workers, project-affected communities and consumers associated with Project activities, by performing a risk control hierarchy.	Yes	Chapter 14 and Chapter 15
PR 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	PR 5 addresses impacts of project-related land acquisition, including restrictions on land use and access to assets and natural resources, which may result in physical displacement (relocation, loss of land or shelter), and/ or economic displacement (loss of land, assets or restrictions on land use, assets and natural resources leading to loss of income sources or other means of livelihood). Involuntary resettlement refers to both these impacts and the processes of mitigating to and compensating these impacts.	Yes	Chapter 13 and Chapter 18
PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	PR 6 recognises that the conservation of biodiversity and sustainable management of living natural resources are crucial for ensuring	Yes	Chapter 12

Performance Requirement	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	environmental and social sustainability.		
PR 7: Indigenous Peoples	PR 7 recognises that indigenous peoples may be among the most vulnerable segments of the population. Their economic, social and legal status may limit their capacity to defend their rights to and interest in lands and resources (both natural and cultural). This, combined with their economic and spiritual dependence on these lands and resources, could make them particularly susceptible to any adverse effects of project operations. PR 7 also recognises that projects can create opportunities for Indigenous Peoples to participate in and benefit from project-related activities that may help them fulfil their aspiration for economic and social development.	No[22]	-
PR 8: Cultural Heritage	PR 8 recognises the significance of cultural heritage for present and future generations. The aim is to protect cultural heritage while guiding the Client to avoid or mitigate adverse impacts on cultural heritage in the course of its business operations.	Yes	Chapter 16
PR 9: Financial Intermediaries	PR 9 recognises that financial intermediaries (FIs) are a key instrument for promoting sustainable financial markets and provide a vehicle to channel funding to the micro, small and medium-sized enterprise (SME) sector. FIs are engaged in a wide range of activities, such as microfinance, SME lending, trade finance, largescale infrastructure finance, medium to long-term corporate or project finance, and housing finance.	No[23]	-
PR 10: Information Disclosure and Stakeholder Engagement	PR 10 recognises the significance of a transparent engagement with relevant stakeholders (especially those defined as vulnerable groups within the scope of the	Yes	Chapter 18 and SEP

[22] There are no identified indigenous people communities in Türkiye.

[23] The project does not use financial intermediaries.

Performance Requirement	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	project) and disclose appropriate project information throughout the lifetime of the Project. Providing an accessible grievance mechanism as a part of the stakeholder engagement is crucial for building strong, constructive, and responsive relationships which are essential for a successful environmental and social impacts management within the Project.		

3.3.4 WBG Environmental, Health and Safety (EHS) Guidelines

The Environmental, Health, and Safety (EHS) Guidelines of the World Bank Group (WBG) are technical reference documents that cover general and industry-specific examples of GIIP. The General EHS guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance on EHS issues in specific industry sectors.

In accordance with the nature and scope of the Project activities; together with the General EHS Guidelines, the Project is expected to be compliant with the EHS Guidelines for Wind Energy and the EHS Guidelines for Electric Power Transmission and Distribution.

3.3.4.1 EHS Guidelines for Wind Energy

The EHS Guidelines for Wind Energy cover information regarding the environmental, health and safety conditions to be focused on for the wind energy facilities. The guidelines provide an overview of possible risks and impacts of wind energy facilities and relevant mitigation measures and performance indicators to be considered on EHS related issues as listed below:

- Environment
  - Landscape and visual impacts,
  - Noise,
  - Biodiversity,
  - Shadow flicker,
  - Water quality,
- Occupational Health and Safety
  - Working at Height and Protection from Falling Objects,
  - Working over Water (for offshore facilities),
  - Working in Remote Locations,
  - Lifting Operations,
- Community Health and Safety
  - Blade/Ice Throw,
  - Aviation,
  - Marine Navigation and Safety (for offshore facilities),
  - Electromagnetic Interference,
  - Public Access,
  - Abnormal Load Transportation.

The ESIA study to be performed will assess the possible impacts that may arise due to each of the listed EHS issues related with onshore wind energy facilities; and put forth necessary mitigation measures reliant with the performance indicators covered in the subject guidelines.

3.3.4.2 EHS Guidelines for Electric Power Transmission and Distribution

The EHS Guidelines for Electric Power Transmission and Distribution provide information related with power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas. The guidelines focus on risks and impacts that may arise during the construction of power transmission and distribution projects and present mitigation measures and performance indicators regarding environment (i.e., terrestrial habitat alteration, aquatic habitat alteration, electric and magnetic fields, and hazardous materials), OHS (i.e., live power lines, working at height, electric and magnetic fields, and exposure to chemicals), and community health and safety (i.e., electrocution, visual amenity, electromagnetic interference, noise and ozone, and aircraft navigation and safety) related issues.

A specific focus must be given on forest fire risks when power transmission line projects take place in forest areas. The guidelines note that if underlying growth is left unchecked, or slash from routine maintenance is left to accumulate within right-of-way boundaries, sufficient fuel can accumulate that may promote occurrence of forest fires. The Annual Fire Report of the European Commission for 2021 highlights that the year 2021 was the worst fire season in Türkiye for more than a decade. The total burnt area from 2,793 fires was 139,503 ha, the highest amount recorded across Europe, Middle East and North Africa in 2021, with most of the fires been caused by human activities (91% in total). Since the Project area is located in fire-sensitive areas of Türkiye, the ESIA study will put a specific focus on forest fire risks that may arise due to power transmission and distribution activities that will be performed within the Project.

3.3.5 DFC's Environmental and Social Policy and Procedures (ESPP)

Environmental and Social Policy and Procedures (ESPP) addresses DFC's commitments regarding the environmental and social dimensions of sustainable development and provides the Applicants[24] notice of the general environmental and social requirements that are applied in evaluating prospective projects and monitoring ongoing supported projects.

The ESPP implements applicable environmental and social requirements and procedures contained in the IFC's PSs on Social and Environmental Sustainability, and Industry Sector Guidelines. The ESPP focuses on the following subjects in relation with the IFC PSs:

- Screening and categorization: (i) to define the Area of Influence of the Project for the purposes of environmental and social review as well as public consultation; (ii) to identify the nature and magnitude of environmental and social risks and impacts, including those project impacts that could preclude support; (iii) to identify issues to be investigated in detail in the environmental and social review process; and (iv) to determine requirements for documentation, consultation, disclosure, notification and third-party audits.
- Environmental and social review: (i) to determine whether projects seeking support can be implemented in accordance with this ESPP and the Performance Standards; (ii) to identify opportunities to avoid adverse impacts and, if impacts are unavoidable, to identify required mitigation and compensation; (iii) to identify opportunities to improve environmental and social performance of projects seeking support; and (iv) to establish specific performance requirements for certain project sectors.

[24] Investors, lenders, insurers or projects sponsors seeking DFC support.

- Environmental and social standards: (i) to specify standards of performance necessary to achieve environmentally and socially sustainable outcomes; and (ii) to identify project-specific international best practices.
- Public consultation and disclosure: (i) to ensure that Project Affected People are informed and consulted during project preparation and implementation; and (ii) to enhance transparency and accountability related to DFC's environmental and social management.
- Conditions and compliance: (i) to establish specific requirements for environmental and social performance in DFC Agreements; (ii) to define remedies in the event performance requirements are not met.
- Monitoring: (i) to review and evaluate DFC-supported projects' compliance with the environmental and social performance requirements; (ii) to evaluate the effectiveness of mitigation measures, action plans, and corrective actions.
- Climate change and renewable energy: (i) to support the reduction of Greenhouse Gas emissions associated with projects; (ii) to promote energy efficiency and conservation; (iii) to promote low and no-carbon fuels and technologies; and (iv) to encourage carbon sequestration in land use and forestry practices.
- Country eligibility – labour: for determining, reviewing, and granting country eligibility on worker rights grounds.

3.3.6 Regional and International Conventions and Agreements

Regional and international conventions and protocols related with the scope of the Project are provided in Table 3-6 below.

Table 3-6: International Legislation Relevant to the Project

Topic	Convention/Legislation
International Conventions and Standards	ISO Standards: ISO 14001:2015 Environment, ISO 9001:2015 Quality, ISO 45001:2018 Occupational Health and Safety, ISO 50001 Energy Management System, ISO 10002:2018 Customer Satisfaction, ISO 27001:2013 Information Security, ICS 27.10 Wind Turbine Energy Systems Standard Family
	Labour Practices
	International Labour Organisation (ILO) Convention No.81 On Labour Inspection in Industry and Commerce (1947)
	ILO Convention No.161, On Occupational Health Services (1985)
	ILO Convention No.167, Safety and Health in Construction (1988)
	World Health Organization (WHO) International Commission on Non- Ionizing Radiation Protection (ICNIRP)
	Biodiversity Conservation
	Convention on Biological Diversity (CBD), ratified in 1996 by Türkiye
	Bern Convention on Protection of Europe's Wildlife and Living Environment (acceded by the Decision of the Council of Ministers dated 9 January 1984 and published in the Turkish Official Gazette dated 20 February 1984 and no. 18318)
	CITES Convention on Trade in Endangered Species of Wild Flora and Fauna, Türkiye has acceded in 1996
	International Union for the Conservation of Nature (IUCN) list of threatened species (the IUCN Red List)
	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (1979)
	The Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR) (1994), Türkiye has acceded in 1994
	The European Landscape Convention (Florence, 2000), Türkiye has been a signatory since October 2000
Türkiye ratified the following ten fundamental conventions of the International Labour Organization	C029 - Forced Labour Convention, 1930 (No. 29), ratified on 30 October 1998
	C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87) ratified on 12 July 1993

Topic	Convention/Legislation
	C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98), ratified on 23 January 1952
	C100 - Equal Remuneration Convention, 1951 (No. 100) ratified on 19 July 1967
	C105 - Abolition of Forced Labour Convention, 1957 (No. 105), ratified on 29 March 1961
	C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111), ratified on 19 July 1967
	C138 - Minimum Age Convention, 1973 (No. 138), ratified on 30 October 1998
	C155 – Occupational Safety and Health Convention, 1981 (No. 155), ratified on 22 April 2005
	C182 - Worst Forms of Child Labour Convention, 1999 (No. 182), ratified on 02 August 2001
	C187 – Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187), ratified on 16 January 2014
UN Conventions and agreements ratified by Türkiye	**Environmental Protection and the Climate Change:**
	Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC) (2016), ratified on 6 October 2021
	Kyoto Protocol of the UNFCCC (1997), ratified on 28 May 2009
	Vienna Convention for the Protection of Ozone Layer (1985) and the Montreal Protocol on Substances that Deplete the Ozone Layer (1987)
	Biodiversity Conservation:
	The UN Convention on Biological Diversity (1997), ratified by Türkiye
	Cultural Heritage:
	United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention on the Protection and Promotion of the Diversity of Cultural Expressions. Paris, 20 October 2005
	UNESCO, Convention for the Safeguarding of the Intangible Cultural Heritage. Paris, 17 October 2003
	UNESCO, Convention concerning the Protection of the World Cultural and Natural Heritage. Paris, 16 November 1972
	UNESCO, Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. Paris, 14 November 1970
	Human Rights:
	International Convention on the Elimination of All Forms of Racial Discrimination, ratified in 2002
	International Covenant on Civil and Political Rights, ratified in 2003
	Optional Protocol to the International Covenant on Civil and Political Rights, ratified in 2006
	International Covenant on Economic, Social and Cultural Rights, ratified in 2003
	Convention on the Elimination of All Forms of Discrimination against Women, ratified in 1985
	Optional Protocol to the Convention on the Elimination of All Forms of Discrimination against Women, ratified in 2002
	Convention against Torture and Other Cruel Inhuman or Degrading Treatment or Punishment, ratified in 1988
	Optional Protocol of the Convention against Torture, ratified in 2011
	Convention on the Rights of the Child, ratified in 1995
	Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict, ratified in 2004
	Optional Protocol to the Convention on the Rights of the Child on the sale of children child prostitution and child pornography, ratified in 2002
	CRPD Convention on the Rights of Persons with Disabilities, ratified in 2017
	International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families, ratified in 2004
	Convention on the Rights of Persons with Disabilities, ratified in 2009

Topic	Convention/Legislation
	Optional Protocol to the Convention on the Rights of Persons with Disabilities, ratified in 2015

4 ESIA Scope and Methodology

4.1 Introduction

This chapter presents details of ESIA Report's scope, methodology and the basis of the assessments that are presented in this ESIA.

4.2 ESIA Objective

The objectives of the ESIA are; to be compliant with applicable national laws and the IFC's Sustainability Policy and PSs, EBRD Environmental and Social Policy (ESP) and PRs, and the Equator Principles IV; to identify and assess the severity of potential impacts on receptors and identified resources; to develop and describe mitigation measures that will be taken to prevent or minimize any potential negative effects and maximize the potential benefits; and to communicate the severity of residual impacts that will remain once the applied mitigation.

4.3 ESIA Screening

Lenders have been evaluating the categorization of the Project in line with their respective Environmental and Social Policies. Based on the numbers of people affected by land acquisition, project location in the internationally protected Key Biodiversity Area, project-related noise, air, visual environment and other potential cumulative impacts, and presence of high-risk activities such as blasting activities. The final decision regarding categorization of the Project has not been shared with the Consultant; as such, the Project is confirmed as Category A by the Lenders. The first stage of the ESIA process is screening the current conditions to identify whether an ESIA study needs to be conducted for the proposed project. This stage is mostly determined through the lender's categorization patterns in accordance with the Project scale and activities. The ESIA study is required to be conducted.

4.4 ESIA Scoping

4.4.1 Technical Assessment

An ESIA Scoping report was submitted to the Lenders for review and comment. This document reviewed the known baseline at the Project site and identified the potentially significant effects that could be realised for a range of topics during both the construction and operation phases. This formed the basis of the proposed scope of the ESIA. The Scoping Report also outlines the proposed methodologies that have subsequently been followed during preparation of this ESIA.

The confirmed scope of the ESIA is as follows:

Table 4-1: Agreed Scope of the ESIA

Impact/Aspect	Construction Phase	Operation Phase	Justification for scoping out (if applicable)
Physical Environment			
Water Quality, Hydrology and Hydrogeology	Scope in	Scope out	Scoped out since no significant impact on water sources is anticipated from operation phase activities
Geology and Soils	Scope in	Scope out	Scoped out since the operation phase activities are not anticipated to result in significant earthworks.
Climate Change	Scope in	Scope in	-

Impact/Aspect	Construction Phase	Operation Phase	Justification for scoping out (if applicable)
Air Quality	Scope in	Scope out	Scoped out since no significant impact on the ambient air quality is expected due to operation of the WPP as there will be no emission in question. There will be minor emissions from the vehicles during the operation; nevertheless, no significant impact is foreseen.
Greenhouse Gases	Scope in	Scope in	-
Noise and Vibration	Scope in	Scope in	-
Shadow Flicker	Scope out	Scope in	Shadow flicker is an impact associated with only the operation phase of the wind power plants. Therefore, it is scoped out during construction phase.
Waste and Resources	Scope in	Scope in	-
Traffic and Transport	Scope in	Scope out	Scoped out since no significant impact on the traffic load is expected due to the operation activities of the WPP as there will not be major vehicle movement in question. There will be minor activities of the Project vehicles during operation; nevertheless, no significant impact is foreseen.
Landscape and Visual	Scope in	Scope in	-
Biodiversity	Scope in	Scope in	-
Social	Scope in	Scope in	-
Archaeology & Cultural Heritage	Scope in	Scope out	Scoped out since no impact is expected regarding cultural heritage during the operation phase. When the activities to be conducted are considered within the operation phase, it is estimated that no other area will be disturbed other than the areas disturbed during the construction phase.

4.4.2 Assessment Scope

In accordance with national and international requirements, the ESIA will consider the following:

- Environmental, social, labour, land acquisition, health, safety and security risks and impacts of the Project;
- Project Components and associated facilities that are directly part of the Project, but which would not have been constructed or expanded without the Project and are needed for the Project to be viable (such as the ETL, road traffic). This includes reviewing potential cumulative impacts and unplanned but predictable developments caused by the Project that may occur later or at a different location;
- Potential impacts and resulting effects that may arise for each key stage of the Project that can be reasonably assessed at this stage, including pre-construction, construction and operation;
- Potential third-party impacts including supply chain considerations; and
- Identification of beneficial and adverse, direct and indirect as well as cumulative impacts and effects of the Project related to the bio-physical and the socio-economic environment.

Cumulative effects are considered, examining the combination of multiple impacts upon a receptor as a result of multiple effects resulting from the Project, together with other nearby developments (please refer to *Chapter 17: Cumulative Impacts*).

As with the technical assessments, significant effects and appropriate mitigation are identified as part of the assessment of cumulative impacts, building upon the impacts identified in the related technical chapters.

As discussed in *Chapter 2: Project Description*, due to the length of the Project lifetime, the impacts of decommissioning cannot be properly predicted at this stage. As such, it is difficult to produce an accurate and meaningful prediction of the significance of likely impacts and their effects because the baseline conditions are likely to have changed notably by this phase of the Project. This ESIA therefore does not assess the likely impacts that may arise from the decommissioning phase. On the other hand, the Project Company will develop a high level decommissioning strategy and improve it throughout the Project lifetime to develop a detailed decommissioning plan including a full impact assessment and mitigation plan.

Should any decommissioning or refurbishment occur, consultation will be undertaken prior to these activities to appropriately assess likely E&S impacts based on an adapted baseline, to understand if assessments, including ESIA, are required, and to ensure the works conform with necessary local requirements. Assessments would mitigate or enhance these impacts based on mitigation/enhancement measures available and feasible at that time. This action is included in the ESMP and, as such, implements an adaptive environmental management approach with regards to associated likely impacts and their management during the decommissioning phase.

This ESIA is based on the general assumption that baseline conditions are unlikely to change significantly between the commencement of construction and its completion.

4.5 Impact Assessment Process

The impact assessment methodology is prepared in line with the national and international requirements.

The key steps during the main ESIA phase are to: identify the study area, or area of influence; characterise the existing baseline; determine the impacts that may occur as a result of the construction and operation of the Project; identify how these impacts may affect the baseline conditions; evaluate the significance of the likely effects; and identify mitigation and enhancement measures to reduce any adverse effects and maximise any benefits resulting from the Project realization. The approach to these stages of the ESIA process is discussed below.

4.6 ESIA Study Area

4.6.1 Project Affected Area

The project affected area (PAA) is defined as the area of land used by the Project permanently or temporarily.

4.6.2 Area of Influence

As defined in IFC PS1, Area of Influence (AoI) encompasses the following, as appropriate:

- The area likely to be affected by: (i) the project and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the Project; (ii) impacts from unplanned but predictable developments caused by the Project that may occur later or at a different location; or (iii) indirect Project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.
- Associated facilities, which are facilities or activities that are not funded as part of the Project but which are significant in determining the success of Project or in producing agreed project

outcomes. These would not have been constructed or expanded if the project did not exist and without which the Project would not be viable.

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

The AoI covers all land or water, directly or indirectly impacted by the Project, and therefore extends beyond the Project boundary. This includes communities and areas adjacent to the PAA that may experience impacts during the construction or operation of the Project, despite being located outside of the area in which the Project will be located e.g., air or noise impacts. The AoI is defined on a topic-by-topic basis, as each topic will define its AoI based upon the potential effects.

4.7 Baseline Conditions Consideration

Baseline information has been collated from a range of sources including primary data collection, secondary data collection, publicly available information and through consultation.

Primary data was collected through:

- Site visits – late September 2023 (specific surveys are detailed in relevant chapters of this report)
- Stakeholder engagement activities – October 2023
- Biodiversity studies (Site Reconnaissance Survey) – late September 2023
- Archaeological walkover survey – September-October 2023
- Baseline soil and groundwater quality analysis – November 2023
- Baseline noise monitoring surveys – September 2023
- Baseline air quality monitoring surveys – October 2023

In addition to primary data, baseline data was collected from National EIA documentation, as well as desktop studies of available secondary data including websites and articles and reports from local authorities, ministries, government organisations, civil society organisations, non-governmental organisations (NGOs), local media, and business groups. Relevant secondary sources used to support the assessment process are referenced in the relevant impact assessment chapters.

4.8 Assessment Methodology

This Final Draft ESIA Report has definition of impacts that likely cause significant environmental and social effects. For each environmental and social impact, magnitude and the sensitivity are defined. Criteria of the magnitude, sensitivity of a receptor and evaluation matrix are given below.

4.8.1 Magnitude Criteria

The assessment of the magnitude of a change, or impact, resulting from the development is undertaken in two steps. Firstly, the identified impacts are categorised as beneficial or adverse. Secondly, impacts are categorised as major, moderate, minor or negligible based on consideration of parameters such as:

- Scale of the impact – how intense or severe the extent of the impact is likely to be.
- Duration of the impact – ranging from ‘beyond decommissioning’ to ‘temporary with no detectable impact’.

- Spatial extent of the impact – for instance, within the site boundary, within district, regional, national and international.
- Reversibility – ranging from 'permanent requiring significant intervention to return to baseline' to 'no change'.
- Likelihood – ranging from 'occurring regularly under typical conditions' to 'unlikely to occur.
- Compliance with legal standards and established professional criteria – ranging from substantially exceeds national standards and limits / international guidance to meets or exceeds minimum standards or international guidance.

Criteria for determining impact magnitude are given below:

Table 4-2: Criteria for Determining Impact Magnitude

Category	Description (adverse impacts)
Major	Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature and requiring significant intervention to return to baseline; would violate national standards or GIIP without mitigation.
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but minor change to the specific conditions assessed.
Negligible	No perceptible change to the specific conditions assessed.

4.8.2 Sensitivity Criteria

Sensitivity is specific to each topic and the environmental resource or population affected, with criteria generally defined on basis of baseline information. The sensitivity of a receptor is determined based on review of the population (including proximity / numbers / vulnerability) and presence of features on the site or the surrounding area. Generic criteria for determining sensitivity of receptors are outlined in Table 4-3. Each detailed assessment defined sensitivity in relation to its topic.

Table 4-3: Criteria for determining sensitivity of a receptor

Category	Description
High	Receptor (human, physical or biological) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
Medium	Receptor with limited capacity to absorb proposed changes or limited opportunities for mitigation.
Low	Receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation.
Negligible	Receptor with good capacity to absorb proposed changes or and good opportunities for mitigation.

4.8.3 Evaluation of Effects

Likely effects are evaluated through taking into account the interaction between the magnitude of an impact and the sensitivity of a receptor, as presented in the effect evaluation matrix in Table 4-4.

Table 4-4: Effect evaluation matrix

Sensitivity	Magnitude						
	Adverse			Neutral	Beneficial		
	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
High	Major	Major	Moderate	Negligible	Moderate	Major	Major
Medium	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Negligible	Negligible	Negligible	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

4.8.4 Types of Effect

The following types of effect are considered within this ESIA:

- **Direct effects** – effects which could arise from activities which form an integral part of the Project;
- **Indirect effects** – effects which could arise from activities not explicitly forming part of the Project;
- **Permanent effects** – effects which could result from an irreversible change to the baseline environment or which persist for the near future, and occur during construction or operation stages;
- **Temporary effects** – effects which could persist for a limited period only and occur mainly during construction;
- **Positive effects** – effects which could have a beneficial influence on receptors and resources; and
- **Negative effects** – effects which could have an adverse influence on receptors and resources.

4.8.5 Determining Significance

The objective of this ESIA is to identify the likely significant effects of the Project on the environment and people. . Likely significant effects are those most pertinent to decision-making in the context of project financing, which takes account of the World Bank's (WB) Environmental and Social Framework, in turn informed by WB IFC EHS Guidelines and Performance Standards.'

Impacts that have been evaluated as being 'Moderate' or 'Major' are considered to be significant effects and identified as such in the specialist chapters. Consequently, effects that are 'Minor' or 'Negligible' are not significant.

4.8.6 Cumulative Assessment

The assessment of cumulative effects considers the combination of multiple effects that may result when the Project is considered alongside other existing or proposed projects in the same geographic area or similar development timetable. The assessment of cumulative effects will identify where particular resources or receptors would experience significant adverse or beneficial effects as a result of a combination of other projects ('inter-project cumulative effects').

In addition, the interaction of multiple impacts from the Project upon the same receptor can also result in cumulative effects. These would only consider impacts from this Project ('intra-project cumulative effects) and are also be presented in this ESIA.

4.9 Mitigation and Enhancement Measures

Where feasible, the following hierarchy of mitigation measures are applied:

- Avoid and reduce impacts and effects through design (embedded mitigation),
- Minimise impacts and effects at source or at receptor,
- Repair, restore or reinstate to address temporary construction effects, and
- Compensate for loss or damage.

In addition to the above, community engagement and disclosure activities will play a key role in managing the extent of effects and consideration has also been given to the identification of enhancement measures. Enhancement measures are actions and processes that:

- Create new positive impacts and effects, or benefits,
- Increase the reach or number of positive impacts and effects, or benefits, and
- Distribute positive impacts and effects, or benefits, more equitably.

Each technical chapter identifies relevant mitigation and enhancement measures. All the mitigation, management and monitoring measures to address likely Project effects reported in the ESMP.

4.10 Residual Impacts

Residual impacts are those that remain after the application of mitigation and enhancement measures. Impacts considered ‘Major’ or ‘Moderate’ after application of mitigation and enhancement measures are presented as ‘significant’ residual impacts. These are identified as part of this ESIA study.

4.11 Uncertainty

Any uncertainties associated with impact prediction or the sensitivity of receptors due to the absence of data or other limitations are explicitly stated. Where applicable, the ESIA makes recommendations concerning measures that should be put in place with monitoring or environmental or social management plans to deal with the uncertainty so that they may be addressed.

5 Water Quality, Hydrology and Hydrogeology

5.1 Introduction

This chapter summarizes the potential effects on the water quality, hydrology and hydrogeology components associated with the Project's construction and operation phases in accordance with the national legislation, IFC, DFC Policies and Procedures, EBRD and EP IV guidelines and other applicable standards. It details the baseline conditions in and around the Project site, describes the identification and assessment of effects on each receptor and identification of mitigation measures proposed for potentially significant effects.

Construction activities may result in contaminating the groundwater sources through accidental pollution spills and infiltration of any other pollutants to soil. Construction activities, such as grading and excavation, and implementation of on-site storm water management, including culverts and drainage ditches, may alter surface runoff patterns by diverting natural drainage into new areas and locally increasing runoff volume. Elevated levels of hydrocarbons, oils, heavy metals, suspended solids and organic compounds originating from routine construction activities and coliform bacteria from human waste may also interfere to water resources via surface runoff and may have significant impacts on water quality. Furthermore, soil erosion may be in question locally due to ground surface disturbance. Depending on the erosion potential of the soil, local terrain, vegetation cover, and distance to the surface water bodies, soil erosion may lead to degradation of water quality in nearby surface water bodies.

Additionally, water will be needed for potable usage, drinking and dust suppression. Thus, impacts on water resources is foreseen during construction phase. On this basis, it is intended that consideration of water quality, hydrology, and hydrogeology impacts during the construction phase will be scoped in for the assessment as part of the ESIA. It should be noted that Water Quality Management Procedure and Emergency Preparedness and Response Plan will be developed to provide management procedures, mitigation measures, and other requirements (e.g., training, Key Performance Indicators (KPIs), etc.) for unplanned events related to this topic, such as spills and flooding, for both construction and operation phase.

However, no significant impact on water sources is anticipated due to activities to be carried out during operation phase. On this basis, it is intended that consideration of water quality, hydrology, and hydrogeology impacts during the operational phase will be scoped out for future assessment as part of the ESIA.

The purpose of the assessment is to ensure that relevant national and international legislation and guidelines are complied with in order that water features and water resources in the area are protected.

5.2 Methodology

The magnitude, sensitivity of a receptor and significance of the impacts are assessed using the general methodology as outlined in Section 4.8.

5.2.1 Applicable Guidelines and Standards

Beside detailed regulation, guideline and standards framework given in *Chapter 3: Legal and Policy Framework*, each chapter presents topic-based policy and legislations. In this chapter, water quality, hydrology and hydrogeology related policy and legislation are given.

5.2.1.1 National Requirements

Environmental Law and the pertinent regulations related with water quality, hydrology and hydrogeology are followed during both the construction and operation phases of the Project. During the development stage of the Project, the issues related with water quality management, hydrology and hydrogeology are reviewed in detail as per Environmental Impact Assessment Regulation. Flood risk assessment and sediment management issues are also assessed during this stage.

In case of groundwater use the technical for water requirements necessary permits and licenses are required to be secured from State Hydraulic Authority and these requirements are stated in Groundwater Law and State Hydraulic Works (DSI) Groundwater Technical Regulation.

Depending on the source of water to be used within the scope of Project whether it is surface water or groundwater the parameters, limits and requirements are provided in detail in Groundwater Law, Water Pollution Control Regulatio and, Surface Water Quality Regulation.

The requirements for the water to be used for drinking purposes are indicated in the Regulation on Water for Human Consumption and Regulation on the Quality and Treatment of Drinking Water Supply.

5.2.1.2 International Requirements

International legislation and policy and lender's standards and guidelines relating water quality, hydrology, and hydrogeology applicable to the Project are shown in Table 5-1.

Table 5-1: International Legislation and Policy Relating to Water Quality, Hydrology and Hydrogeology

Policy
EBRD Environmental and Social Policy and Performance Requirements (PR) (2019)
European Commission Environmental Impact Assessment (EIA) Guidelines
European Commission's Guidance Document on Wind Energy Developments and EU Nature Legislation (2020)
EU Council Directive 2000/60/EC Water Framework Directive (WFD)
EU Council Directive 2020/2184/EC on the Quality of Water Intended for Human Consumption
EU Council Directive 91/271/EEC on Urban Wastewater Treatment and Directive 98/15/EEC amending Directive 91/271/EEC
EU Council Directive 2006/118/EC Groundwater Directive (GWD)
IFC's Environmental, Health and Safety (EHS) Guidelines for Wind Energy (2015)
IFC's Environmental, Health and Safety (EHS) Guidelines for Electric Power Transmission and Distribution (2007)
IFC Performance Standards (PSs) on Environmental and Social Sustainability (2012)
IFC Sustainability Framework (updated in 2012)
IFC Good Practice Note: Managing Contractor's Environmental and Social Performance (2017)
World Bank Group Environmental, Health, and Safety General Guidelines (EHS General Guidelines) (2007)
WHO Guidelines for Drinking-water Quality: Fourth edition incorporating the first and second addenda

5.2.1.3 Project Standards

National and international requirements for water quality, hydrology, and hydrogeology are mentioned within Section 5.2.1.1 and Section 5.2.1.2. As such, all the provisions of these standards and guidelines will be complied with. Moreover, specific commitments and mitigation measures are provided in Section 5.5 of this chapter.

IFC EHS General Guidelines clearly state that, when host country regulations differ from the levels and measures presented in the IFC EHS General Guidelines, projects are expected to

achieve whichever is more stringent. Therefore, comparison of the applicable standards is necessary to set the project standards. Thus, the comparison between national and international standards for groundwater quality is presented in Table 5-2.

It was noted that, no surface water and groundwater sampling & analysis were carried out within the scope of the National EIA Studies. The Consultant has carried out a groundwater sampling & analysis study within the scope of the ESIA Studies to be able to further assess the impact on groundwater according to national and international standards. Results of the groundwater sampling study is presented in Table 5-4. Thus, the comparison between national and international standards for groundwater quality is presented in Table 5-2.

During the site visit, it was observed that project affected people are using the groundwater resources for drinking purposes besides the irrigation. Therefore, Regulation on Water for Human Consumption (OG Date/Number: 17.2.2005/25730) and WHO Drinking Water Standards are accepted as Project Standards for groundwater quality.

The selection of parameters has been done according to information given in “Guideline values for individual chemicals, by source category[25]”. WHO provides list of chemicals in five categories as provided below:

1. Naturally occurring chemicals,
2. Chemicals from industrial sources and human dwellings,
3. Chemicals from agricultural activities,
4. Chemicals used in water treatment or from materials with drinking-water, and
5. Chemicals of emerging concern.

During the historical use of the Project area. Accordingly, it was found that no significant agricultural activities have been conducted on the Project area. Although there are agricultural and husbandry activities taking place in the Central and Lapseki Districts, it was found that no significant agricultural activities have been conducted within the Project area boundaries. Therefore, *chemicals from agricultural activities*, including pesticides, were scoped out from sampling study since they are not anticipated to be found.

Additionally, any water treatment plant will not be established within the scope of the Project. Therefore, parameters listed in the *chemicals used in water treatment or from materials with drinking-water* are not anticipated to be found. Similarly, chemicals of emerging concern (e.g., pharmaceuticals) were not considered since the parameters are not anticipated to be found in and around the Project area.

The parameters listed in *naturally occurring chemicals* and *chemicals from industrial sources and human dwellings* are more intensively anticipated to be found in and around the Project area when comparing to aforementioned list of parameters. In this sense, microbial parameters and Total Petroleum Hydrocarbons (TPH) were screened out since they are not anticipated to be found considering the past use of the Project site. In addition, TPH parameter, which has been assessed in *Chapter 6: Land Use, Soil and Geology*, is not assessed in this chapter due to several reasons. Firstly, both national legislation and Guidelines for Drinking-water Quality: Fourth Edition do not provide a limit value for the TPH. Secondly, no TPH pollution and related impacts are anticipated due to the Project activities.

It should also be noted that septic tanks will be used during construction and operation phases of the Project. According to the Wastewater Treatment Facilities Norm Guide, published by the Ministry of Agriculture and Forestry, septic tanks are subject to requirements of the “*Design Criteria and Norms for Septic Tanks (DIN EN 12566-1)*”. According to the guide, septic tanks

[25] Guidelines for drinking-water quality: fourth edition incorporating the first addendum (4th ed., pp. 176-190). Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO

must withstand the loads and stresses caused by operation, installation, and sludge removal operations during their design life. Additionally, the septic tank must pass the leakage test given in DIN EN 12566-1. Therefore, leakage is not anticipated provided that the integrity tests are performed in line with the above-mentioned guide. Consequently, below parameters have been selected to be analysed.

Table 5-2: Groundwater Quality Standards

Parameter-Unit	National Value (Regulation on Water for Human Consumption (OG Date/Number: 17.2.2005/25730)	International Value (WHO) (Guidelines for Drinking-water Quality: Fourth Edition)	Project Standard (i.e. the stringent of the two)
pH	≥ 6.5 & ≤ 9.5	≥ 6.5 & ≤ 9.5	≥ 6.5 & ≤ 9.5
Conductivity	2500 µS / cm at 20°C	-	2500 µS / cm at 20°C
Temperature	-	-	Baseline Level
Saltiness	-	-	Baseline Level
Dissolved Oxygen	-	-	Baseline Level
Nitrate	50 mg/L	50 mg/L	50 mg/L
Nitrite	0.50 mg/L	3 mg/L	3 mg/L
Ammonium	0.50 mg/L	-	0.50 mg/L
Total Phosphorus	-	-	Baseline Level
Total Organic Carbon	-	-	Baseline Level
Chloride	-	0.7 mg/L	0.7 mg/L
Sulphate	250 mg/L	-	250 mg/L
Carbonate	-	-	Baseline Level
Bicarbonate	-	-	Baseline Level
Fluoride	1.5 mg/L	1.5 mg/L	1.5 mg/L
Total Cyanide	50 µg/L	-	50 µg/L
Calcium	-	-	Baseline Level
Magnesium	-	-	Baseline Level
Sodium	200 mg/L	-	200 mg/L
Potasium	-	-	Baseline Level
Chromium +6	-	-	Baseline Level
Suspended Solids	-	-	Baseline Level
Arsenic	10 µg/L	10 µg/L	10 µg/L
Cadmium	5.0 µg/L	3.0 µg/L	3.0 µg/L
Lead	10 µg/L	10 µg/L	10 µg/L
Mercury	1.0 µg/L	6.0 µg/L	1.0 µg/L
Aluminum	200 µg/L	-	200 µg/L
Antimony	5.0 µg/L	20.0 µg/L	5.0 µg/L
Copper	2 mg/L	2 mg/L	2 mg/L
Barium	-	1.3 mg/L	1.3 mg/L
Berylium	-	-	Baseline Level
Zinc	-	-	Baseline Level
Total Chromium	50 µg/L	50 µg/L	50 µg/L
Nickel	20 µg/L	70 µg/L	20 µg/L
Manganese	50 µg/L	80 µg/L	50 µg/L
Selenium	10 µg/L	40 µg/L	10 µg/L

Parameter-Unit	National Value (Regulation on Water for Human Consumption (OG Date/Number: 17.2.2005/25730)	International Value (WHO) (Guidelines for Drinking-water Quality: Fourth Edition)	Project Standard (i.e. the stringent of the two)
Boron	1 mg/L	2.4 mg/L	1 mg/L

5.2.2 Study Area and Area of Influence

The area of influence regarding water quality, hydrology and hydrogeology is the area that could potentially be affected by disturbance and contamination due to the construction activities and operation of the Project. It should be noted that the Project area is not located in any absolute, short-distance, medium-distance or long-distance protection area within the scope of the " Regulation on the Protection of Drinking Water Basins".

A 3 km radius from the site is used to assess groundwater and surface water derived receptors. The area of influence is based upon professional judgement and experience of assessing similar developments. It is considered that at distances from the site in excess of 3km, attenuation and dilution of substances is likely to occur. Therefore, the proposed development is unlikely to have a hydrological effect beyond the AoI. The AoI is illustrated in below figure.

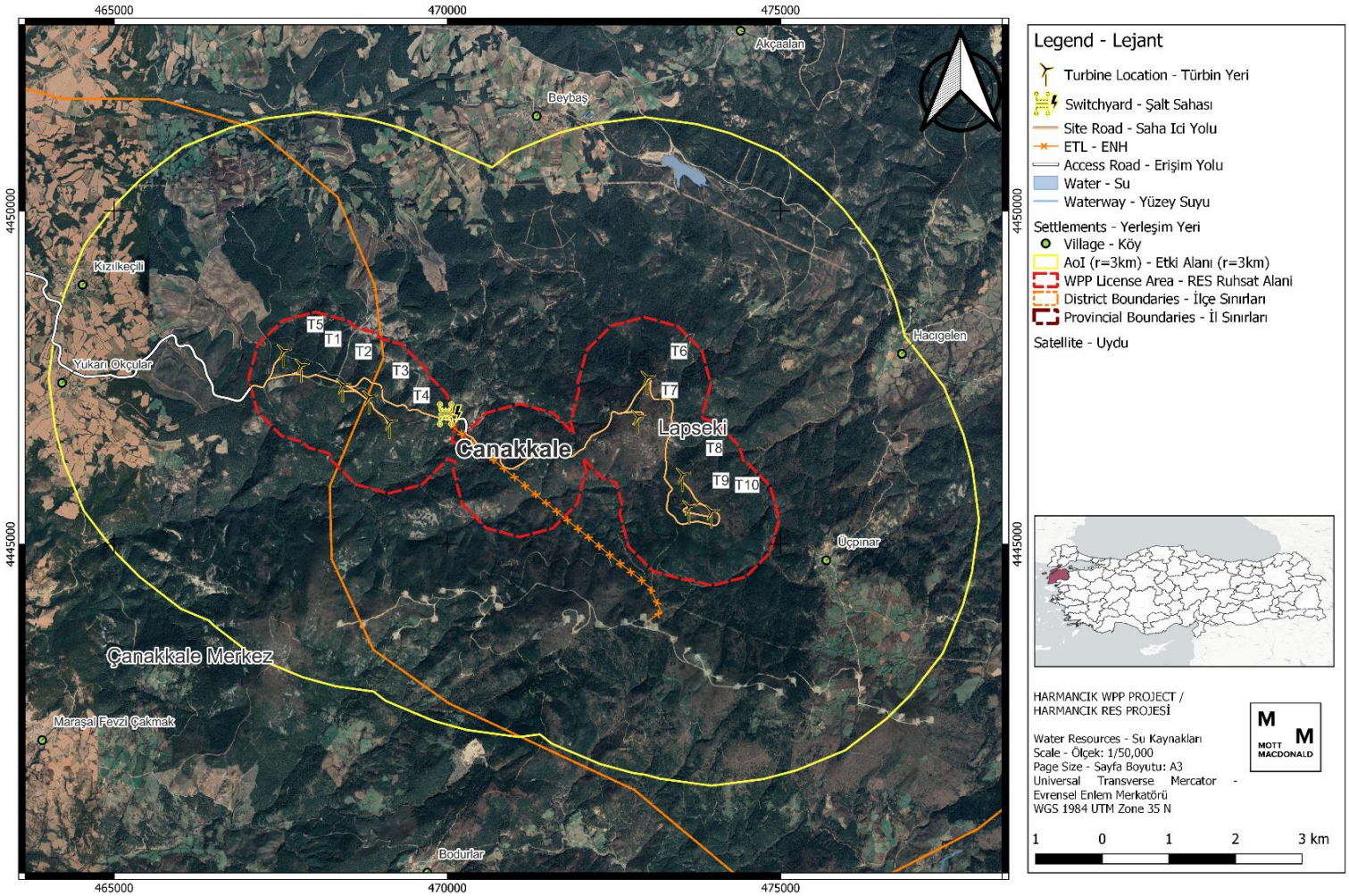


Figure 5-1: Area of Influence for water quality, hydrology and hydrogeology

5.2.3 Limitations and Assumptions

According to the findings of the site survey, which has been conducted during dry season in September, and satellite images, no surface water body observed in the near vicinity of the Project area. During the site visit, due to unavailability of the access roads, some part of the Project area could not be visited. Nevertheless, it is assumed that locations, which were not visited, accepted as having the similar characteristic with the visited locations where access is possible.

Anticipated impacts on the surface water bodies are surface or stormwater runoff; contamination of sediments due to spills which have occurred during dry conditions; and, the likelihood of contamination due to above-mentioned impacts is considered as low. Additionally, it is assumed that there will not be significant discharge resulting from the construction activities.

Therefore, sampling study and laboratory analysis and wet season site visit will not be conducted for surface water sources in the vicinity of the Project area due to low levels of discharge from the Project and associated low risk of contamination.

It is anticipated that construction works of the Project may have negative impacts on the groundwater sources in the vicinity of the Project area due to contamination, leakage, etc. Therefore, a groundwater sampling and laboratory analysis are performed to assess baseline groundwater quality.

It is also assumed that the operational activities of the Project will not have significant impacts on the groundwater sources in the vicinity.

5.3 Baseline Conditions

The baseline status of water quality, hydrology, and hydrogeology have been examined by considering surface water and groundwater bodies in the vicinity of the Project area. Within this scope, a desktop analysis was carried out in order to gather information regarding the baseline status obtained by examining the below listed documentation.

- Harmancık WPP National EIA Report, 2023, Savra,
- National Basin Management Strategy (2014-2023), 2014, MoAF,
- Marmara Basin Flood Management Plan, 2023, MoAF,
- Marmara Basin Strategic Environmental Assessment (Final) – Scoping Report, 2023, MoAF,
- Official Water Sources Statistics for 2020, State Hydraulic Works,
- Çanakkale Province Environmental Status Report, 2022, Çanakkale Governorship Provincial Directorate of Environment, Urbanisation and Climate Change,
- Geological and Geotechnical Investigation Report, 2023, Aydın Geoteknik,
- Google Earth Satellite Images.

Additionally, a site visit has been carried out to have a visual understanding of the site conditions as well. The description of the baseline status of the site has been established via a synthesis of the desktop study and the site visit.

5.3.1 Hydrology

The Project site is located within the Marmara Basin shown in Figure 5-2, which has an annual average precipitation of 662.30 millimetres per square meter in an approximately 23,500 km^2 drainage area. According to Marmara Basin Protection Action Plan, prepared by TÜBİTAK Marmara Research Centre, surface water potential of the Marmara Basin is $5.08x10^9$ m^3 (6.69 $L/s.km^2$) which corresponds to 2.77% of the Türkiye's overall surface water potential. Usable

portion of the surface water potential was assumed as $2.54x10^9$ m^3/year in the Marmara Basin Protection Action Plan.

Marmara Basin Strategic Environmental Assessment (Final) – Scoping Report, prepared by Ministry of Agriculture and Forestry in 2023, shows that most of the streams flow into Marmara Sea. In the same study, it was mentioned that Marmara Basin is not a typical river basin since streams, creeks, and other type of watercourses are not merging on a single river and flow into the sea from a single point. Therefore, there are great number of creeks distributed over the Marmara Basin.

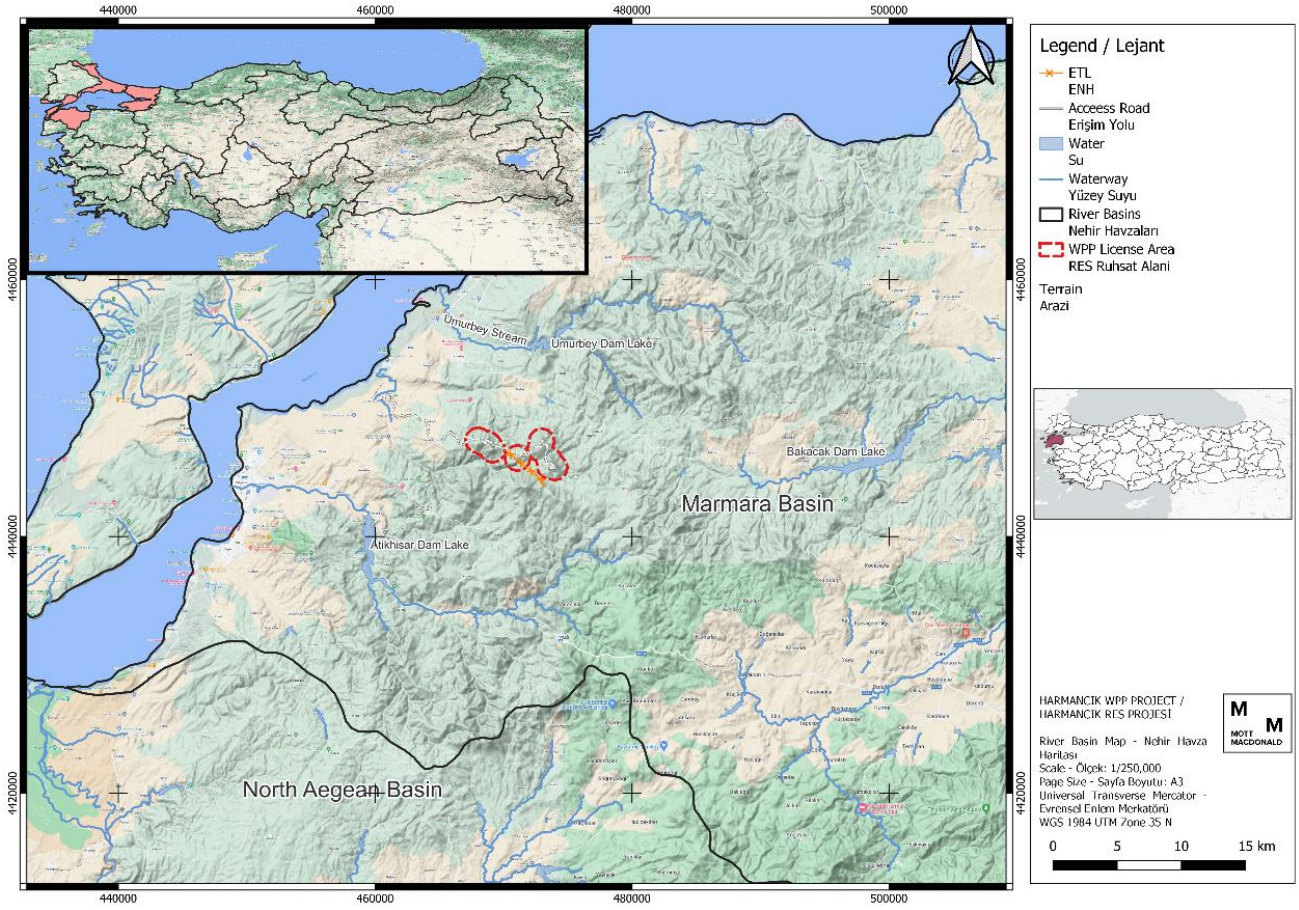


Figure 5-2: Marmara Basin and Project Location

The nearest streams to the Project area are Umurbey Creek located in the north and Sarıçay Creek located in the south-west of the Project area. Umurbey Creek Basin is located in the northwest of the Biga Peninsula in the South Marmara Region of the Marmara Region. Umurbey Creek flows towards north from the central part of Umurbey Plain and through Umurbey Dam Lake, finally merging with the sea at Çanakkale Strait. Umurbey Creek is being used for irrigation purposes.

Sarıçay Creek rises from Küçükburun and flows through Atikhisar Dam Lake and Çanakkale City Center, finally merging with the sea at Çanakkale Strait. Sarıçay Creek is being used for irrigation purposes.

The smaller creeks, which are close to the Turbines, have seasonal characteristics without a base flow[26]. To elaborate this section following information regarding the seasonal creeks have

[26] Harmancık WPP National EIA Report, 2023, Savra.

been retrieved from the National EIA study. According to the study, T2, T3 and T4 Turbine Platform Areas drain the collected water towards the side branches of Oluk Creek, while T1 and T5 Turbine Platform Areas drain the collected water towards Kirazlı Creek.

The distances of T1 and T5 Turbine Platform Areas to Kirazlı Creek are 358 m and 127 m, respectively. The distance of T1 Turbine Platform Area to another branch of Kirazlı Creek is 409 m. The closest seasonal creek to the T2 Turbine Platform Area is 264 m away and located in the Oluk Creek Micro Basin. The closest seasonal creek to the T3 Turbine Platform Area is 229 m away, and the closest seasonal creek to the T4 Turbine Platform Area is 289 m away.

The closest seasonal creek to the T6 Turbine Platform Area is 195 m away, whereas the closest creek to the T7 Turbine Platform Area is the Eğri Creek, which is 479 m away.

The closest creek to the T8 Turbine Platform Area is Şapdağı Creek, which is 167 m away. T9 and T10 Turbine Platform Areas drain the water they collect into Kirazlı Creek, and the closest seasonal stream to the T9 and T10 Turbine Platform Area is the side branch of Kirazlı Creek, which is 267 m and 228 m away, respectively. Accordingly, Figure 5-3, Figure 5-4, and Figure 5-5 show the hydrological features around the Project area

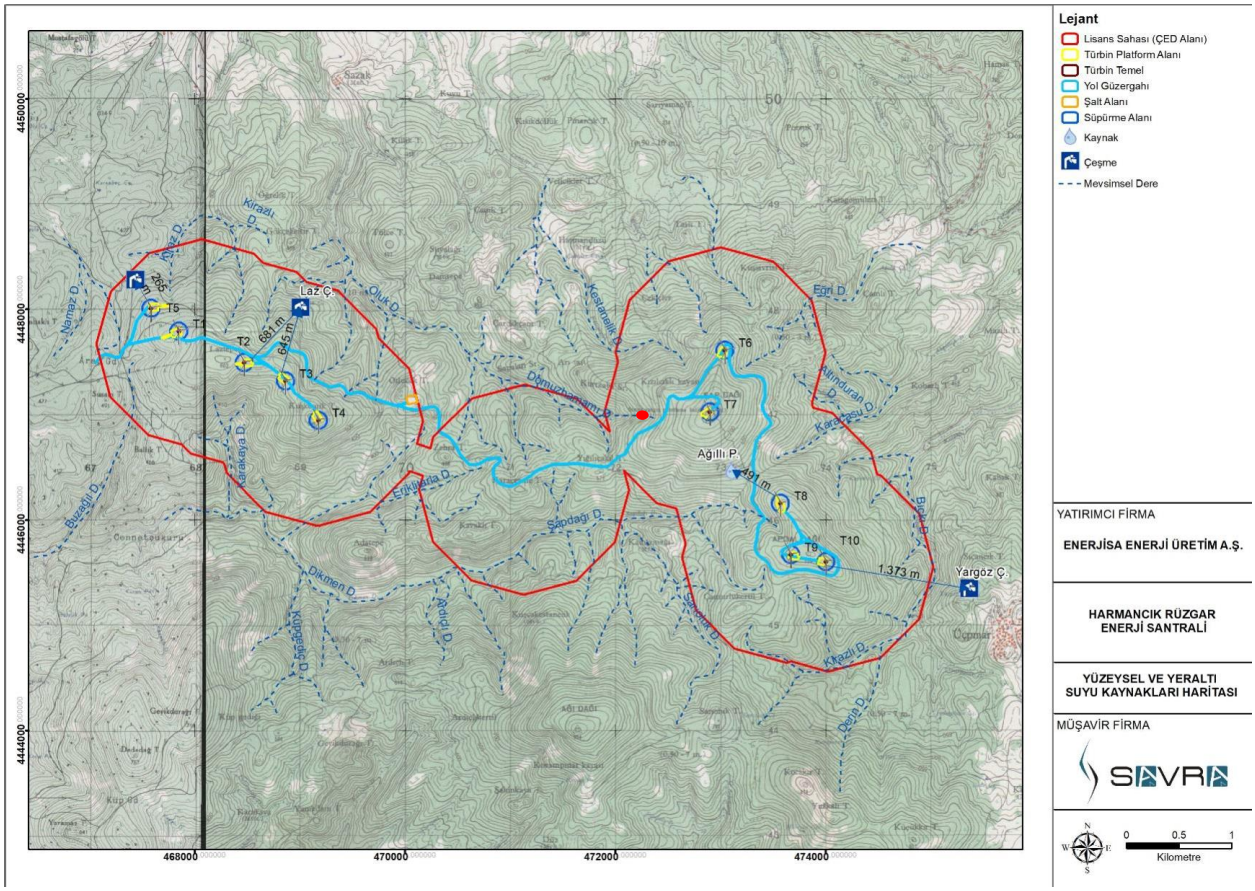


Figure 5-3: Surface and groundwater sources

Source: Harmancık WPP National EIA Report, 2023, Savra (Red: EIA licence area, Yellow: Turbines, Blue (continous): Roads, Orange: Switchyard, Blue (dashed): Seasonal creek, Red dot: Source, Blue rectangle: Fountain)

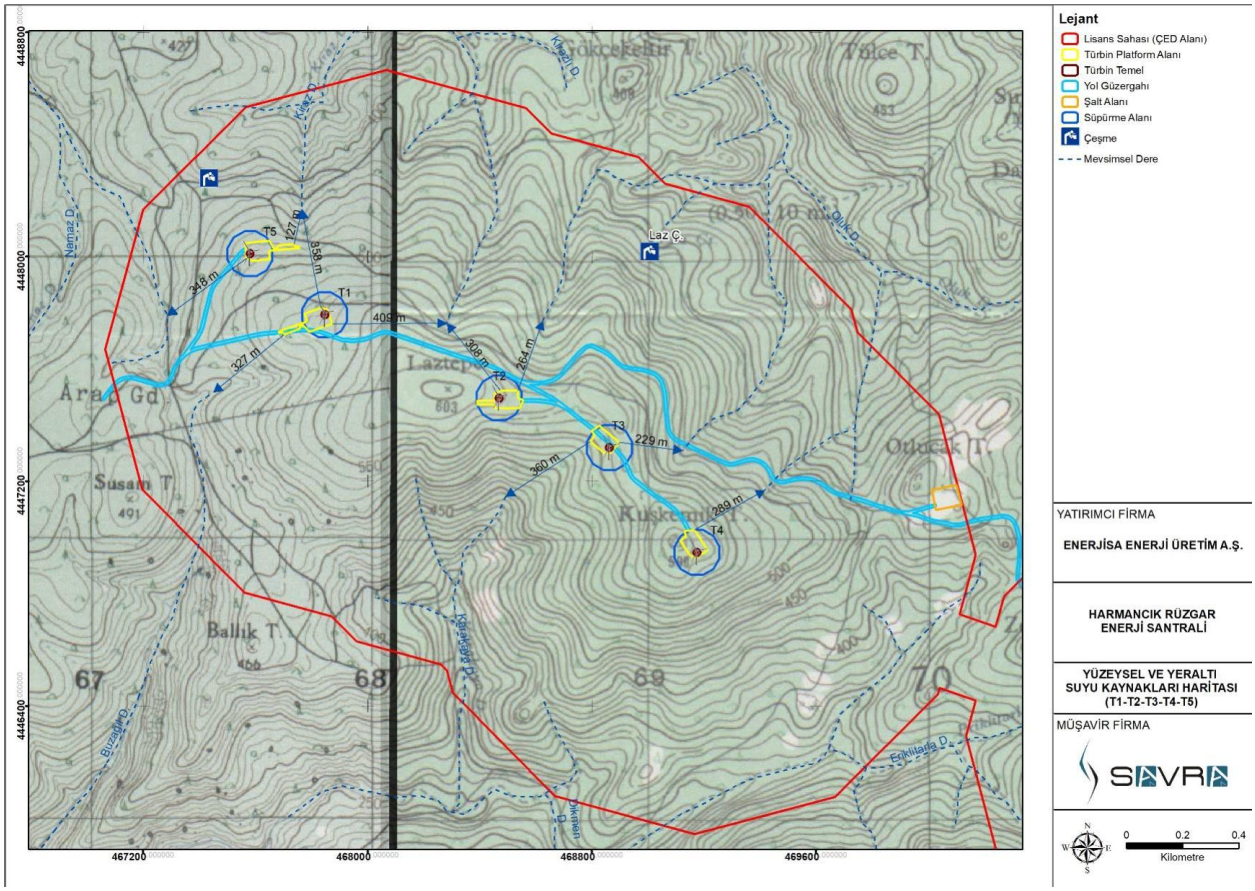


Figure 5-4: Distances of T1, T2, T3, T4 and T5 Turbines to Seasonal Creeks

Source: Harmancık WPP National EIA Report, 2023, Savra (Red: EIA licence area, Yellow: Turbines, Blue (continous): Roads, Orange: Switchyard, Blue (dashed): Seasonal creek, Blue rectangle: Fountain)

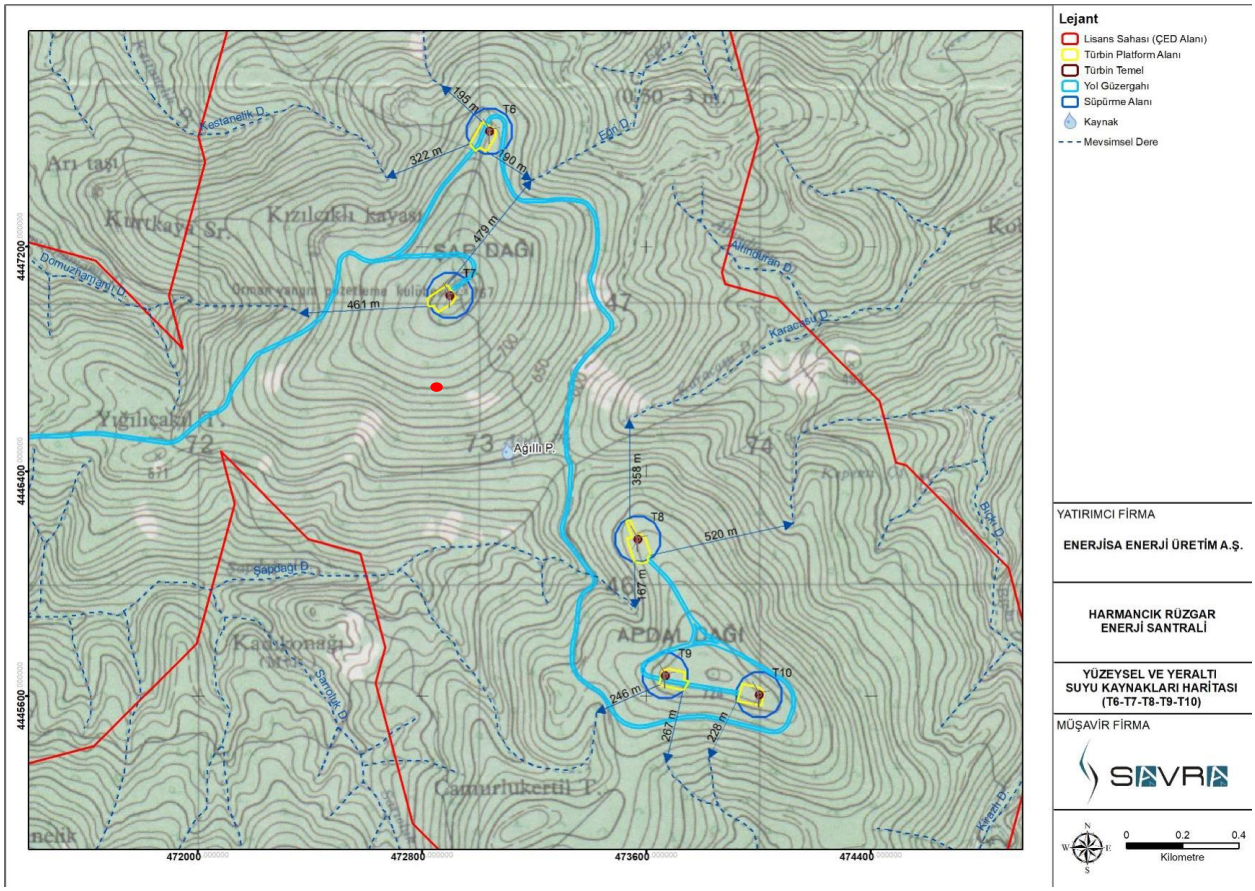


Figure 5-5: Distances of T6, T7, T8, T9 and T10 Turbines to Seasonal Creeks

Source: Harmancık WPP National EIA Report, 2023, Savra (Red: EIA licence area, Yellow: Turbines, Blue (continous): Roads, Orange: Switchyard, Blue (dashed): Seasonal creek, Red dot: Source)

Additionally, it should be noted that the Project area is not located in any absolute, short-distance, medium-distance or long-distance protection area within the scope of the " Regulation on the Protection of Drinking Water Basins "

It is anticipated that the Project will not have significant impacts on surface water bodies in the vicinity due to disposal of waste or accidental spills/leakages that may result from the Project activities.

5.3.2 Hydrogeology

According to the National EIA Report prepared for the Project, the WPP License Area is formed Late Eocene-Oligocene aged Mezardere Formation, Oligocene aged Hallaçlar Volcanite and Pliocene aged Bayramiç Formation.

In addition, as a result of field, drilling and geophysical studies, units belonging to the Şahinli Formation (Teşa) were observed in the survey area[27]. The unit presents a type section, especially in the east of Lapseki district, around Şahinli village, and from here it is named Şahinli formation. The unit is cut by numerous dykes with basaltic composition. Samples taken from lava levels within the Şahinli formation were identified as basalt in petrographic examinations. The rocks have a hypocrystalline porphyritic texture. The main phenocrysts consist of plagioclase, clinopyroxene, biotite, titanite and opaque minerals.

[27] Geological and Geotechnical Investigation Report, 2023, Aydın Geoteknik

According to the Official Water Sources Statistics for 2020, prepared by the State Hydraulic Works, Türkiye's total groundwater recharge rate is 23.032,3 hm^3/year, whereas Marmara Basin generates groundwater recharge of 241.7 hm^3/year.

There are 24 hydrogeological sub-basins of which 17 sub-basins located in İznik-İstanbul region whereas 7 sub-basins are located in Çanakkale region. Aquifers that are existing in the Marmara Basin are alluvial aquifers which are originated due to deposition. Additionally, since they stretch across the Marmara Sea, saline water recharge can be observed if there is excessive extraction.

The Project site is located in Çanakkale Province of which groundwater potential is given in Table 5-3 with respect to existing sources.

Table 5-3: Source Based Groundwater Potential in Çanakkale Province

Sources	Groundwater Potential (hm^3/year)
Bayramiç – Evciler – Ayazma	50.08
Yenice Çınar	0.409
Yenice – Ilıca	1.04
Geyikli – Pınarbaşı – Kırkgözler	0.63
Karadağ Village	4.20
Total	**56.539**

The factors, that result mainly from human activities on the groundwater bodies in both basins and cause changes in the quantity and quality characteristics of the groundwater in these bodies, have been determined. The most important factor, especially in terms of quantity, is excessive water withdrawal. Excessive withdrawals can also be interpreted by monitoring and analysing groundwater level changes or by dividing the amount of withdrawals and recharge after determining the amount of recharge of the aquifer.

Excessive water withdrawal from the groundwater body is one of the pressure factors that causes significant decrease in the quantity of groundwater. Drawing more than the recharge amount of the groundwater mass will cause the level to constantly decrease, the amount of water mass in the aquifer to decrease, and the amount of groundwater to decrease over time.

According to the information obtained from Harmancık WPP National EIA Report, groundwater usage is not planned for drinking purposes or spraying purposes to supress dust emissions. In the Çanakkale Province Environmental Status Report, it was also stated that groundwater is not used as drinking and domestic water except for individual private boreholes[28]. In addition, no groundwater resource is found in the Project area according to geological and geotechnical surveys conducted by the Project company[29]. Therefore, no impact is expected on the groundwater bodies due to excessive water withdrawal.

5.3.3 Water Quality

No water quality sampling study was carried out within the scope of National EIA. Çanakkale Province Environmental Status Report, prepared by the Çanakkale Governorship Provincial Directorate of Environment, highlights point sources and non-point sources of pollution that may create pressure on the water bodies. However, no information is found regarding industrial or domestic wastewater discharges into Umurbey and Sarıçay creeks which are the closest surface water bodies to the Project area. It should be noted that, the groundwater sampling

[28] Çanakkale Province Environmental Status Report, 2022, Çanakkale Governorship Provincial Directorate of Environment, Urbanisation and Climate Change

[29] Geological and Geotechnical Investigation Report, 2023, Aydın Geoteknik

study was carried out at Kızılkeçili Village and Üçpınar Village as shown in Figure 5-6 and Figure 5-7, respectively. Tap water samples, which are representing the groundwater quality without a treatment, were collected from drinking foundation available in the villages. The groundwater sampling locations are presented in Figure 5-8 and the results of these analyses are provided in below Table 5-4.

Figure 5-6: Groundwater Sampling at Kızılkeçili Village

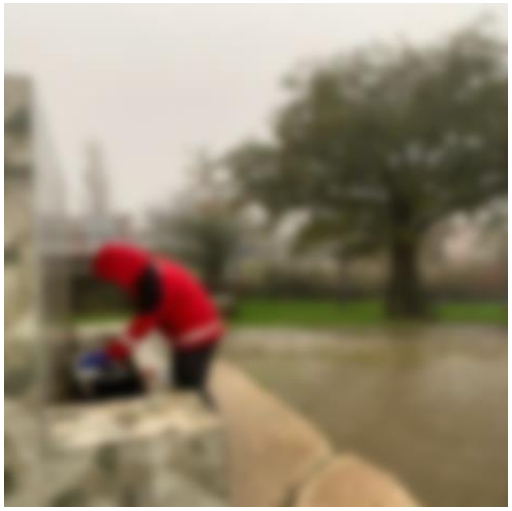


Figure 5-7: Groundwater Sampling at Üçpınar Village

(Note that the photographs are blurred in the publicly disclosed version of this document in compliance with personal data protection regulations)

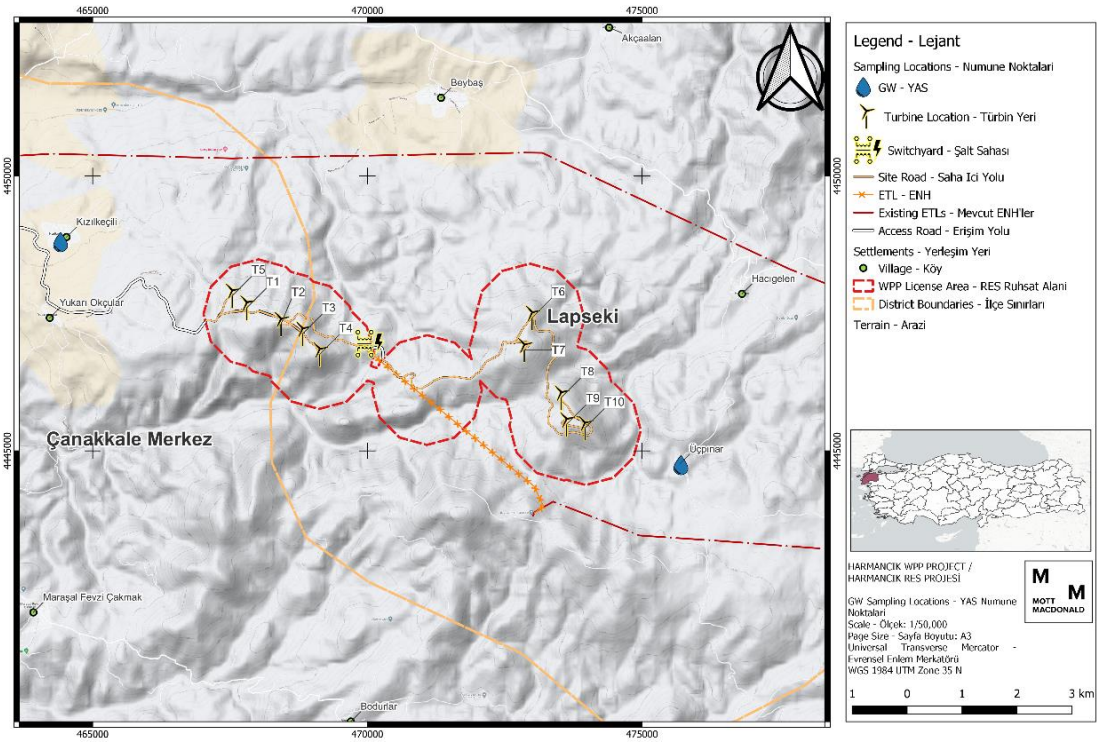


Figure 5-8 Groundwater Sampling Locations

Table 5-4: Groundwater Sampling Analysis Results

Parameter-Unit	National Value (Regulation on Water for Human Consumption (OG Date/Number: 17.2.2005/25730)	International Value (WHO) (Guidelines for Drinking-water Quality: Fourth Edition)	Project Standard (i.e., the stringent of the two)	Üçpınar Village	Kızılkeçili Village
pH	≥ 6.5 & ≤ 9.5	≥ 6.5 & ≤ 9.5	≥ 6.5 & ≤ 9.5	8.02	7.94
Conductivity	2500 µS / cm at 20°C	-	2500 µS / cm at 20°C	302 mg/L	222 mg/L
Temperature	-	-	Baseline Level	12.7 ºC	12.6 ºC
Saltiness	-	-	Baseline Level	0.15 ‰	0.11 ‰
Dissolved Oxygen	-	-	Baseline Level	7.64 mg/L	7.86 mg/L
Nitrate	50 mg/L	50 mg/L	50 mg/L	<0.44 mg/L	<0.44 mg/L
Nitrite	0.50 mg/L	3 mg/L	3 mg/L	<0.33 mg/L	<0.33mg/L
Ammonium	0.50 mg/L	-	0.50 mg/L	0.084 mg/L	<0.026 mg/L
Total Phosphorus	-	-	Baseline Level	0.055 mg/L	0.1 mg/L
Total Organic Carbon	-	-	Baseline Level	<4 mg/L	<4 mg/L
Chloride	-	0.7 mg/L	0.7 mg/L	48.8 mg/L	22.5 mg/L
Sulphate	250 mg/L	-	250 mg/L	12.8 mg/L	4.9 mg/L
Carbonate	-	-	Baseline Level	<10 mg/L	<10 mg/L
Bicarbonate	-	-	Baseline Level	78.5 mg/L	86.8 mg/L
Fluoride	1.5 mg/L	1.5 mg/L	1.5 mg/L	<0.1 mg/L	<0.1 mg/L
Total Cyanide	50 µg/L	-	50 µg/L	<0.005 mg/L	<0.005 mg/L
Calcium	-	-	Baseline Level	18.8 mg/L	10.1 mg/L
Magnesium	-	-	Baseline Level	4.58 mg/L	3.15 mg/L
Sodium	200 mg/L	-	200 mg/L	23.9 mg/L	27.6 mg/L
Potassium	-	-	Baseline Level	2.2 mg/L	1.95 mg/L
Chromium +6	-	-	Baseline Level	<0.02 mg/L	<0.02 mg/L
Suspended Solids	-	-	Baseline Level	<10 mg/L	<10 mg/L
Arsenic	10 µg/L	10 µg/L	10 µg/L	0.0012 mg/L	3.4 mg/L
Cadmium	5.0 µg/L	3.0 µg/L	3.0 µg/L	<0.0002 mg/L	<0.0002 mg/L

Parameter-Unit	National Value (Regulation on Water for Human Consumption (OG Date/Number: 17.2.2005/25730)	International Value (WHO) (Guidelines for Drinking-water Quality: Fourth Edition)	Project Standard (i.e., the stringent of the two)	Üçpınar Village	Kızılkeçili Village
Lead	10 µg/L	10 µg/L	10 µg/L	<0.001 mg/L	<0.001 mg/L
Mercury	1.0 µg/L	6.0 µg/L	1.0 µg/L	<0.001 mg/L	<0.001 mg/L
Aluminium	200 µg/L	-	200 µg/L	<0.002 mg/L	<0.002 mg/L
Antimony	5.0 µg/L	20.0 µg/L	5.0 µg/L	<0.002 mg/L	<0.002 mg/L
Copper	2 mg/L	2 mg/L	2 mg/L	0.0012 mg/L	0.002 mg/L
Barium	-	1.3 mg/L	1.3 mg/L	0.065 mg/L	0.027 mg/L
Beryllium	-	-	Baseline Level	<0.002 mg/L	<0.002 mg/L
Zinc	-	-	Baseline Level	0.011 mg/L	0.011 mg/L
Total Chromium	50 µg/L	50 µg/L	50 µg/L	0.005 mg/L	0.005 mg/L
Nickel	20 µg/L	70 µg/L	20 µg/L	<0.002 mg/L	<0.002 mg/L
Manganese	50 µg/L	80 µg/L	50 µg/L	<0.001 mg/L	<0.001 mg/L
Selenium	10 µg/L	40 µg/L	10 µg/L	<0.001 mg/L	<0.001 mg/L
Boron	1 mg/L	2.4 mg/L	1 mg/L	<0.025 mg/L	<0.025 mg/L

As it can be seen from Table 5-4, the analysis results have been compared with the threshold values for Regulation on Water for Human Consumption (OG Date/Number: 17.2.2005/25730) and WHO Guidelines for Drinking-water Quality: Fourth Edition. Accordingly, all analysed parameters are within the limits specified in Project standards except Chloride levels. High concentrations of Chloride, i.e., excess of 250 mg/L, lead change in the taste of water and beverages[30]. In addition, no health-related issues were mentioned regarding Chloride levels in the WHO Guidelines for Drinking-water Quality: Fourth Edition.

5.4 Impact Assessment

A wind energy project can impact surface water and groundwater in several different ways, including the use of water resources, changes in water quality, alteration of natural flow system, and the alteration of interactions between the groundwater and surface water. For the most part, however, wind energy development does not require much water, except during the construction phase and, to a lesser extent, during decommissioning. These water uses are temporary, and during the operation phase, water use would be minimal.

This section describes the types of impacts that might occur during each phase of the development.

5.4.1 Construction

Use of Water Resources

There will be numerous activities that would use water during construction. According to the information shared by the Project Company the construction period of the Project will be 16 months. Hence, potentially significant amounts of water would be needed.

Following activities are listed related to use of water resources:

- Water will be used for dust control during construction of access roads, clearing of vegetation, grading and road traffic,
- Water will be used by the construction personnel.

The drinking water will be supplied from dispenser size bottled water. It is to be noted that the groundwater allocation is not allowed by the State Hydraulic Works (DSI) around Project area, as such groundwater will not be used. In case utilization of groundwater deemed necessary, the opinion from the 25th Regional Directorates of the DSI will be requested. In addition, the utility water will be used during the construction phase to meet the personnel needs as well as to prevent generation of dust during construction activities.

The amount of drinking and potable water for the personnel planned to work within the scope of the Project is determined as 231 L/person-day (see Section 11.4.4). It was also found that 42 m^3/day of water will be needed for dust suppression[31]. The water will be supplied from the licenced sources which have been confirmed to have sufficient capacity to meet water demand of the Project. Therefore, no significant impact is expected on the existing local users.

Since ready-mixed concrete will be supplied from sources outside of the Project site, water use is not anticipated for concrete production.

Direct withdrawal from water resources, including surface water and groundwater is not anticipated as mentioned above. Thus, the anticipated severity of the impact will be minor. Additionally, the spatial extent of the impact is within the Area of Influence.

[30] Guidelines for Drinking-water Quality: Fourth edition, 2017, World Health Organization

[31] Harmancık WPP National EIA Report, 2023, Savra

The nearest significant streams to the Project area are Umurbey Creek located in the north and Sarıçay Creek located in the south-west of the Project area. These creeks are being used for irrigation purposes in the region. Therefore, sensitivity of surface waters is evaluated as high.

Groundwater resources in the region are being utilized by some of the project affected persons for drinking and domestic purposes from the deep wells when required. Nevertheless, groundwater sensitivity is evaluated as medium since the Project area is not located within any groundwater protection zone.

Thus, the significance of impacts is assessed as minor for surface water and groundwater.

Water Quality Alteration

During the construction phase of the Project, there will be an increase in traffic at the site due to transport of material. This will increase the risk of contamination of surface water and groundwater bodies by accidental spills, hydrocarbon-based oils and lubricants, heavy metals, suspended solids, and organic compounds.

Dust creation and settlement, excavations, the presence of stockpiles of exposed soil and concrete may potentially lead to high suspended solid/sediment loads within surface runoffs especially during rainfall events. Stormwater comprises surface runoff and flows resulting from various sources, including precipitation and drainage. As stated in the WBG EHSEHS General Guidelines (2007), stormwater runoff carries suspended sediments, metals, petroleum hydrocarbons, Polycyclic Aromatic Hydrocarbons (PAHs), coliform, among other contaminants. Furthermore, rapid runoff, even from uncontaminated stormwater, can cause erosion of banks and stream beds, which ultimately degrades the quality of the receiving water.

In the Çanakkale Province Environmental Status Report, it was stated that groundwater is not used as drinking and domestic water except for individual private boreholes. As mentioned above, project affected people are using the groundwater resources for drinking purposes besides the irrigation when required. It should also be noted that Project area is not located within any groundwater protection zone. In addition, no groundwater resource is found in the Project area according to geological and geotechnical surveys conducted by the Project company[32].

The sensitivity of the groundwater resource is evaluated as medium. It is anticipated that impacts on the groundwater will not cause permanent or temporary deterioration provided that necessary mitigation measures are taken. Therefore, the magnitude of impact due to groundwater contamination assessed as minor. The spatial extent of the impact is within the Area of Influence, and it does not likely to affect the local people's livelihood. The anticipated severity of the impact will be moderate. In addition, as stated in Harmancık WPP National EIA Report and also as reported by the Project Company, within the scope of the Project, groundwater will not be used. Impact magnitude is assessed as minor as described in Table 5-7. Thus, the significance of impact is assessed as minor.

The nearest significant streams to the Project area are Umurbey Creek located in the north and Sarıçay Creek located in the south-west of the Project area. These creeks are being used for irrigation purposes in the region. There are no other significant surface bodies in the close vicinity of the Project area other than seasonal creeks. Therefore, the likelihood of contamination of surface water bodies around the Project due to accidental spills, suspended solids/sediment loads or organic compounds is considered as unlikely. The sensitivity of nearby surface water bodies is considered as high given that the water is being used as irrigation water and the magnitude of impact is minor since the contamination of receptors due to construction activities is not likely. Additionally, severity of the impact will be minor since no interaction is

[32] Geological and Geotechnical Investigation Report, 2023, Aydın Geoteknik

anticipated with surface water courses in the scope of the Project. Impact magnitude is assessed as minor as described in the Table 5-5.Thus, the impact significance can be assessed as minor.

Alteration of Water Flow Systems

Construction activities, including excavation, blasting, and trenching, could potentially impact natural surface water and groundwater flow systems, including agricultural drainage channels. Construction of access road and use of storm water control systems may divert surface water flows on site and off site. In addition, excavation activities may alter surface overflow and groundwater flow.

The withdrawal of surface water and groundwater for water uses and discharge of wastewater and storm water would also affect the water flows of the surface water and groundwater bodies. However, impacts related to withdrawal is not anticipated since the direct withdrawal of water from surface water and groundwater bodies is not planned in the scope of the Project. In addition, it should be noted that wastewater will be collected in septic tanks and will not be discharged into a water body.

Alteration of Surface Water & Groundwater Interaction

Construction activities could alter the interaction between surface water bodies and local groundwater in systems where the two resources are hydrologically connected. In these circumstances, extracting water from one source eventually could affect the other source as well. Similarly, altering the water quality of one source could affect the water quality of other sources at downgradient locations. Impacts related to water extraction is not anticipated since water withdrawal from surface water or groundwater bodies is not planned in the scope of the Project.

Impacts also could occur if construction activities (e.g., excavation, blasting, trenching) create a conduit between a surface water body and a groundwater aquifer, or between two aquifers, by breaching the hydrologic barrier. This could result in unwanted dewatering or recharge of any of these water resources, depending on local hydrogeological conditions. In addition, storm water control systems and any other activity that alters the ground surface could affect groundwater infiltration as well as the response time of a nearby surface water body. It should be noted that no groundwater resource is found in the Project area according to geological and geotechnical surveys conducted by the Project company. Therefore, no significant impact is anticipated.

Moreover, the anticipated severity of alteration of water flow systems and surface water & groundwater interaction is assessed as minor. The spatial extent of the impact is within the Area of Influence, and it does not likely affect the local people’s livelihood. Alteration of above-mentioned hydrological and hydrogeological systems due to construction activities is not likely. Considering that the impact magnitude is minor and reversible with medium receptor sensitivity of surface water (ones with seasonal flow) and groundwater sources in the close vicinity of the Project area, the impact significance can be assessed as minor.

5.4.2 Operation

No significant impact on water sources is anticipated due to activities to be carried out during operation phase.

On this basis, it is intended that consideration of water quality, hydrology, and hydrogeology impacts during the operational phase are scoped out for assessment as part of the ESIA.

If appropriate mitigation measures are implemented during the construction phase, potential impacts to water during operation phase would be limited to the degradation of water quality as a result of accidental spills or vehicle traffic. Therefore, Water Quality Management Procedure

and Emergency Preparedness and Response Plan will be developed to provide management procedures, mitigation measures, and other requirements (e.g., training, KPIs, etc.) for unplanned events that may happen during operation phase related to this topic, such as spills and flooding.

5.4.3 Summary

Assessment of impacts on water quality, hydrology and hydrogeology was done based on the methodology presented in Section 5.2. Accordingly, the magnitude of each impact was estimated as a factor of the foreseen: geographic extent, duration, reversibility, and frequency of the impact, based on expert's judgement. Sensitivity/value of the associated resource/receptor was determined in consideration of the baseline conditions described in the previous sections. Table 5-9 presents a summary of the construction and operation impacts and their likely significance before the application of mitigation.

Specific sensitivity/value criteria considered in assessing the impacts on hydrology, hydrogeology, and water quality s is provided below.

Table 5-5: Impact Magnitude Criteria for Surface Waters

Magnitude	Definition
Major	• Contamination of surface water degrades the existing water quality by 100% of the original Water quality. • Potentially severe effects on surface water quality are likely to be long-lasting (e.g., months or more) or permanent and/or give rise to indirect ecological and/or socio-economic impacts. • There are known/expected physical (property, agricultural fields, infrastructure, etc.) or sensitive ecological receptors upstream or downstream within the catchment that could experience a 'significant increase in flood frequency (above baseline conditions) as a result of the Project.
Moderate	• Contamination of surface water degrades the existing water quality by 50% of the original water quality. • Potential localized effects on water quality are likely to be fairly long-lasting (e.g., weeks or months) and/or give rise to indirect ecological and/or socio-economic impacts. • There are known/expected physical (property, agricultural fields, infrastructure, etc.) or sensitive ecological receptors upstream or downstream within the catchment that could experience an increase in flood frequency (above baseline conditions) as a result of the Project.
Minor	• Contamination of surface water degrades the surface water run-off quality by 10% of the original water quality. Potential short-term localized effects on water quality but which are likely to return to equilibrium conditions within a short timeframe (e.g., hours or days at most). • There are no known/expected physical (property, agricultural fields, infrastructure, etc.) or sensitive ecological receptors upstream or downstream within the catchment that could be affected by the changed drainage regime.
Negligible	• Contamination of surface water that is temporary and that does not degrade the existing surface water run-off quality. • Potential short-term localized effects on water quality but likely to be highly transitory (e.g., lasting a matter of hours) and well within natural fluctuations. • There is likely to be no alterations to existing drainage regimes and characteristics at any time of year

Table 5-6: Surface Water Sensitivity/Value Criteria for Resource/Receptors

Value	Definition
High	• Watercourse with high quality e.g., in its natural state and with ecological importance. • The watercourse provides vital ecosystem services. • The watercourse provides urban water supplies, major industrial abstraction or large irrigation supplies.
Medium	• The watercourse supports diverse populations of aquatic habitats. • The watercourse provides ecosystem services to some extent.

Value	Definition
	• Watercourse used for local water supply source, small industrial abstraction or minor irrigation scheme
Low	• Watercourse located in the vicinity that does not support diverse aquatic habitat. • Watercourse already significantly modified from some aspect of a natural condition. • Watercourse with little or no community use.

Table 5-7: Impact Magnitude Criteria for Groundwater

Magnitude	Definition
Major	Discharges to groundwater are likely to cause breaches of statutory discharge limits (over extended periods) and cause background levels to be above the site-specific long-term cancer and hazard risk levels (provided in Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites).
Moderate	Discharges to groundwater bodies are expected to cause breach(s) of statutory limits (over limited periods) and cause background levels to be below the site-specific but above the generic long-term cancer and hazard risk levels (provided in Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites).
Minor	Discharges to groundwater are expected to be within (but perhaps close to) statutory limits and will cause background levels to increase but remain below the generic risk levels for all sites (levels provided in Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites).
Negligible	Discharges to groundwater are expected to be well within statutory limits.

Table 5-8: Groundwater Sensitivity/Value Criteria for Resource/Receptors

Value	Definition
High	• Project area falls within a protection zone
Medium	• Groundwater that provides baseflow to surface watercourses that have high quality or supports a wetland with ecological importance • Groundwater that is used for drinking or domestic purposes.
Low	• Groundwater is available, however additional treatment is required to be utilized • Groundwater that provides baseflow to surface watercourses used for recreational fishing. • Groundwater that is abstracted for industrial purposes or agriculture (i.e., irrigation purposes).
Negligible	• No aquifer or groundwater in deep aquifers. • Low-quality groundwater is not used by the community. • Groundwater that does not provide or provide very little baseflow to surface watercourses or support habitats.

Table 5-9: Summary of Construction Impacts

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Use of Water Resources	Surface water bodies	Minor	Construction	AoI	Reversible	Unlikely	Minor	High	Moderate
Use of Water Resources	Groundwater bodies	Minor	Construction	AoI	Reversible	Unlikely	Minor	Medium	Minor
Water Quality Alteration	Surface water bodies	Minor	Construction	AoI	Reversible	Unlikely	Minor	High	Moderate
Water Quality Alteration	Groundwater bodies	Moderate	Construction	AoI	Reversible	Low	Minor	Medium	Minor
Alteration of Water Flow Systems	Surface water bodies & Groundwater bodies	Minor	Construction	AoI	Reversible	Unlikely	Minor	Medium	Minor
Alteration of Surface Water & Groundwater Interaction	Surface water bodies & Groundwater bodies	Minor	Construction	AoI	Reversible	Unlikely	Minor	Medium	Minor

5.5 Impact Mitigation & Residual Impact

This section presents mitigation measures and residual impacts to manage potential water related impacts during construction and operation. The mitigation measures have been identified based on the potential impacts identified above.

5.5.1 Mitigation during Construction

The assessment has shown that surface waters and groundwater could get contaminated from a wide range of sources linked to the construction of the Project. This section describes specific mitigation measures that will be implemented to prevent and minimise these construction impacts.

Preventative measures such as best practice site management and effective site planning/layout will be implemented to minimise the risk of any pollution incidents finding their way to the receptors. A range of remedial or suppressive methods will then also be applied to control these potential adverse activities.

Specific mitigation measures to avoid and/or mitigate the potential impacts on surface water and groundwater during construction phase will need to include the following.

- Accidental spill prevention through implementing of mitigation measures defined in this ESIA.
- Construction workers and relevant staff will be trained related to the implementation of good construction site practices and on spill response and prevention measures.
- Compliance with rules of material storage and use, waste storage and its timely removal.
- Suitably sized impervious bunds or other containment will be installed where hazardous materials are handled to prevent hazardous materials entering the site drainage.
- Use of the existing roads for material delivery.
- Work performed strictly within the construction site.
- Strict prohibition of vehicle washing and refuelling outside of the specially equipped places.
- Construction activities will be regularly inspected on site by the Project Company.
- Impermeable surfaces should be minimized, and the peak discharge rate of the runoff should be reduced (e.g., by using vegetated swales and retention ponds).
- Groundwater quality and groundwater table monitoring regime will be implemented before and after the construction phase. The water will be sampled from the already available groundwater wells around the Project site in 1 km distance from the boundary.
- In order to prevent direct or indirect impacts on stream beds, no intervention will be made to the bed sections of the streams in the vicinity of the Project area, bed sections will not be narrowed, and activities will not be carried out to disrupt the flow regimes.
- During construction activities, the excavation residue will not be stored in the stream bed.
- Within the scope of the Project, if a water source is encountered in the vicinity of the turbine sites and switchyard, the relevant institution will be contacted, and no destruction and construction activities will be carried out in the water source and the area feeding the source.
- The provisions of the Water Pollution Control Regulation and the Regulation on the Protection of Drinking-Use Water Basins will be complied with.
- The provisions of the Regulation on the Quality and Purification of Water Supply for Drinking Water, Regulation on Surface Water Quality, Regulation on Water for Human Consumption and Regulation on the Protection of Groundwater against Pollution and Deterioration will be complied with.
- During the construction activities, the provisions specified in the Law No. 167 on Groundwater will be complied with.

- All necessary measures will be taken to ensure that groundwater resources (springs, fountains, etc.) are not adversely affected in terms of quantity and water quality.
- All precautions against the environmental surface and flood waters that may occur in possible excessive rainfall will be taken.
- In the event that a crossing is provided on the flowing and dry streams in the vicinity of the Project area, the necessary project design will be made in accordance with the principles of the Disaster Regulation for Highway Engineering Structures and will be constructed in accordance with the scientific procedures and principles after obtaining the hydraulic suitability opinion from the DSI 25th Regional Directorate.
- The minimum culvert size applied in the flood control facilities constructed by DSI is 2 m x 2 m. The passage structures constructed in the form of multicompartment culverts are tend to be blocked due to the sediment and plant roots and branches during floods, causing loss of life and property. For this reason, any work related to the streams will be within the permission of the DSI 25th Regional Directorate.
- No waste material, solid or liquid, will be poured into the existing stream beds in the vicinity of the Project area including ones with seasonal flowing, their cross-sections will not be narrowed, the existing and cadastral width of the stream beds will be preserved, excavation and filling will be carried out at least 20 meters from the slope tops on both banks of the streams, and the transfer of the excavation residue material and erosion residue material will be handled in a way that stream beds will not be effected.
- Construction vehicles should only use the designated roads to prevent any harm or alteration on the agricultural drainage channels.
- The provisions of the Flood and Sediment Control Regulation will be complied with.

Furthermore, mitigation measures mentioned in Section 11.5 will also be taken into consideration. In addition, as part of the construction phase, it is expected that significant amounts of dust will be created and re-settled. This process creates a substantial amount of material that will be mobilised through surface runoff and deposited in the drainage channels and surface water courses at points of particularly low flow, such as at culverts and reaches of thick vegetation. The siltation of the channels can cause flooding problems and reduce the volume of the drainage channels for transporting the resulting flow. The use of water as a dust suppression mechanism may further increase the sediment load entering the drainage channels and increase pressure on local resources. Dust related mitigation measures will be given in Section 7.5.2 as part of Air Quality Impact assessment.

5.5.2 Mitigation during Operation

No significant impact on water sources is anticipated due to activities to be carried out during operation phase. It should be noted that mitigation measures that will be provided in the Water Quality Management Plan for the Operation Phase will be complied with during operation.

5.5.3 Residual Impacts

- Residual impacts are those that remain after mitigation and/or enhancement measures have been implemented. A summary of impacts is presented below in Table 5-10. Although the likelihood of the impacts will be greatly reduced with the application of mitigation, sensitivity of the receptors does not change.
- However, the application of mitigation including best practice measures means that the impact of spillages, leaks and pollution is reduced to negligible. As this mitigation would remove the likely risk of an incident occurring that could affect water resources, any major spillages would be considered an emergency which would require implementation of the emergency spill response measures.

There should be no residual significant effects on surface water and groundwater quality caused by the Project after the implementation of appropriate mitigation measures.

Table 5-10: Summary of Residual Impacts, After the Application of Mitigation

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Runoff from construction of temporary and permanent impermeable hard surfaces	Surface water bodies	Moderate	Negligible
Stormwater runoff resulting from precipitation and drainage	Surface water bodies	Moderate	Negligible
Groundwater contamination	Groundwater	Minor	Negligible
Use of Water Resources	Surface water bodies	Moderate	Negligible
Use of Water Resources	Groundwater bodies	Minor	Negligible
Water Quality	Surface water bodies	Moderate	Negligible
Water Quality	Groundwater bodies	Minor	Negligible
Alteration of Water Flow Systems	Surface water bodies & Groundwater bodies	Minor	Negligible
Alteration of Surface Water & Groundwater Interaction	Surface water bodies & Groundwater bodies	Minor	Negligible

6 Land Use, Soil and Geology

6.1 Introduction

In this chapter, component of soil and geology related with the Project site is detailed and the potential impacts due to construction and operation phases of the Project are examined. Policy and legislation related with soil, geology and their potential impacts are given in this chapter by taking into consideration national legislation as well as Lenders' standards and guidelines.

The geology and soils topic can typically comprise of several sub-topics, namely: geology as resource (e.g., for minerals); soils as a resource; and also, the potential for impacts associated with land contamination that may arise through the disturbance of contaminants contained in the subsurface.

Information on the existing environments regarding baseline ground and soil conditions is provided in Section 6.3 of this chapter. Beside the examination of potential impacts, area of influence, mitigation measures, and any residual impact following mitigation are given in this chapter.

6.2 Methodology

The magnitude, sensitivity of a receptor and significance of the impacts are assessed using the general methodology as outlined in Chapter 4.8.

6.2.1 Applicable Guidelines and Standards

In addition to the national and international policy and legislation for the Project given in *Chapter 3: Legal and Policy Framework*, policy and legislation which specifically relates to soil and geology are presented in this section.

6.2.1.1 National Requirements

Environmental Law is the major law required to be followed during the lifetime of the Project and there are pertinent regulations applicable for soil management and geology. During the development stage of the Project, the issues related with soil management and geology are reviewed in detail as per Environmental Impact Assessment Regulation. Türkiye Earthquake Regulation for Buildings indicates the requirements for structural issues needed to be followed during construction phase. The excess soil generated during the construction phase should be managed in accordance with the Regulation on Control of Excavation, Construction and Demolition Waste. Regulation on Soil Pollution Control and Point-Source Contaminated Sites is applicable for all phases of the Project and aiming to prevent contamination of soil, to identify areas and sectors where contamination exists ofr is likely to occur and to determine the principles of remediation and monitoring of contaminated soil in line with sustainable development goals.

Soil Contamination

The prevailing legislation in Türkiye relating to pollution prevention and control is the Law on Environment No. 2872[33], which sets out that polluters are liable for damages caused to the

[33] Official Gazette no/date: 18132/16.08.1983

environment and natural resources, and for compensation of such damages. Other relevant legislation under the Law on Environment includes the following:

- Regulation on Soil Pollution Control and Point-Source Contaminated Sites (Official Gazette date/number: 08.06.2010/27605): The regulation defines the principles and procedures to prevent the contamination of soil, to identify the sites where pollution exists or is likely to exist, and to remediate and monitor the contaminated sites. The generic limit concentrations of soil contaminants defined in the regulation are taken into account in assessment of soil pollution. The regulation requires all existing and proposed facilities which are included in Annex-2 Table 2 of the regulation to declare a “Preliminary Operation Information Sheet” to the Provincial Directorate of Environment Urbanization and Climate Change. The Provincial Directorate will then assess the sites with respect to the evaluation criteria given in Annex-4 of the regulation. If at least one of the criteria is valid for the subject site, it is characterized as a “Suspicious Site” that require further assessment.
- Regulation on Control of Excavated Soil, Construction and Demolition Wastes (Official Gazette date/number: 18.03.2004/25406): Excavated land must be managed in such a way as to avoid harming the environment and human health in accordance with this regulation. The regulation defines general rules about administrative and technical issues on the reduction, collection, temporary storage, recovery and disposal of excavation soil and construction and demolition wastes. Accordingly, the municipalities establish and operate all the recycling and disposal facilities.

6.2.1.2 International Requirements

Related international policy and legislations for the Project are given below:

Table 6-1: International Legislation and Policy Relating to Soils and Geology

Policy
EBRD Environmental and Social Policy and Performance Requirements (PR) (2019)
EU Directives European Commission Environmental Impact Assessment (EIA) Guidelines
Directive 2004/35/CE of The European Parliament and of The Council on environmental liability with regard to the prevention and remedying of environmental damage (2004)
IFC Performance Standards (PSs) on Environmental and Social Sustainability (2012)
IFC Sustainability Framework (updated in 2012)
IFC Environmental, Health, and Safety Guidelines Wind Power (2015)
World Bank Group Environmental, Health, and Safety General Guidelines (EHS General Guidelines) (2007)
IFC Good Practice Note: Managing Contractor’s Environmental and Social Performance (2017)

6.2.1.3 Project Standards

Within the scope of the Project, the guidelines and standards specified in Sections 6.2.1.1 and 6.2.1.2 will be complied with. In addition, for the soil sampling study conducted, the following Table 6-2 has been determined as Project Standards. It shall be noted that, national standards for the soil quality were selected as the threshold limits of “Contamination Ground Water” since it was assumed in *Chapter 5: Water Quality, Hydrology and Hydrogeology,* the main risk to be considered is pollution of soil and groundwater due to spills and contamination. According to the regulation, as the possible area of contamination is assumed to be less than 10 hectares and there are no karstic features are found beneath the Project area, the dilution factor is determined as DF=10. Considering the fact that, contamination risk can be foreseen due to storage of chemicals and waste containing heavy metals, the relevant parameters were selected. It should also be noted that The Project area does not fall within the evaluation criteria provided in Annex-4 of the Regulation on Soil Solution Control and Point-Source Contaminated

Sites. According to same regulation, soil impact can impact human health through various pathways, including:

1. Absorption through Ingestion of Soil and Dermal Contact: people can accidentally ingest soil or unintentionally consume it. Contaminants in the soil can enter the body through the digestive system.
2. Inhalation of Volatile Substances in the External Environment: People breathe gases and vapors released from soil. The respiratory system absorbs them, potentially leading to health effects.
3. Inhalation of Fugitive Dust Outdoors: Fine soil particles become airborne as fugitive dust, especially during construction. Inhaling these particles can introduce contaminants into the respiratory system.
4. Transport of Pollutants to Groundwater and Drinking Water: Soil contaminants can leach into groundwater over time. Rainwater or irrigation can carry pollutants downward, affecting aquifers.

In summary, these pathways are interrelated, and their occurrence rates during construction depend on factors such as soil type, contaminant sources, and preventive measures.

Table 6-2: Soil Quality Project Standards

Parameter	Regulation on Control of Soil Pollution and Point Source Contaminated Sites Annex-1			
	Absorption through ingestion of soil and dermal contact (mg/kg in dry soil)	Inhalation of volatile substances in the external environment (mg/kg in dry soil) t	Inhalation of fugitive dust outdoors (mg/kg in dry soil)	Transport of pollutants to groundwater and drinking of groundwater (DF=10) (mg/kg in dry soil)
Total Organic Halogen (TOX)	Baseline Level	-	-	-
Total Petroleum Hydrocarbons (TPH)	Baseline Level	-	-	-
Total Volatile Organic Compounds (TVOCs)	Baseline Level	-	-	-
Arsenic	0.4	-	471	3
Cobalt [a]	23	-	225	5
Barium [a]	15643	-	433702	288
Cadmium	70	-	1124	27
Chromium (Total)[a]	235	-	24	900000
Copper [a]	3129	-	-	514
Nickel [a]	1564	-	-	13
Lead	400	-	-	135
Vanadium [a]	548	-	-	2556
Zinc [a]	23464	-	-	6811

[a]: Since there is no skin absorption factor for this pollutant, only soil ingestion exposure pathway was taken into account.

6.2.2 Study Area and Area of Influence

Within the scope of the ESIA studies, an AoI)is considered taking into consideration the methodology described in Section 4.6.2. To understand the direct and indirect impacts of the Project, the WPP License Area where the wind turbines are planned to be located, access road and ETL route had been considered. A 1 km buffer zone is determined. The AoI is illustrated in below figure.

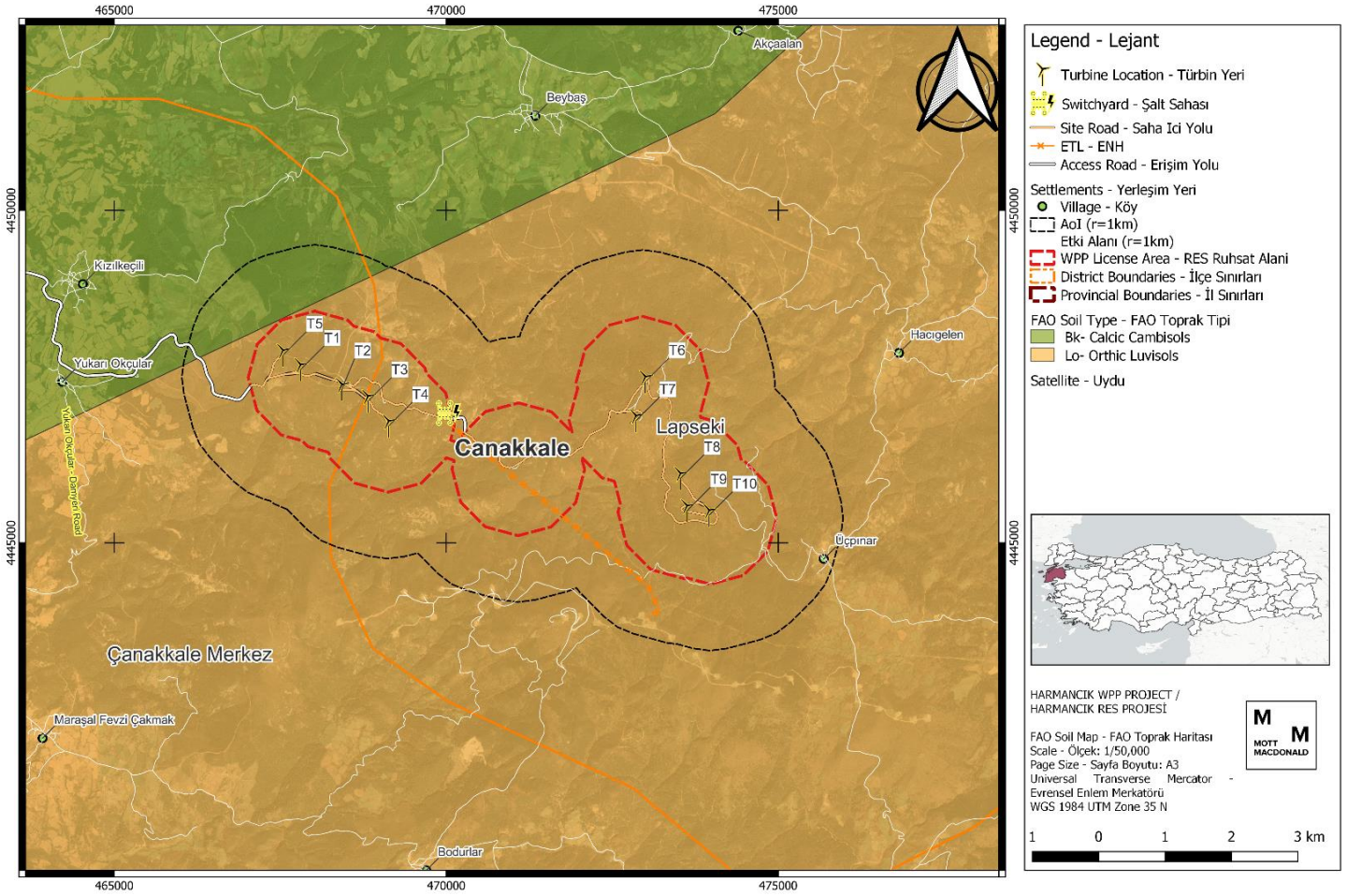


Figure 6-1: AoI Identified for Land Use, Soil and Geology Impact

6.2.3 Limitations and Assumptions

As the site roads within the WPP License Area are not established yet, site survey could only be carried out to cover the locations where access was possible.

6.3 Baseline Conditions

The baseline status of land use, soil texture and geology of Project area have been examined in order to understand current Land Use and Land Cover (LULC) activities carried out on the Project area. Within this scope, a desktop analysis was carried out in order to gather information regarding the baseline status obtained by examining the below listed documentation.

- Harmancık WPP National EIA Report, 2023, Savra
- CORINE 2018 Land Cover Database (https://land.copernicus.eu/en/products/corine-land-cover)
- Google Earth Satellite Images
- Food and Agriculture Organization (FAO) Harmonized World Soil Database – The Digital Soil Map of the World Version 3.6 (https://data.apps.fao.org/map/catalog/static/search?keyword=DSMW)
- International Soil Reference and Information Centre (ISRIC) – World Soils Information Database (https://www.isric.org/)
- Türkiye Earthquake Hazard Maps Interactive Web Application (https://tdth.afad.gov.tr/TDTH/main.xhtml)
- Geological-Geotechnical Survey Report Based On 1/5000 (8 pieces) and 1/1000 (32 pieces) Scale Development Plan, 2023 Aydın Geotechnical Engineering, Drilling Ltd.

Additionally, a site visit has been carried out on 28 September 2023 to have an information regarding the site as well. The description of the baseline status of the site has been established via a synthesis of the desktop study and the site visit observations.

6.3.1 Land Use

The LULC classification was done with the help of Google Earth Satellite Images, and CORINE 2018 Land Cover Database through desktop review.

The LULC was examined according to the land to be occupied as the WPP License Area. This examination has shown that the License Area, which has a 1647.3-hectare area, is mainly located on forest land (Table 6-3). There is almost no built area within WPP License Area, as the closest settlement is Üçpınar Village which is located approximately 1.7 km east of Turbine T-10. Industrial and commercial activities are identified to be located far away from the footprint of the Project area (Table 6-3).

Table 6-3: Corine 2018 Land Use & Land Cover

Code	Land Use & Land Cover	Area(ha)	Percentage
311	Broad-leaved forest	498.2	30.24%
312	Coniferous forest	592.9	35.99%
313	Mixed forest	146.3	8.88%
324	Transitional woodland-shrub	409.9	24.88%
Total		**1647.3**	**100.00%**

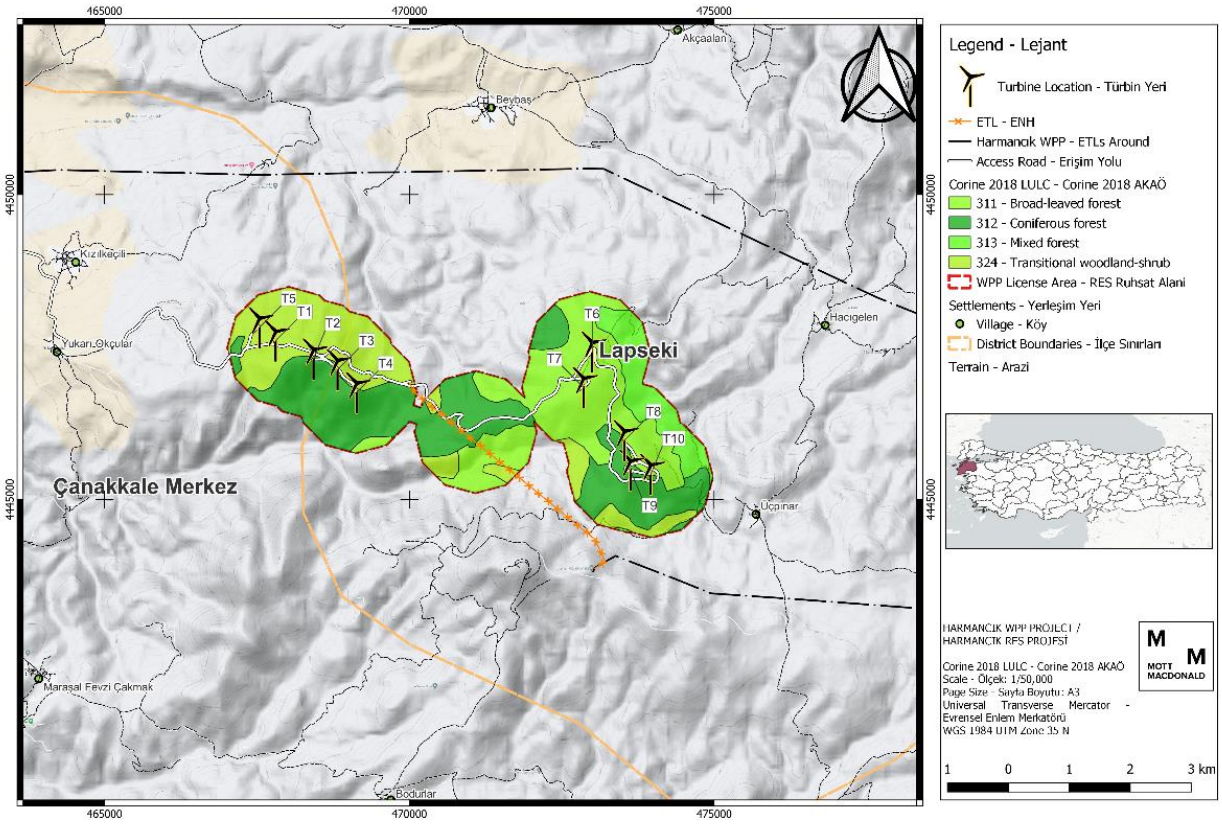


Figure 6-2: Corine 2018 LULC Map of WPP License Area

Furthermore, the WPP License Area was also examined via the National EIA Report prepared in 2023. Accordingly, it has been seen that land to be occupied by the WPP is forest area. Although there are agricultural and husbandry activities taking place in the Central and Lapseki Districts, it was found that no significant agricultural activities have been conducted on the Project area boundaries.

During the site visit it has been observed that the WPP License Area has forest features overall. Additionally, the site designated to be mobilisation area was also visited and the view from the mobilisation area is presented below.

Figure 6-3: Mobilisation Area

6.3.2 Soil

Soil texture properties of the Harmancık WPP Project, Land Use, Soil and Geology WPP License Area was assessed according to FAO Harmonized World Soil Database (The Digital Soil Map of the World Version 3.6). As it can be seen from Figure 6-4, dominant soil type of the WPP License Area is *Orthic Luvisols*. Additionally, on the north-western section of the WPP License, where a small portion of the access road is located, the soil type is identified as *Calcic Cambisols.*

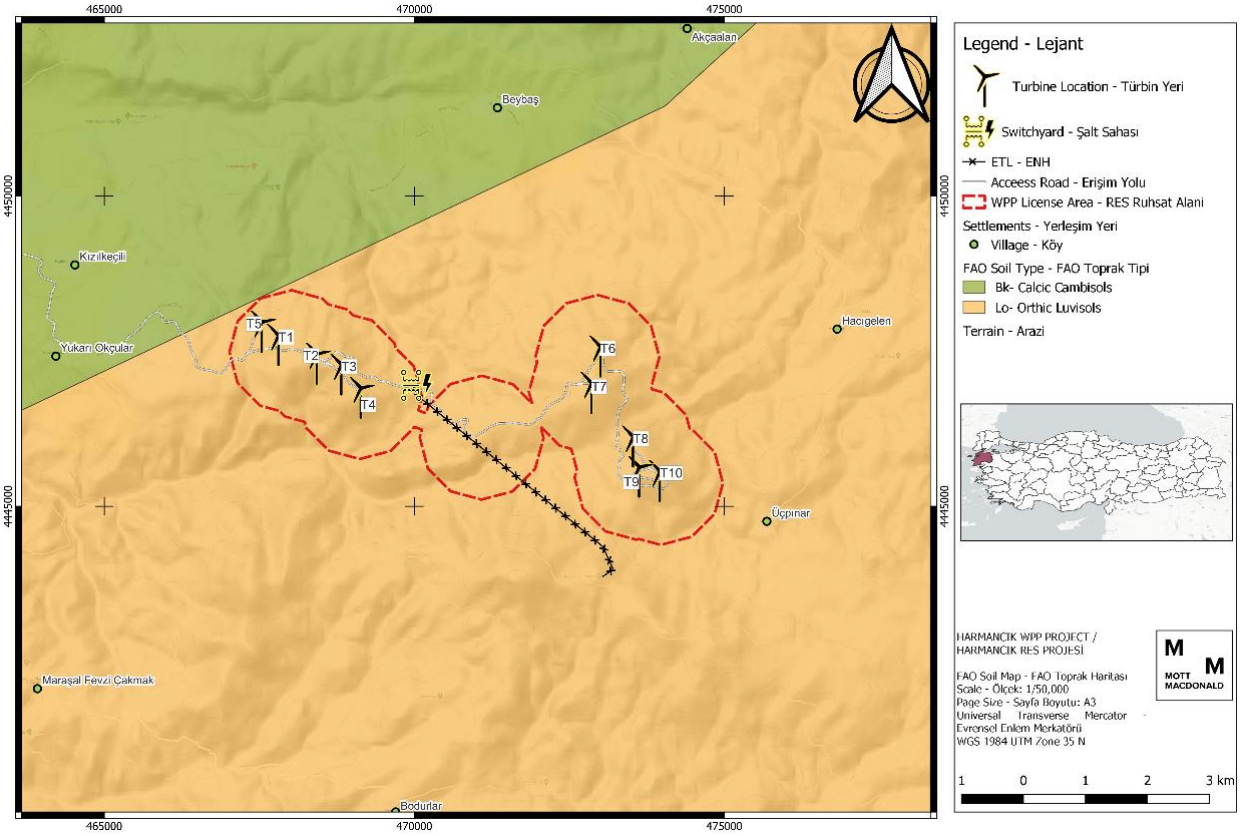


Figure 6-4: Soil Map of Harmancık WPP License Area

Luvisol is one of the 30 soil types that make up the Food and Agriculture Organization's (FAO) classification scheme. The surface horizon of Luvisols is usually brown to dark brown, with a subsurface horizon that is (greyish) brown to strong brown or reddish-brown. Particularly in subtropical Luvisols, there may be pockets of soft, powdered lime in and beneath a reddish-brown argic horizon, or a calcic horizon[34].

It shall be noted that, the Consultant has carried out soil quality sampling analysis at turbine locations, site road, mobilization area (1 sample at the mobilization area near Yukari Okcular) and Switchyard Area (1 sample) (Figure 6-5).

[34] ISRIC - International Soil Reference and Information Centre. (2023, 10 25). World Soil Information. Retrieved from Major Soils of the World: https://www.isric.org/sites/default/files/major_soils_of_the_world/set4/fl/fluvisol.pdf

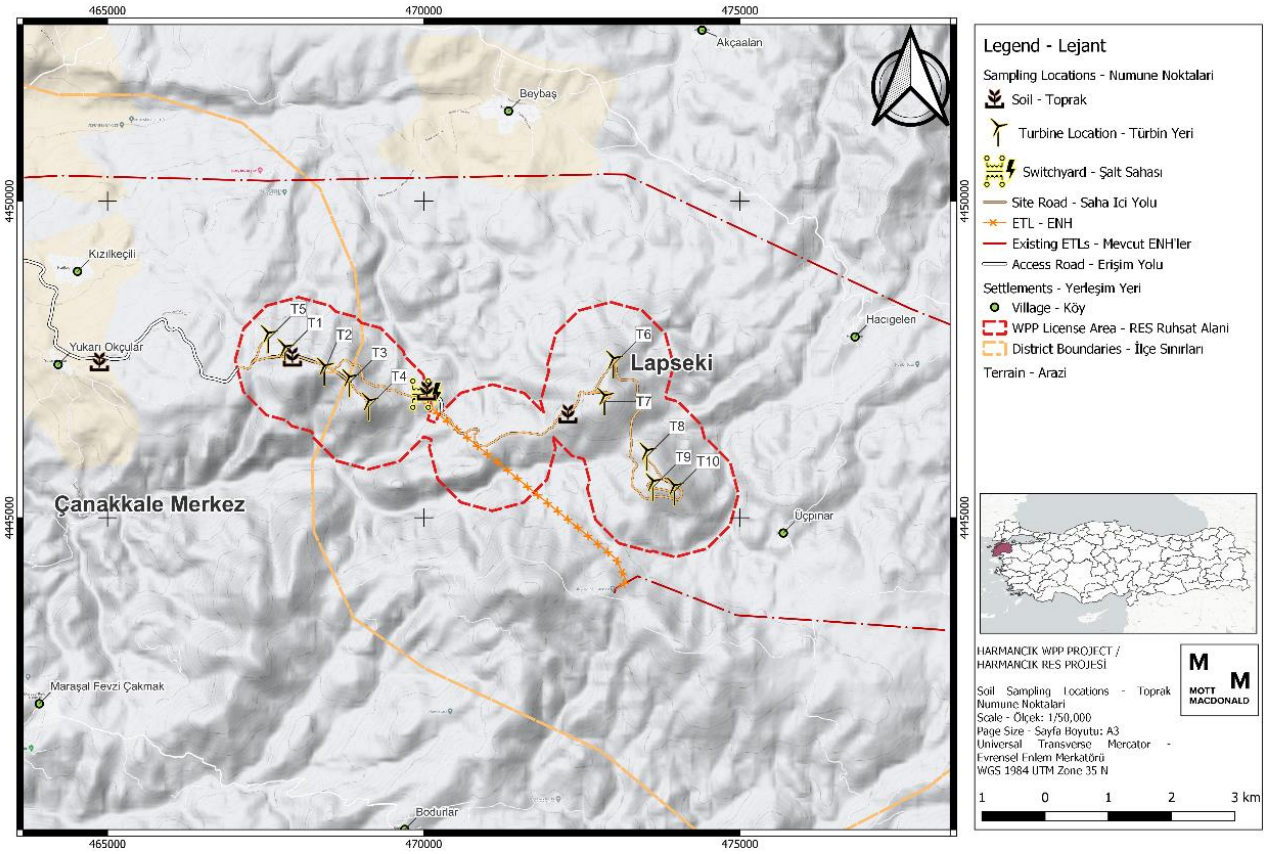


Figure 6-5: Soil Sampling Locations

Figure 6-6: Soil Sampling at Mobilisation Area

Figure 6-7: Soil Sampling at Switchyard Area

Figure 6-8: Soil Sampling at Site Road Area

Figure 6-9: Soil Sampling near Turbine Area

(Note that the photographs are blurred in the publicly disclosed version of this document in compliance with personal data protection regulations)

The results of these analyses are presented in Table 6-4. During the site visit Çanakkale Provincial Directorate of Agriculture and Forestry and local people were consulted regarding historical use of the Project area. Accordingly, it was found that no agricultural activities have been conducted on the Project area. Nevertheless, pesticide sampling and analysis will be conducted at a later stage of the ESIA study. In addition to the pesticide sampling, additional TPH sampling and analysis will also be conducted.

As it can be seen from Table 6-4, the analysis results have been compared with the threshold values for transport of pollutants to groundwater and use of groundwater for drinking (mg/kg oven dry soil) of Regulation on Soil Pollution Control and Point Source Contaminated Sites (OG Dated: 08 June 2010, Numbered: 27605) . Accordingly, no contamination has been observed except Arsenic, Barium, Cobalt, and Nickel of which concentrations have been found higher than the limit values set in the National Legislation.

Slightly elevated levels of Arsenic, Barium, Cobalt, and Nickel do not necessarily indicate short-term or long-term pollution in the soil. These are naturally occurring elements in soil and primarily derived from geological processes and the weathering of rocks and minerals. These chemical elements serve as micronutrients for plant growth and health but can become toxic at elevated levels.

In addition, it should be noted that one-time a soil monitoring sampling study will be carried out after the construction is complete. It should be noted that operation phase soil monitoring will not be conducted since no significant impact had been foreseen due to the activities to be carried out during the operation phase of the Project.

Table 6-4: Soil Sampling Analysis Results

Parameters	Unit	Absorption through ingestion of soil and dermal contact	Inhalation of fugitive dust outdoors	Transport of pollutants to groundwater and drinking of groundwater (DF=10)	Soil-1 (WPP Site Road)	Soil-2 (Mobilisation)	Soil-3 (near Turbine-1)	Soil-4 (Switchyard Area)	Method
TOX	mg/kg	_	-	-	44.1	55.2	40.2	22.8	Internal Method
TPH	mg/kg	_	-	-	<100	<100	<100	<100	TS EN 14039
TVOCs	mg/kg	-	-	-	<0,1	<0,1	<0,1	<0,1	EPA 3051 A EPA 6020 B
Arsenic (mg/kg)	mg/kg	0.4	471	3	**10.06**	**18.46**	**13.89**	**16.79**	EPA 3051 A EPA 6020 B
Barium (mg/kg)	mg/kg	15643	433702	288	**321.67**	86.22	39.23	44.26	EPA 3051 A EPA 6020 B
Cadmium (mg/kg)	mg/kg	70	1124	27	0.50	0.12	0.09	0.12	EPA 3051 A EPA 6020 B
Cobalt (mg/kg)	mg/kg	23	225	5	**9.23**	**7.40**	**5.05**	**5.37**	EPA 3051 A EPA 6020 B
Chromium (mg/kg)	mg/kg	235	24	900000	4.62	20.33	125.95	10.88	EPA 3051 A EPA 6020 B
Copper (mg/kg)	mg/kg	3129	-	514	14.92	8.05	2.55	2.53	EPA 3051 A EPA 6020 B
Nickel (mg/kg)	mg/kg	1564	-	13	4.63	**25.01**	10.50	10.01	EPA 3051 A EPA 6020 B
Lead (mg/kg)	mg/kg	400	-	135	38.73	10.09	9.45	8.51	EPA 3051 A EPA 6020 B
Vanadium (mg/kg)	mg/kg	548	-	2556	29.01	15.49	14.69	15.48	EPA 3051 A EPA 6020 B
Zinc (mg/kg)	mg/kg	23464	-	6811	107.87	21.11	36.74	18.58	EPA 3051 A EPA 6020 B

6.3.3 Geology

According to the National EIA Report prepared for the Project, the WPP License Area is formed Late Eocene-Oligocene aged Mezardere Formation, Oligocene aged Hallaçlar Volcanite and Pliocene aged Bayramiç Formation.

Mezardere Formation

The rock group identified in the oil wells drilled in Northern Thrace and consisting of claystone, mudstone, slope and to a lesser extent sandstone, was defined as the Mezardere formation by Ünal (1967). Mezardere formation belongs to Temek (1949)'s Oligocene marl and shale, and Holmes (1961)'s Yenimuhacir formation belongs to the Ali Sheikh member. Kemper (1961)'s Muhacir formation. It is the counterpart of the Yenimuhacir formation of Gökçen (1967), the Muhacir formation of Türkse Shell (1972), the Mezardere formation of Keskin (1974) and the Muhacir formation of Lebküchner (1974). The formation is a narrow NE-SW extending belt around Yeniköy in the Gelibolu Peninsula. The rock communities that make up the formation are found as thin-layered sandstone-mudstone shale alternations. Sandstones are generally small-grained. *Ta-b* structures of the Bouma sequence, current and climbing ripples, caval and load collapse structures are observed within the sandstones. This rock group is pro-delta sediments. (Sümengen et al. 1987). Thin-layered turbiditic sandstones were deposited due to turbidity currents derived from the delta. The Mezardere formation is gradually transitional with the underlying Ceylan formation. In Thrace, it is overlain by the Osmancık formation (Siyako. 2006). Sümengen et al. (1987) determined the age of the unit as Late Eocene.

Hallaçlar Volcanite

The rocks, which are locally composed of altered andesite, basaltic andesitic lava and pyroclastics, are called Hallaçlar volcanics (Dönmez et al. 2005). Unit Ercan et al. (1995)'s Çan and Kirazlı volcanics are equivalent to the Hallaçlar formation named by Krushensky (1976). It crops out around Söğütalan and Kızılelma in the northeast of the WPP License Area, and around Avcılar and Güre in the south. Most of its outcrops have undergone extreme alteration and stand out in the field with their white, yellow, brown and red colors. Unweathered samples taken from the unit were named as andesite in microscopic examination and the rocks have a hypocrystalline porphyritic texture. Beachioclase, biotite, clinopyroxene, alkali feldspar, apalite and opaque minerals mainly form phenocrysts. Calcite, chlorite and serpentines are encountered as secondary minerals. Plagioclases are in the form of coarse-medium grained, euhedral minerals. Oscillatory zoning is observed in pygioclases. Plagioclases are in oligoclase-andesine composition, depending on their anorthite content, which varies between 12-50%. Biotites are in the form of euhedral-semi-hedral grains. Since clinopyroxenes are degraded from their edges, they are observed as anhedral residues. Opacification and chloritization are observed in biotites, carbonation, chloritization and a small amount of transformation into serpentine-like aggregates are observed in clinopyroxenes.

Bayramiç Formation

Piio-Quaternary fluvial deposits observed in the Biga and Gelibolu Peninsulas were reported by Siyako et al. It was named as the Bayramiç formation in reference to the Bayramiç Stream, where the unit is best observed.

Bayramiç formation consists of red-brown coloured conglomerate, sandstone, and mudstone. The conglomerates that form these deposits have planar, parallel, or erosional layer surfaces. Conglomerate and sandstones are massive or roughly layered, planar parallel layered, planar parallel and trough cross layered. Mudstones are generally massive or roughly parallel layered. Within the Bayramiç formation sediments, sequences starting with conglomerates with erosional bottom surfaces and tapering upwards, passing into sandstones and mudstones, are observed.

These sediments also form point bars with lateral growth surfaces. Geological map of the Project area and its close vicinity is provided in Figure 6-10.

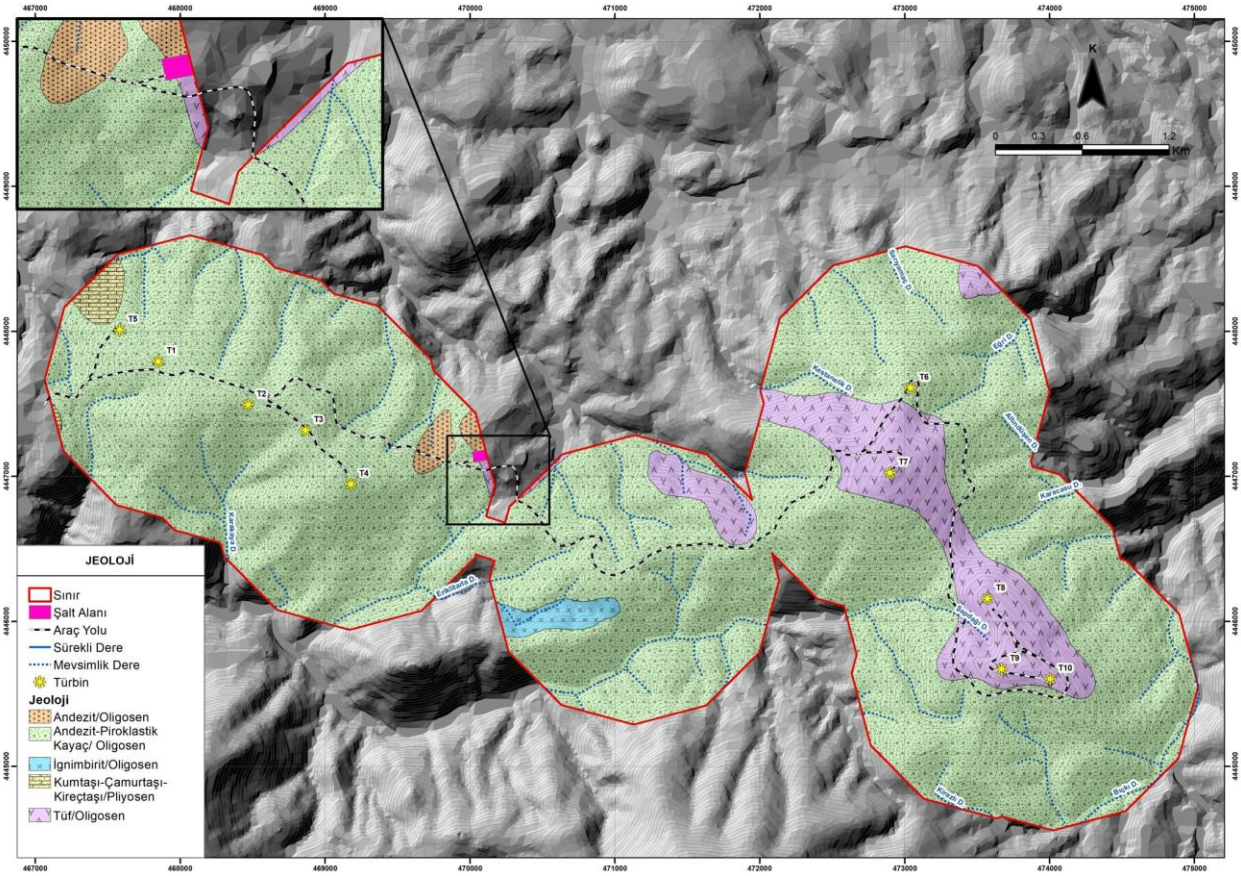


Figure 6-10: Geological features of the Project area

Source: Harmancık WPP National EIA Report, 2023, Savra (Pink: Switchyard, Blue (dashed line): Seasonal creek, Yellow: Turbines, Black-White Line: Roads, Green area: Andesite Pyroclastic Rock / Oligocene, Blue area: Ignimbrite / Oligocene, Yellow area: Sandstone – Mudstone – Limestone / Pliocene, Pink area: Tuff / Oligocene, Orange area: Andesite / Oligocene)

According to the geological-geotechnical studies carried out by Aydın Geotechnic in June 2023, as a result of field, drilling and geophysical studies, units belonging to the Şahinli Formation (Teşa) were observed in the survey area. The unit presents a type section, especially in the east of Lapseki district, around Şahinli village, and from here it is named Şahinli formation. The unit is cut by numerous dykes with basaltic composition. Samples taken from lava levels within the Şahinli formation were identified as basalt in petrographic examinations. The rocks have a hypocrystalline porphyritic texture. The main phenocrysts consist of plagioclase, clinopyroxene, biotite, titanite and opaque minerals.

Rock hand samples were taken from four points, from the exposed parts of the rock units, from the turbine points and switchyard, where drilling work could not be done; and the lithological characteristics of these units were determined and point loading tests were carried out on the samples taken.

In addition, in the study area between 09 June 2023 and 14 June 2023, 76 mm drilling was done with semi-hydraulic type drilling machine. Diameter core barrel, depths of 7.50 to 10.50 m. Drilling work (total depth 78 m.) was carried out at nine locations.

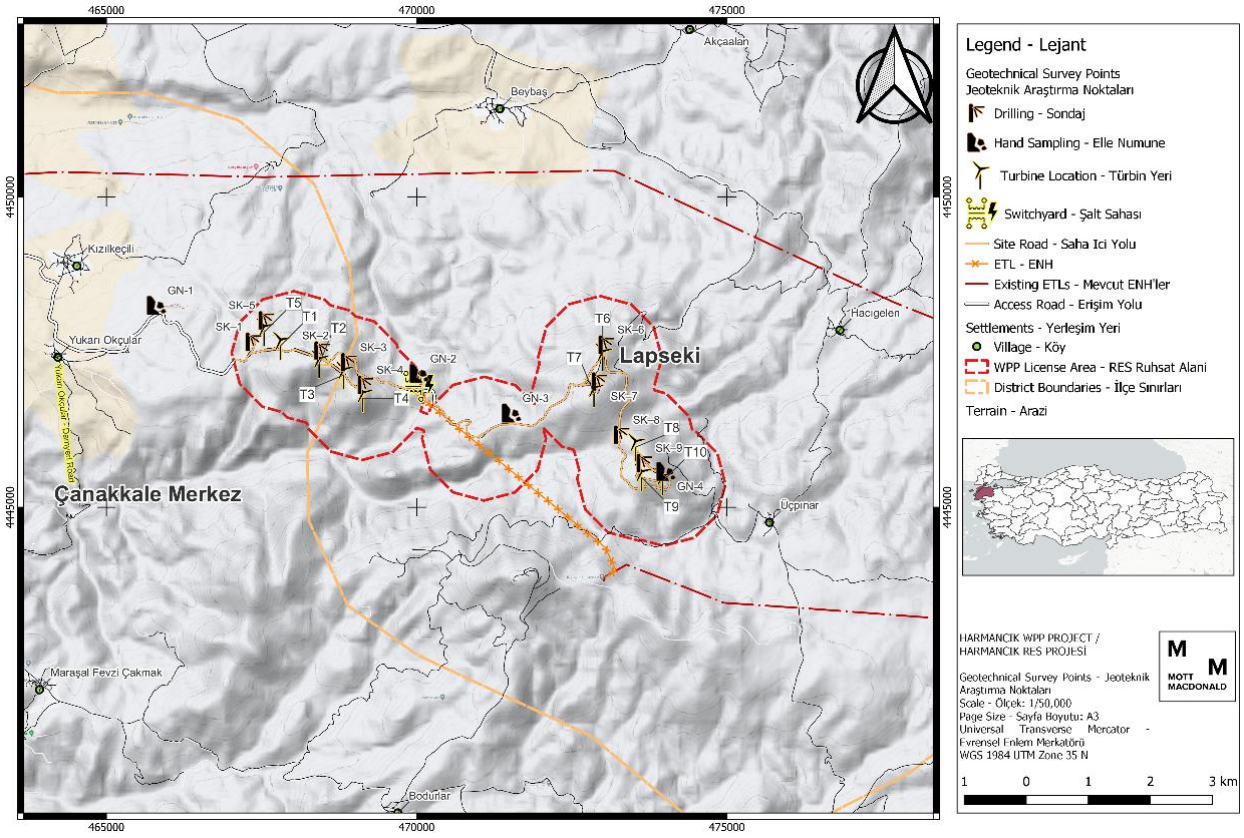


Figure 6-11: Geotechnical Survey Points

Source: Geological-Geotechnical Survey Report[35]

According to the carried out geotechnical survey, following was determined:

- As a result of the drilling carried out in the WPP License Area, groundwater was not detected and there is no potential for liquefaction risk in the rock units in the field.
- According to the results of the uniaxial pressure test performed on the rocks in the WPP License Area, the rocks in the field are in the low-medium strength and weak (R2) rock class, and according to the point loading test results, these rocks are in the low-medium-high strength rock class. The rocks in the WPP License Area are classified as very poor-poor-medium rocks according to the Rock Quality Indicator (RQD) Classification, and very poor-poor-medium according to the RQD Classification. As a result of the drillings, these rocks are in the very poor-poor-medium class according to the RQD Classification, and in the very poor-poor-medium class according to the RQD Classification, and the rocks in the field are evaluated as low-medium weathered.
- Since the geology of the WPP License Area consists of volcanic units belonging to the Şahinli formation (Teşa), no swelling or slumping problems are expected in the field. However, there may be different slumping problems due to the variation in lateral and vertical directions due to the decomposed residual units. In the ground survey studies that will form the basis of the Project, settlement calculations must be made in detail after determining the building loads and foundation dimensions.
- The WPP License Area is located on a sloping and rugged topography. As a result of the geological, geomorphological studies and field observations, it is seen that the WPP Site

[35] Geological-Geotechnical Survey Report Based On 1/5000 (8 pieces) and 1/1000 (32 pieces) Scale Development Plan, 2023 Aydın Geotechnical Engineering, Drilling Ltd.

Roads have a slope of 0-10% because they are corrected as roads, but the general topographic condition of the land has a slope of 0-10%, 10-20%, 20-30%. In field observations no mass movement such as flows, slides, rock falls, landslides, was observed, but it was concluded that stability problems may develop due to uncontrolled excavations and foundation excavations because of slope and lithology (rocks having a weathered, fractured and cracked structure) during the intervention in the topography. In this context, since the field is sloping and the units in the field are altered, fractured and cracked, stability problems can be expected in deep excavations in these areas.

- As a result of the investigations carried out in the study area, Other Natural Disaster Hazards (Collapse, Subsidence, Karstification) and Engineering Problems are not expected.
- In the WPP License Area, volcanic units belonging to the Şahinli formation (Teşa) were observed and the topographic slope is between 0-10%, but when the general topographic condition of the land is considered, the turbine areas vary between 0-10%, 10-20%, 20-30%.
- The suitability for settlement assessment of the WPP License Area was made based on its morphological features, geology, lithological-structural-tectonic features, groundwater status, engineering properties of the soils and earthquake-disaster situation, and these areas were listed as Areas with Stability Problems.

Seismicity

In addition to the National EIA Studies, Peak Ground Acceleration (PGA) values of Switchyard and turbine locations were identified via Türkiye Earthquake Hazard Maps Interactive Web Application (Figure 6.10). Accordingly, the PGA values of the Project components were determined to be varying from 0.293 to 0.300 (Figure 6-12). According to the Türkiye Earthquake Hazard Map PGA values between 0.2 and 0.3 is classified as 3rd Degree Earthquake Zone and 0.3 and 0.4 is classified as 2nd Degree Earthquake Zone. Considering the PGA values is close to 0.3, it can be said that the Project area is located in 2nd Degree Earthquake Zone.

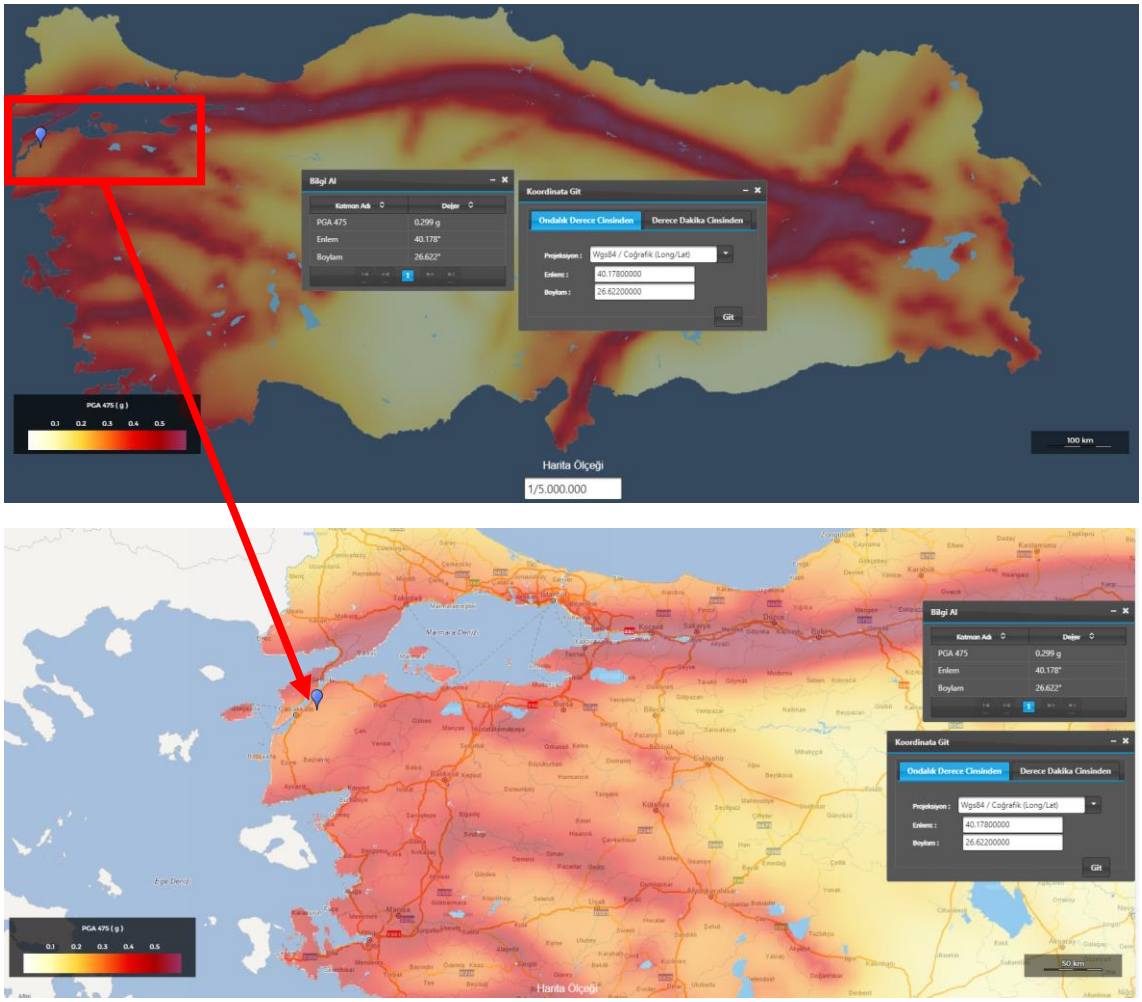


Figure 6-12: Hazard Risk Map of the Switchyard Area (Location is showing T1)

Table 6-5: Peak Ground Acceleration Values for Wind Turbine and Switchyard Locations

Name	X	Y	PGA
T1	26.622	40.178	0.299
T2	26.629	40.176	0.299
T3	26.634	40.174	0.298
T4	26.637	40.171	0.297
T5	26.619	40.180	0.300
T6	26.683	40.177	0.296
T7	26.681	40.171	0.295
T8	26.689	40.164	0.294
T9	26.690	40.159	0.293
T10	26.694	40.159	0.293
Switchyard	26.648	40.172	0.297

Source: Türkiye Earthquake Hazard Maps Interactive Web Application[36]

[36] Türkiye Earthquake Hazard Maps Interactive Web Application[36] (https://tdth.afad.gov.tr/TDTH/main.xhtml)

Erosion

The risk of erosion at the Project area was assessed by the ICONA method using the reclass method in the GIS environment within the scope of the National EIA studies carried out by Savra for the Project. The MAPA/ICONA (Institut National pour la Conservation de la Nature) method is an erosion risk determination method developed and still used by the Spanish General Directorate for the Conservation of Natural Resources (DGCONA). After the ICONA method was developed, it was integrated with UNEP (United Nations Environment Program) standards in order to achieve standards in erosion level values and maps produced.

In the ICONA method, the erosion risk status of a basin or region could be determined by evaluating land use, vegetation density, topographic (slope) condition and geological characteristics of the region using these four main variables related to regional characteristics. ICONA method lists five different levels of erosion risk, namely, very low, low, moderate, high, and very high.

As a result of the ICONA erosion modelling study conducted within the scope of landscape erosion function analysis, low and very low risk of erosion can be observed throughout the project area. Meanwhile, the northwestern, western, and southern parts of the project area consist of areas with medium erosion risk.

Although areas with high erosion risk are also present in the northwestern, western, and southern parts of the project area, they are not as extensive as the areas with medium erosion risk.

Furthermore, the erosion risk of the turbine locations has been assessed within the scope of National EIA studies by ICONA method. Accordingly, it had been identified that Turbine and Switchyard locations have been located on areas where low or very low erosion risk exist, except for T4 where there is medium risk of erosion. Following map shows the erosion risk levels of the Project area.

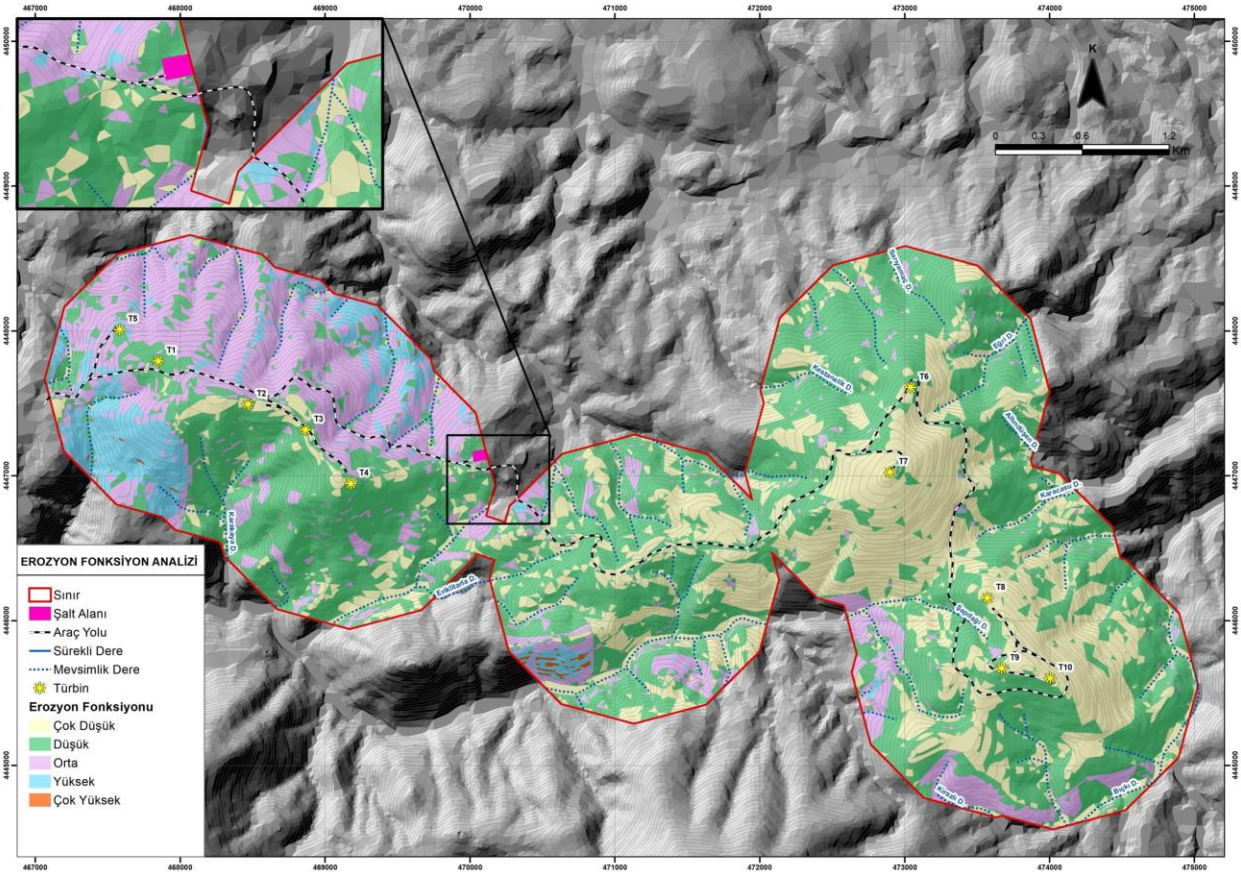


Figure 6-13 Erosion risk levels of the Project area

Source: Harmancık WPP National EIA Report, 2023, Savra (Pink: Switchyard, Blue (dashed line): Seasonal creek, Yellow: Turbines, Black-White Line: Roads, Yellow area: Very low risk, Green area: Low risk, Pink area: Moderate risk, Blue area: High risk, Orange area: Very high risk)

Landslides

According to the Türkiye Landslide Inventory Map, there are passive landslides observed around the Project area. The nearest passive landslide is located 1056 m away from the T4 turbine (Figure 6-14).

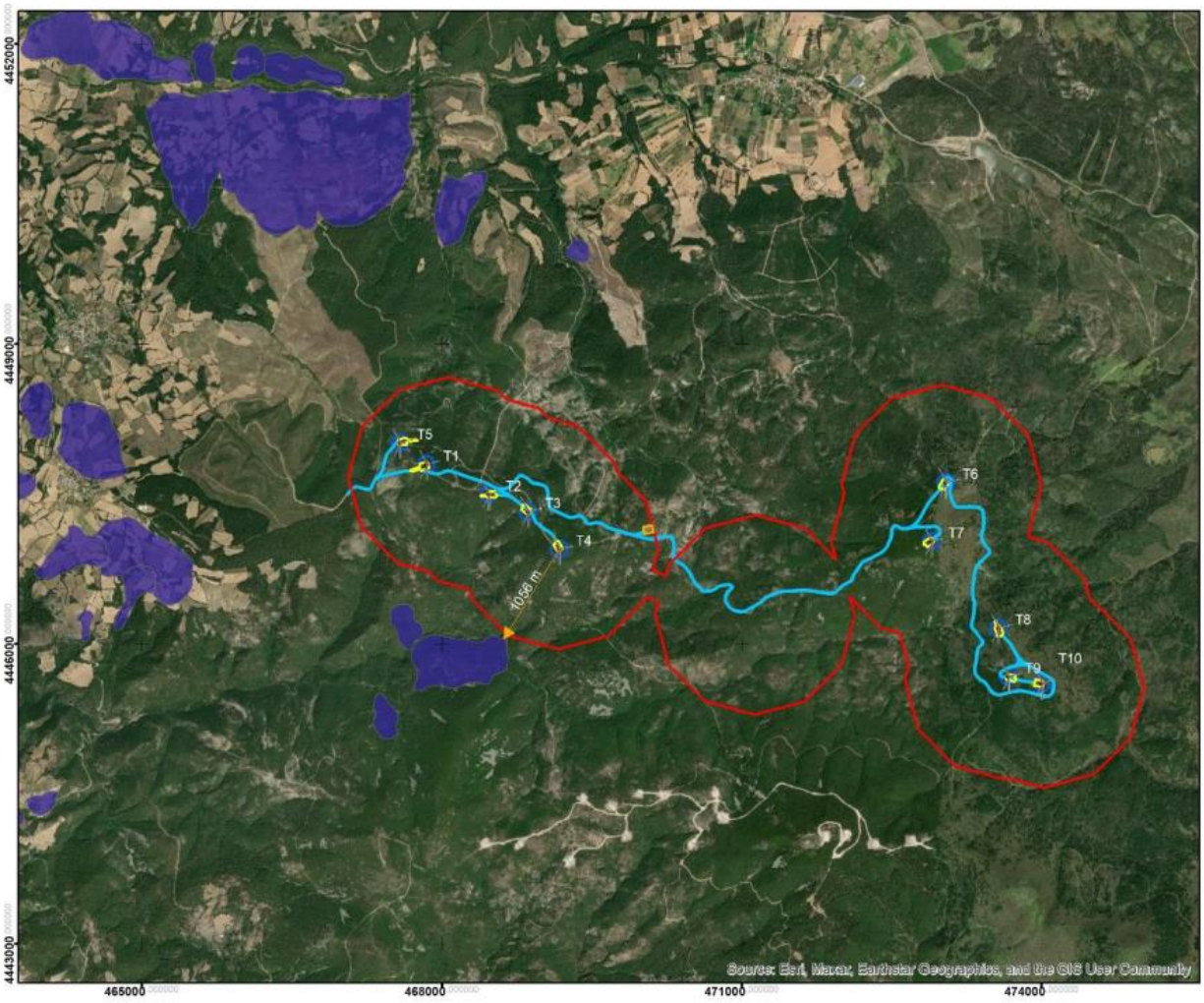


Figure 6-14 Landslide inventory map

Source: Harmancık WPP National EIA Report, 2023, Savra (Orange: Switchyard, Blue: Roads, Yellow: Turbines, Pruple areas: Passive landslide)

6.4 Impact Assessment

6.4.1 Construction

The construction of a wind power plant can lead to the loss of forest area, as it requires space for installing wind turbines, switchyard, and infrastructure like access roads and site roads. This process can contribute to habitat disruption and biodiversity loss in the affected areas.

In addition, the proposed WPP Project is anticipated to have direct and indirect impacts on land use within the Project area. The primary land use changes stem from the installation of wind turbines and the construction of access roads. The wind turbine installation will require clearings for their foundations, resulting in a temporary alteration of the land. The access road to be constructed to access to the WPP License Area, and site roads inside the WPP License Area while providing necessary infrastructure, will involve the opening of a new pathway through the existing terrain. The Project area, characterized by mountainous and rocky features, will necessitate blasting in certain sections, further influencing land use.

6.4.1.1 Impact on Land Use

Land Loss

Within the scope of the Project there will be land use needed for wind turbines, switchyard, and septic tank to be used by personnel. The details are provided below.

Table 6-6: Project Footprint Area

Unit	Area (m^2)
T1	6,910
T2	6,445
T3	5,605
T4	5,580
T5	6,910
T6	5,778
T7	5,484
T8	6,786
T9	5,533
T10	5,183
Switchyard	7,897
Septic Tank	18
Total	**68,129**

The ready-mixed concrete and aggregate will be supplied from ready-mixed concrete batching plants existing outside of the Project area. It is to be noted that any concrete batching plant and new quarry will not be established in either the Project area and/or in its close vicinity.

6.4.1.2 Impacts on Soil

The construction and operational phases of the WPP Project pose potential threats to soil integrity, primarily arising from accidental spills and the application of blasting techniques during site preparation. Soil contamination is a distinct possibility, as spillages of construction materials or operational fluids may infiltrate the soil, compromising its quality and fertility. Construction equipment would need to be refuelled and some hazardous materials or wastes (such as waste paints and degreasing agents) may be generated. Accidental fuel spills or releases of hazardous materials could result in the exposure of vegetation at the Project site, and reestablishment of the vegetation may be impacted or delayed because of residual soil contamination. However, after expected hazardous materials handling and refuelling requirements were met, only small spills or releases would be anticipated. Additionally, the use of explosives in blasting activities has the potential to disturb the soil structure, leading to compaction and reduced permeability.

Contamination Risk

The risk of soil contamination will be contingent upon the effectiveness of containment measures during material handling, storage, and transportation. In the event of accidental spills, the type and quantity of spilled substances will play a crucial role in determining the extent of soil contamination. The implementation of strict spill response protocols will be essential to mitigate potential adverse effects on soil quality.

Topsoil Stripping and Excavation Material Storage

The construction phase of the WPP will necessitate the removal of the topsoil, approximately the top first 15-30 cm of the soil, from areas designated for turbine foundations and the access road. This topsoil stripping process is carried out to facilitate construction activities and expose

the underlying terrain. The stripped topsoil will be temporarily stored to later reinstate the original soil composition after construction. The storage of excavation materials will also be a component of this process, with measures taken to prevent erosion or contamination during storage.

Within the scope of the Project, excess excavation material to be removed during the construction of the turbines will be temporarily stored in the turbine platform areas and reused in backfilling works. A mobile crushing and screening facility will be established to size the material at the filling stage.

After construction activities are completed, the stripped topsoil will be reinstated to the areas from which it was removed. This process is critical for the restoration of soil fertility and ecosystem functions. It was found that a rehabilitation plan has been developed within the scope of the National EIA study to ensure the effective reintegration of the topsoil and promote the recovery of the disturbed areas.

6.4.1.3 IImpact on Geology

The extent of seismicity and erosion requires careful assessment to gauge their impact on the stability and resilience of the area.

Seismicity Impact

Seismicity, the occurrence of earthquakes, can be influenced by the construction activities associated with wind power plants. Although the direct impact might be limited, it's essential to consider the seismic vulnerability of the chosen site.

Potential Geological Hazards

Geological hazards that could affect the construction and operation of a wind energy development site include landslides, rock falls and earthquakes. Earthquakes and volcanic activities happen in areas under specific geologic conditions and are determined by the local geology. Site construction activities can destabilize slopes if they are not conducted properly. Slope failures can occur naturally or be enhanced by slope modifications that change the local groundwater regimes and slope angles. In regions that have active earthquakes, heavy precipitation, or where geologic hazards are common, slope stability is sensitive to minor changes of landscape because of human intervention. Also, the water quality downslope of a failed slope can be adversely affected. During the construction phase, the activities that can potentially activate geological hazards include:

- Slope (or grade) increase resulting from site grading or construction of access roads;
- Toe-cutting at the bases of slopes for construction of on-site structures or access roads; and
- Alteration of natural drainage patterns (e.g., alterations of slope or implementation of on-site storm water controls) or increase of precipitation infiltration (e.g., from clearing vegetation, backfilling with permeable materials, roadbed fracturing due to heavy vehicles) that can increase pore pressure, which weakens the strength of soils on slopes or causes accelerated soil erosion, thereby creating slope instability.

Soil Erosion

Apart from contamination and compaction, the construction activities may increase the vulnerability of the soil to erosion. The removal of vegetation and the disturbance of natural topography can expose the soil to the erosive forces of wind and water. Identifying erosion-prone areas and understanding the potential consequences on nearby ecosystems will be integral to this assessment.

The construction of the access and site roads and turbine foundations, coupled with the blasting activities, may expose the soil to increased erosion potential. The removal of vegetation and disruption of natural contours may exacerbate soil erosion, leading to sedimentation in nearby water bodies. The assessment will focus on identifying erosion-prone areas and estimating the potential sedimentation impacts on surrounding ecosystems. The activities that could contribute to soil erosion include:

- Ground surface disturbance on site, at borrow sites, and along access roads. Ground surface disturbance would occur during the construction or installation of access roads, wind tower pads, staging areas, lay-down areas, substations, transformer pads, underground cables, and other on-site structures. The extraction of geologic materials from borrow areas or quarries would also result in ground surface disturbance.
- Heavy equipment traffic. Heavy vehicles can disturb or destroy originally stable soil conditions and enhance soil erosion by both wind and surface runoff.
- Surface runoff pattern disturbance. Construction activities (e.g., grading and excavation) and the implementation of on-site storm water controls (e.g., culverts and drainage ditches along roads) could alter surface runoff patterns by diverting natural drainage into new areas and locally increasing runoff volume.

In conclusion, the impacts on land use, soil, and geology within the Project area necessitate a thorough assessment to comprehensively understand the potential consequences of the proposed WPP.

Erosion controls, such as drainage channels, settling structures, etc., will be applied prior to site preparation and building activities, as part of the necessary control measures to prevent erosion risk.

The waters from the Project surrounds and slopes will be separated from surface run-off by directing them through temporary channels and soil embankments, thereby eliminating the risk of erosion during periods of high rainfall.

Following the excavation process, the slopes will be reinforced and all erosion control measures, including culvert outlets, will be put into place. Excavation material will be stored in a designated storage area with embankments around it to minimize soil erosion.

6.4.2 Operation

No significant impact had been foreseen due to the activities to be carried out during the operation phase of the Project.

On this basis, it is intended that consideration of land use, soil, and geology impacts during the operational phase are scoped out for future assessment as part of the ESIA.

6.4.3 Summary

Assessment of impacts on land use, soils and geology is done based on the methodology presented in *Chapter 4: ESIA Scope and Methodology*. Accordingly, the magnitude of each impact is estimated as a factor of the foreseen: geographic extent, duration, reversibility, and frequency of the impact, based on expert's judgement. Sensitivity/value of the associated resource/receptor was determined in consideration of the baseline conditions described in the previous sections and typical descriptor of defined in Table 6-7. Specific sensitivity/value criteria considered in assessing the impacts on land use and soils is provided below.

Table 6-7: Land Use and Soil Sensitivity/Value Criteria for Resource/Receptors

Area of Concern	Receptor	High	Medium	Low	Negligible
Land Loss / Arable Lands	Forest Lands	Agricultural area	Forest and pasture area	Urban area	Non arable land
Topsoil Loss	Topsoil	Agricultural area	Forest and pasture area	Urban area	Non arable land
Soil (Erosion)	Soil	Very severe erosion risk	Severe erosion risk	Moderate erosion risk	None or very low level of erosion risk
Soil (Contamination)	Soil	Areas with ecologically critical habitat status	Agricultural and forest areas	Urban area	Industrial and mining areas.
Seismicity / Stability of structures	Structures	1st and 2nd degree earthquake zone	3rd degree earthquake zone	4th degree earthquake zone	5th degree earthquake zone

Table 6-8: Magnitude of Impact on Land Use, Soil and Geology

Magnitude	Definition
Major	• Continuous/long-term oil spills during construction activities on soils and during operation (e.g. accidents) (concentrations of pollutants in the soil defined in the Soil Pollution Control Regulations are exceeded to cause long term cancer and hazard risk) • In case of disturbance of contaminated soils, increase contamination in nearby non-contaminated soils to above the background level that will be hazard to human health • Major impacts on the integrity of structures and functionality of the Project (e.g. collapse of the buildings) during a seismic event. • Soil stability issues leading to landslides Soil erosion process during construction that would lead to sediment loading into the sensitive receptors
Moderate	• Continuous/long-term oil spills during construction activities on soils and during operation (e.g. accidents) (concentrations of pollutants in the soil defined in the Soil Pollution Control Regulations are exceeded above the generic contamination levels but below the long term cancer and hazard risk) • In case of disturbance of existing contaminated soils: increase contamination in nearby non-contaminated soils to above the background level that is above the generic risk levels stated in the Soil Pollution Control Regulations but below long-term cancer and hazard. • Moderate impacts on the integrity of structures and functionality of the Project (e.g. major cracks in the structures) during a seismic event. Soil stability issues leading to small settlements and Soil erosion process during construction that would lead to sediment loading into local waterways-drainage areas
Minor	• Temporary small-scale oil spills during construction and operation (e.g. accidents) activities on soils that lead to contamination below generic contamination levels stated in the Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites (Soil Pollution Control Regulations) • In case of disturbance of existing contaminated soils: increase contamination in nearby non-contaminated soils to above the background level but below the generic contamination levels stated in the Soil Pollution Control Regulations. • Minor impacts on the integrity of structures and functionality of the Project (e.g. minor cracks in the structures) during a seismic event. • Soil stability issues that do not cause health and safety risk concerns Soil erosion process during construction that would lead to small loading in the amount acceptable to the normal sediment loading process
Negligible	• Temporary use of land (with soil surface) for the storage of excavated materials and construction equipment with no or little impact that is recoverable within a short time scale • No earthquake impact • No soil stability issue • No soil erosion

Table 6-9: Summary of Impact Assessment

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Land Loss	Agricultural and Forest Land	Medium	Construction	Project footprint	Irreversible	Certain	Minor	Medium	Minor
Soil Contamination	Agricultural and Forest Land	Low	Construction	AoI	Reversible	Unlikely	Minor	Medium	Minor
Topsoil Stripping	Agricultural and Forest Land	Medium	Land Preparation	Project footprint	Reversible	Occurring regularly under typical conditions	Moderate	Medium	Moderate
Stability of Structures after Earthquake	Project Area Project Components	High	Construction	Regional	Reversible	Possible	Moderate	High	Major
Stability of Structures after Soil Erosion	Project Area Project Components Nearby Settlements	Medium	Construction	AoI	Reversible	Possible	Moderate	High	Major
	Areas with Moderate Erosion Risk	Medium	Construction	AoI	Reversible	Possible	Moderate	Moderate	Major
	Areas with Low Erosion Risk	Medium	Construction	AoI	Reversible	Possible	Moderate	Low	Moderate

6.5 Impact Mitigation & Residual Impact

6.5.1 Land Use

To effectively mitigate impacts on land use, the Project will adopt a hierarchical approach, beginning with avoidance and minimization strategies. It shall be noted that, majority of the significant impact had been avoided as the wind turbine locations were selected on the lands with the Class VII land use capability or lower. So, it can be said that majority of the significant impact had been avoided within the design process. Additionally, the access and site roads design will follow existing terrain contours, minimizing land clearance requirements.

Minimization efforts will involve adopting a careful design for the access road to reduce its impact on land use. This includes exploring alternative routes that avoid sensitive areas, utilizing existing infrastructure where possible, and implementing construction techniques that minimize the need for extensive land clearance. Within this scope it was aimed to use existing roads as much as possible. In addition, shortest paths were preferred as much as possible while deciding on road routes.

After construction, disturbed areas will undergo restoration through the implementation of rehabilitation plans. This involves reinstating topsoil, reseeding with native vegetation, and implementing erosion control measures to restore the ecological functions of the land. Restoration efforts aim to return the land to a condition as close as possible to its pre-development state.

6.5.2 Soil

Mitigating impacts on soil quality involves a multi-faceted approach encompassing prevention, response, and restoration strategies. The hierarchy of mitigation will guide the Project in minimizing adverse effects on soil, responding promptly to incidents, and restoring soil quality after construction activities.

According to the Regulation on Control of Excavation, Construction, and Demolishing Wastes, which went into effect after being published in the Official Gazette dated 18.03.2004 and numbered 25406, stripped topsoil will be stored in areas within the Project area with slopes of no more than 5%.

The soil quality will be maintained and potential losses during topsoil storage will be avoided. Temporary storage places for topsoil will be set up so that vehicle movements will not impact the bulk material and its height does not exceed five meters. In this case, these regions will be marked, and at predetermined intervals, control and monitoring tasks will be completed.

Plants that grow quickly will cover the topsoil's surface if it is left exposed for an extended period. Following the topsoil removal, filling will occur concurrently, and topsoil will be temporarily stored for a brief period. Detailed information regarding the plants to be planted are presented in *Chapter 12: Biodiversity* in detail.

Preventive measures will be implemented to minimize the risk of soil contamination. Emergency Response Plan will detail strict protocols for handling and transporting construction materials and operational fluids, reducing the likelihood of spills reaching the soil. Secondary containment systems will be deployed at storage areas as an additional preventive measure.

In the event of accidental spills, rapid response measures will be activated to contain and remediate the affected areas promptly. Response actions may include the deployment of absorbents, barriers, and specialized equipment to mitigate the spread of spilled substances and prevent further soil contamination.

Accidental spills and releases of hazardous materials and wastes could result in soil contamination throughout the Project's land preparation and construction phase. It is therefore impossible to estimate these accidental amounts before to the incident. Depending on the degree and type of contamination, different management and mitigation techniques will be used in the event that soil contamination occurs. However, prompt treatment of contaminated media is crucial for the effective management of soil contamination, as is developing an understanding of the source-pathway-receptor link in the event of an unintentional spill or leak. The following is a list of some essential measures.

- Accidental spills during the storage of chemical and hazardous materials pose a risk to soil contamination, potentially harming the surrounding environment. Proper containment measures are crucial to mitigate these risks.
- It is forbidden to release substances into the soil that could contaminate it.
- Leaks and spills that happen by accident will be controlled by putting emergency preparedness and response plans into action.
- By carrying out the relevant mitigation measures, solid wastes, hazardous wastes, and wastewater that will be produced as a result of land preparation and building activities will be further handled in *Chapter 11: Waste and Resources.*

A key component of soil impact mitigation involves adaptive management. Regular soil monitoring, coupled with adaptive management strategies, will allow for adjustments to mitigation measures based on monitoring results. This iterative approach ensures continuous improvement in addressing soil impacts throughout the Project's lifecycle.

In addition, the requirements identified in Erosion Control Management Plan Including Drainage and Sediment Management Procedure for the Construction and Operation Phases will be followed.

6.5.3 Geology

Mitigating geological impacts involves a combination of avoidance, engineering solutions, and ongoing monitoring. The hierarchy of mitigation will guide the Project in avoiding high-risk geological zones, implementing engineering measures for stability, and continuously monitoring geological conditions for adaptive management.

To mitigate erosion and promote effective site rehabilitation after the installation of a WPP, several key measures should be implemented. First and foremost, establishing vegetative cover is crucial. Planting native grasses, shrubs, and trees helps stabilizing the soil, reducing the risk of erosion. These plants have deep root systems that anchor the soil and prevent it from being easily displaced by wind or water. Additionally, the use of erosion control blankets or mats can be employed on slopes to provide immediate protection and support the growth of vegetation. Details of this measure are specified in Biodiversity Management Plan and Erosion Control Management Plan Including Drainage and Sediment Management Procedure.

Additionally, stormwater management is essential in erosion control management. Implementing sediment basins, in-channel check dams, soak aways, and silt fences (if needed and where possible) can help trap sediment-laden runoff, preventing it from reaching vulnerable areas. Sediment basins act as temporary storage areas, allowing water to slow down and sediment to settle before it is released from the site. Silt fences, on the other hand, are physical barriers that intercept and control the flow of sediment-laden water, preventing it from causing erosion. Details are presented in Erosion Control Management Plan Including Drainage and Sediment Management Procedure.

Regular monitoring and maintenance of erosion control measures are imperative for their long-term effectiveness. Conducting routine inspections to identify any signs of erosion or

degradation allows for timely intervention. In cases where erosion is detected, quick action will be taken to reinforce or replace erosion control measures as needed. Additionally, educating personnel and stakeholders about the importance of erosion control and rehabilitation measures fosters a collective commitment to maintaining the environmental integrity of the WPP site.

Finally, incorporating soil stabilization techniques, such as the use of biodegradable erosion control blankets and soil-binding agents, can enhance erosion resistance. These measures create a protective layer over the soil, preventing erosion while facilitating the establishment of vegetation. By combining these mitigation strategies, wind power plant developers can ensure sustainable land use and minimize the environmental impact associated with the installation and operation of the facility.

In instances where geological impacts occur, rehabilitation measures will be implemented. This may include the restoration of slopes affected by erosion or landslides, the stabilization of disturbed areas, and the reestablishment of natural geological conditions where feasible.

Continuous monitoring of geological conditions will be conducted throughout the Project's lifecycle. Visual observation will be carried out and database of Disaster and Emergency Management Authority's (AFAD) latest earthquakes list[37] will be controlled regularly to detect changes in soil conditions, subsurface stability, and potential seismic activity. Adaptive management strategies will be employed to adjust mitigation measures in response to monitoring results. Moreover, during the activities to be carried out during construction of turbine foundations as well as other structures such as the administrative building, the provisions of Türkiye Building Earthquake Regulation (18.03.2018/30364) will be complied with.

- In soil-foundation survey studies, stability analyses along the slope will be made by calculating the excavations to be carried out, the structure loads to be planned and external loads, and permanent engineering measures to ensure stability will be determined.
- In soil surveys to be carried out on a parcel/building basis, the foundation type and foundation depth will be determined, the engineering parameters of the building on which the foundation will sit (swelling, settlement, bearing capacity, etc.) and stability analyses along all slopes will be examined in detail, and the necessary precautions will be determined and implemented according to the problems that will arise.
- Cuts that will occur in existing and deep excavations in these areas will be protected with appropriately designed shoring measures, and surface and waste waters will be removed from the surface by drainage method.
- Building foundations will be placed on solid levels of volcanic rocks. Engineering parameters of the units where the building loads will be carried will be examined in ground and foundation surveys.
- In the geotechnical survey studies to be prepared before construction, the impacts of the additional load on the slope on the natural or artificial slope and the distance to the slope edge, determining the safe distance of the additional load to the slope edge that will not disrupt the stability of the slope, examining in detail the problems that may arise from the geotechnical parameters of the rock and the slope, and geotechnical engineering. Depending on the nature of the problem, one or more of the necessary precautions must be taken.
- Slopes that will be formed as a result of all kinds of foundation and road excavations must be supported by retaining structures appropriate to the technique.
- The construction phase will not begin without ensuring the safety of the parcel, the neighbouring parcel, and the road.

[37] AFAD's list of lates earthquakes (URL: https://deprem.afad.gov.tr/last-earthquakes)

- Care will be taken to base the targets on levels with the same geological, lithological and geotechnical characteristics. Appropriate projects will be developed for the foundations that will sit on different units. Existing and under-construction slopes will be supported by appropriate retaining structures.
- Since there are dry streams crossing the WPP License Area, DSI will be informed about planned and ongoing studies and in case of floods, slope floods and inundations.
- In places where the slope is high, necessary measures to reduce the slope will be determined and implemented.
- The provisions of the Turkish Building Earthquake Regulation and the Regulation on Buildings to be Built in Disaster Areas will be complied with.

In addition, the requirements identified in Erosion Control Management Plan Including Drainage and Sediment Management Procedure for the Construction and Operation Phases will be followed.

6.5.4 Residual Impacts

Summary of the residual impacts after relevant mitigation measures are provided below in Table 6-10.

Table 6-10: Mitigation Measures and Residual Impact

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Land Loss	Agricultural and Forest Land	Minor	Negligible
Soil Contamination	Agricultural and Forest Land	Minor	Negligible
Topsoil Stripping	Agricultural and Forest Land	Moderate	Negligible
Seismicity	Project Area Project Components	Major	Low
Stability of Structures after Soil Erosion	Areas with Severe Erosion Risk	Major	Low
	Areas with Moderate Erosion Risk	Major	Low
	Areas with Low Erosion Risk	Moderate	Negligible

7 Air Quality

7.1 Introduction

This chapter presents potential emission sources with respect to air quality, from the construction phase of the Project and assesses their impacts on local receptors and / or amenities. The assessment has been undertaken taking into account the requirements of national and international standards such as IFC and EBRD performance standards and guidelines and Regulation on the Control of Industrial Source Air Pollution (RCAPOI).

As a renewable energy source, wind energy has fewer effects on air quality than fossil energy sources and that is why it may be considered as desirable energy source in terms of air quality aspect. However, some construction facilities of wind turbines such as earthwork, excavation, transportation of soil and materials may cause temporary fugitive dust emissions and engine emissions.

Construction phase emissions are handled in two categories:

- Earthwork activities: Earthwork activities generates fugitive dust emissions which occur from excavation of road routes and turbine areas, blasting, crushing the material, loading and unloading and transportation of excavation material,
- Engine emissions: During construction, a number of vehicles will be used resulting in combustion emissions. In addition, a mobile crushing plant will be used as well as diesel-fired generators on a need-basis.

The Project has the potential to affect air quality during the construction phase. The Project related air emissions during the construction phase will include particulate matter with an aerodynamic diameter of less than 10 and 2.5 microns (PM_{10}, $PM_{2.5}$)) due to earthworks and construction activities. It will also lead to emissions of oxides of nitrogen (NO_x), Sulphur Oxides (SO_x), VOC's, CO, PM_{10} and $PM_{2.5}$ emissions from construction equipment and construction vehicles.

The Project's operation is designed to have a minimal footprint on air quality. While routine activities will necessitate the use of security and maintenance vehicles, and the emergency backup generator will require periodic testing, these operations are strictly controlled to mitigate any potential air quality impacts. The limited number of vehicles and the short operating duration of the generator ensure emissions remain de minimis.

The project will include an emergency generator for use in the administrative building. The generator will only be used during short-term power outages, resulting in approximately a few hours of use per year. Four vehicles will be used for Project operation, including maintenance, repairs, security, and personnel transportation. The low number of vehicles and the limited use of the generator indicate that emissions from these sources will be negligible.

This aligns with the EHS Guidelines for Wind Energy published by the IFC, which states that "Wind energy facilities do not normally generate process emissions and effluents during their operation."

7.2 Methodology

The air quality impact assessment has been conducted through the following steps:

- **Establishment of baseline:** Ambient air quality conditions within the Project AoI have been identified by conducting baseline measurements. Detailed explanations of the baseline

measurements conducted to assess ambient air quality conditions within the Project AoI are provided in Section 7.2.4. and Section 7.3.1.

- **Assessment of impacts:** Possible impacts related to air quality and emissions have been assessed together with their significance levels. Impact assessment covers:
  - Assessment of deviation from baseline conditions: An air quality dispersion modelling study was carried out by using AERMOD View – Gaussian Plume Air Dispersion Model software to estimate Project emissions and their contribution to the baseline conditions for both construction and operation phases of the Project.
  - Assessment of potential impacts on key receptors associated with construction and operation phases of the Project. Key receptors which are anticipated to be sensitive to changes in the existing air quality conditions on site are considered to include human health (nearby communities, businesses, Project employees), and ecological receptors.
- **Development of mitigation measures:** To reduce any significant impacts to an acceptable level and to identify good practice measures to minimise the overall environmental impact from associated with the Project.

The AERMOD model was employed in the air quality modelling study. AERMOD model, which was developed by United States Environmental Protection Agency (US EPA), is one of the most advanced computer models estimating hourly, daily and annual ground level concentrations (GLCs) on the basis of the real time values. The model enables the calculation of different dispersion models for different sources (point, volume, line) from isolated stacks to fugitive pollutants. Additionally, it can consider conditions like aerodynamic waves and turbulence. Latest version of the software (i.e., AERMOD 22112) which was released in April 2022 is used.

Hourly meteorological data for the modelling study were obtained from the Edremit Meteorological Station which is 22 km away from the project boundary run by General Directorate of Meteorology. In order to determine representative meteorological year, prevailing wind direction was determined for long term meteorological data from 1960-2022 meteorological bulletin and this data was compared with each year's prevailing wind directions. Result of this study meteorological data of 2015 were used for the modelling study. As a result of the modelling study, dispersion maps were generated for maximum daily and annual average emission dispersions of PM_{10} and $PM_{2.5}$ parameters for the construction phase. When determining pollutant parameters, an assessment was made considering the quantity and exposure duration of the potential pollutants including PM parameters as well as emission parameters from vehicles (i.e. gas parameters). The mass flows of these pollutants were calculated, and consequently the mass flow of the PM parameter was observed to be quite high. These calculations are presented in Table 7-8. The RCAPOI valid in Türkiye has determined threshold values for these parameters. The calculations have been compared with the threshold values specified in RCAPOI and it is seen that the mass flows of gas parameters are below the Regulation threshold values. As such, only PM parameters were included in the modelling study as all other parameters remained significantly below the threshold values provided in the legislation.

7.2.1 Applicable Guidelines and Standards

There are a number of national requirements that the Project will have to comply with in addition to appropriate international lenders requirements. This section provides a brief overview of the applicable regulations and standards that will be applied to the Project.

7.2.1.1 National Requirements

Within the framework of national legislation, limit values for all kinds of industrial activities are given in the RCAPOI. Ambient air limit values are provided in Annex-2 Table 2.2 of RCAPOI

and these limit values decrease gradually over the years until 2024. The limit values for key parameters in Table 12 of the RCAPOI are shown in Table 7-1.

Table 7-1: Limit Values Stipulated in the RCAPOI

Parameter	Period	Limit Value [µg/m^3] [Deposition mg/m^{2}day]						
		2014	2015	2016	2017	2018	2019-2023	2024 and later
PM 10	24 hours (not to be exceeded more than 35 times a calendar year)	100	90	80	70	60	50	50
	Annual	60	56	52	48	44	40	40
PM 2.5	24 hours	-	-	-	-	-	-	-
	Annual	-	-	-	-	-	-	-

7.2.1.2 International Requirements

IFC Requirements

The IFC provide a portfolio of Standards and Guidelines that should be adhered to for any project seeking IFC finance. The IFC PS 3: Resource Efficiency and Pollution Prevention[38] aims:

"To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities".

To achieve this, the IFC provides both industry-specific and general guidance on GIIP with respect to ambient air quality and emissions to air. The Project will need to comply with the IFC Performance Standards, and the standards set out in the IFC EHS General Guidelines[39].

The IFC General EHS Guidelines advise that 'relevant standards' with respect to ambient air quality are national legislated standards or, in their absence, the current World Health Organisation (WHO) Air Quality Guidelines or other internationally recognised sources. As Türkiye has its own nationally legislated standards, as described above, these have been used to determine significance of potential ambient impacts.

The IFC General EHS Guidelines suggest that, as a general rule, emissions should not contribute more than 25 percent of the relevant air quality standards to allow additional, future sustainable development in the same airshed. Therefore, the significance of the impact of the Project has been discussed in the context of this approach.

EBRD Requirements

The Project has been assessed against the guidance provided by the EBRD Environmental and Social Policy PR3: Resource Efficiency and Pollution Prevention Control[40] the objectives of which are:

"adopt the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource use and pollution released from the project"

[38] International Finance Corporation Performance Standard 3: Resource Efficiency and Pollution Prevention 2012

[39] International Finance Corporation, World Bank Group, General Environmental Health and Safety Guidelines (2008)

[40] European Bank for Reconstruction and Development, Environmental and Social Policy 2019

PR3 refers to EU substantive environmental standards[41] and requires projects to be structured so that these can be applied at the project level.

"When host country regulations differ from the levels and measures presented in EU substantive environmental standards or other appropriate environmental standards identified, projects will be required to meet whichever is more stringent."

PR3 also states "The client will structure the project to meet relevant EU substantive environmental standards, where these can be applied at the project level". It further clarifies how this should be implemented and confirms "For the purpose of this PR, EU substantive environmental standards can be applied at the project level where the EU secondary legislative document itself contains clear quantitative or qualitative requirements that are applicable at the project level (as opposed to, e.g., ambient level)."

On this basis the national ambient air quality standards are the primary standards applicable to the Project.

7.2.1.3 Project Standards

The limit values determined for the project in accordance with national legal requirements are as summarized in Table 7-2 in addition to EU limit values which have been used to supplement national standards where specific averaging periods are not included.

Table 7-2: Air Quality Standards

Parameter	Averaging Period	Turkish Limit Values (1) (µg/m³)	EU Limit Values (2) (µg/m³)	WHO/ (Guideline) Values	Project Standards
PM $_{10}$	24 hours	50 (not to be exceeded more than 35 times a year)	50 (not to be exceeded more than 35 times a year)	45 (not to be exceeded more than 3-4 times a year)	45
	Annual	40	40	15	15
PM $_{2.5}$	24 hours	-	-	15 (not to be exceeded more than 3-4 times a year)	15
	Annual	-	20	5	5

(1) Annex-2 Table 2.2 of RCAPOI
(2) EU Council Directive "2008/50/EC

7.2.2 Study Area and Area of Influence

The Project area is located in the Kızılkeçili and Yukarıokçular Villages region of the Merkez District in Çanakkale Province, and in the Üçpınar and Hacıgelen Villages regions of the Lapseki District. The study of determining the AoI aiming at the evaluation of air quality was carried out by evaluating various factors and standards. The main evaluations made for this purpose are:

- The distribution of the emission sources,
- The land uses and intensities of sensitive receptor types, and
- regulations and guidelines.

[41] Substantive environmental standards of the EU are comprised in EU secondary legislation, e.g., regulations, and directives. Procedural norms directed at Member States and EU institutions and the jurisprudence of the European Court of Justice and the Court of First Instance which applies to Member States, EU institutions and EU legal and natural persons, are excluded from this definition.

The Project activities have the potential to impact residential areas. The nearest residential areas that could be affected by the activities are Kızılkeçli Village in the central district, Yukarıokçular Village, and Üçpınar Village in Lapseki District.

Another criterion to determine AoI is Turkish RCAPOI which was published in the Official Gazette dated 03 July 2009 and numbered 27277 and amended with the date 06 November 2020 and numbered 31296. The impact area defined in the RCAPOI for the modelling study suggests an area should be taken as square-shaped area with a side length of two km which is the minimum AoI.

Within the scope of the Project, emissions from point, areal, and linear sources arising from road and turbine construction activities are distributed heterogeneously in the field. Hence, examination areas have been established by separately evaluating each emission source based on its type. For linear sources, a two-kilometer area on both sides of the source has been designated as the impact area, while for areal sources, a two-kilometer radius area from the center of the source has been defined as the impact area.

As can be seen in the Figure 7-1, a total of 288 receptors are located in 2 different polar grid receptor systems, each consisting of 144 receptors, with 250-meter rings cut at 10-degree angles to represent field sources. In addition, in order to determine the effect of emissions from the road on the receptors, a total of 2299 discrete receptor system placed at intervals of 10 to 100 meters from the source centre were used, as shown in the below figure.

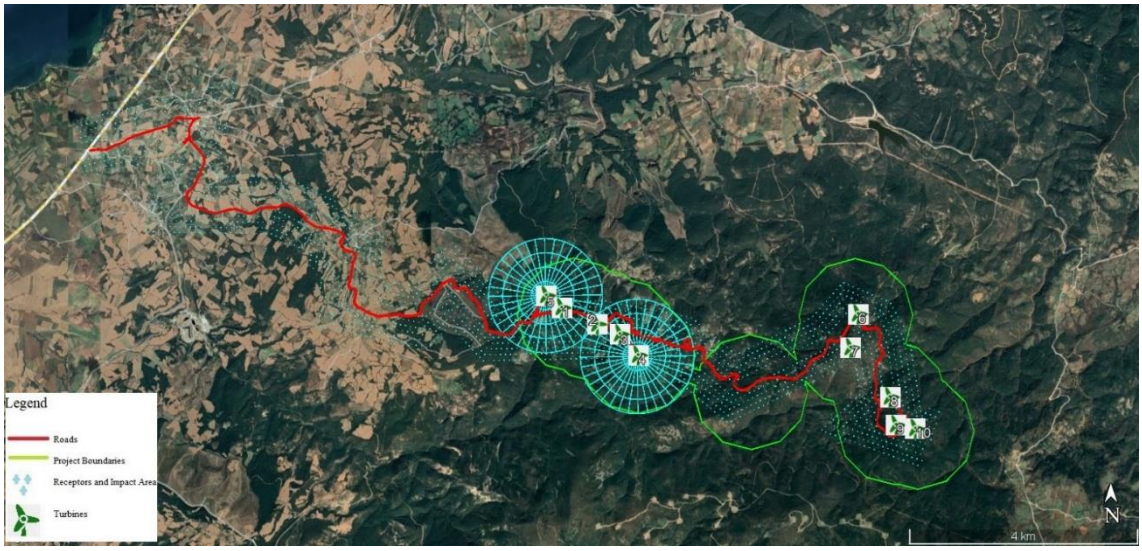


Figure 7-1: Impact Area Selected for the Air Quality Modelling Study

7.2.3 Limitations and Assumptions

Air quality measurements have been classified according to the receptor environment characterization, considering the size of the Project area. Representative points have been identified, assuming that they represent the entire region with similar characterization.

It is assumed that during excavation operations, material removal will be carried out by trucks with having a capacity of 10 m³. Additionally, it is assumed that heavy machinery will consume fuel at a rate of 25 liters per hour. Within the scope of the Project, it is anticipated that the construction activities will span 48 days, and work will be conducted for 8 hours per day.

7.2.4 Baseline Measurement Methodology

Project specific baseline monitoring has been undertaken to support the assessment. When determining the baseline air quality sampling locations, care was taken to identify points that would represent all receptors. The measurement point selections were carried out taking into account factors such as the distribution of emission sources of the Project, the distance of sensitive receptors to emission sources, in particular emission quantity and exposure duration, the similarity of receptors to each other, and their representational capacity. As mentioned in the previous section, the study area includes various sensitive receptors such as settlements, forest lands, and agricultural lands. Due to the extensive coverage of the Project area and the technical impracticality of sampling at all receptors within this area, representative locations suitable for each receptor type have been identified. As a general approach, it was considered that the background emissions of nearby settlements with similar demographic and geographical characteristics would be similar, and a single measurement location was determined for nearby settlements. A single sampling location was also determined for geographically similar areas in agricultural and forest lands. When determining these locations, the following factors were taken into account based on the receptor type:

1. Settlements: Representative sampling points were identified for settlements within the study area, where demographic and geographic factors are similar for receptors. For settlements that are close to each other, they often have similar demographic structures, and if there is geographic similarity, emission sources also exhibit similarity. In such cases, it is expected that background emissions would represent each other.

2. Forest and agricultural areas: Dust emissions originating from forestry may occur in forest areas in the region. In agricultural lands, emissions from agricultural activities are possible. In addition, factors such as long-range and transboundary dust emissions and forest fires can also affect the emission levels in these areas. Due to all these factors in forest and agricultural lands with similar geographic structures, similar emissions are expected to occur. Therefore, when determining emission sampling locations, locations representing the receptor type as a whole have been identified.

Monitoring was undertaken for PM_{10}, $PM_{2.5}$, parameters. PM10 and $PM_{2.5}$ measurements were carried out at 4 different locations for 30 days between 23 October 2023 and 23 November 2023 for each around the Project area. Measurement devices are designed to sample dust (PM_{10} and $PM_{2.5}$) in ambient air.

7.2.4.1 Overview

Considering the characteristics of the emission sources in the Project timeline, the modelling study was carried out for the construction phase.

In order to determine construction phase emission impacts, emissions were calculated by using emission factors and an air quality modelling study was carried out by using *AERMOD,* which is the *US EPA's* regulatory model.

AERMOD model is one of the most developed computer models estimating hourly, daily and yearly GLC's on the basis of the real time values. Model comprises the calculations of different dispersion models for different sources (point, volume, line) from isolated stacks to fugitive pollutants. Additionally, it considers conditions like aerodynamic waves and turbulence.

Emission dispersions are calculated by using hourly meteorological data which covers all hours of one year meaning all best and worst meteorological conditions are considered in the modelling study for the Project area.

AERMOD model works in a network system defined by the user and calculations are made for corner points of each receiving environment segments forming the network. The network system

used by AERMOD model can be defined as polar or Cartesian. Additionally, detailed calculations can be made at the discrete receptor points, which can be determined out of the network system. In the dispersion calculations, Planetary boundary layer theory is used. In the model, there is also an option for hilly areas.

Assessment of construction of phase impacts through the use of dispersion modelling is a national requirement.

7.2.4.2 Construction Phase Emissions

The land preparation and construction phase activities covers the land arrangement (land preparation and excavation) activities of the roads and turbine area. Significant pollutant of this step will be dust generated from excavation, loading and unloading on trucks and vehicle movements. No greenhouse gases will be emitted by construction activities except engine emissions.

In addition to turbine and road construction activities, the Project will also involve the construction of an ETL as an associated facility. The only source of emissions during the installation of the ETLs will be the excavation of the foundations for the pylons. According to the Project Information Document (PID) prepared, four excavation measuring 3mx3mx3m will be carried out for each pylon. Due to the low volume of excavation required, the fact that this work will be carried out at times independent of the other emission-generating activities of the project, the distance between the emission sources, and the fact that the excavation will be completed in a short period of time (approximately one day), the emissions from this activity will be negligible. Therefore, energy transmission line installation works have not been included in the emission assessment.

Used Emission Factors in Calculations

In order to calculate dust and engine emissions, emission factors were used. There will be two main construction activities during the project as road construction and turbine platform construction.

As mentioned in the previous section, dust emissions resulting from excavation, loading/unloading to trucks, and vehicle movements will occur during construction activities. The emission factors provided in the literature for these activities and used in calculations for the project are as follows.

Blasting

Blasting emissions are addressed in the US EPA document “Western Surface Coal Mining”, Section 11.9.

$$E_{PM10} = 0.52 \times 0.00022 \times (A)^{1,5}$$

$$E_{PM2.5} = 0.03 \times 0.00022 \times (A)^{1,5}$$

Where;

$E_{PM10/PM2.5}$	: Emissions of $PM_{10}/PM_{2.5}$ (kg/blast)
A	: blasting surface area for blasts up to 21 meters deep.

Crusher

The project will include a fully enclosed mobile crushing and screening plant. In order to calculate particle emissions of crushers and screen plant, emission factors were used. Particulate matter emission factors derived from *The EMEP/EEA Air Pollutant Emission Inventory Guidebook 2023-Quarrying and mining of minerals other than coal- Table 3-2*

Emission factors per processing step and particles size document. Abatement efficiencies are derived from *The EMEP/EEA Air Pollutant Emission Inventory Guidebook 2023-Quarrying and mining of minerals other than coal- Table 3-3 Abatement efficiency per processing step and per abatement technology* document.

$$E_{PM10} = 0.0012 \text{ (kg/t)}$$

$$E_{PM2.5} = 0.0006 \text{ (kg/t)}$$

Since the mobile crushing and screening plant to be used in the project will be completely enclosed, an emission reduction factor has been applied. EMEP document states in Table 3-3 that emission measures in these activities provide a 90% reduction. Therefore, in the modelling study, a value of

$$E_{PM10} = 0.0012 \text{ (kg/t)} \times 0.1 = 0.00012 \text{ (kg/t)}$$

$$E_{PM2.5} = 0.0006 \text{ (kg/t)} \times 0.1 = 0.00006 \text{ (kg/t)}$$

Excavation

Particulate related emissions from excavation is calculated by emission factors derived from US EPA AP-42 Section 11. Western Surface Coal Mining Table 11.9-2. These emission factors are shown below. Moisture content of the material are obtained from Table 11.9-3 of same document.

$$\mathbf{E_{PM10}} = \frac{\mathbf{0.0029}(\boldsymbol{d})^{\mathbf{0.7}}}{(\boldsymbol{M})^{\mathbf{0.3}}} \boldsymbol{x}\ \mathbf{0.75}$$

$$\mathbf{E_{PM2.5}} = \frac{\mathbf{0.0046}(\boldsymbol{d})^{\mathbf{1.1}}}{(\boldsymbol{M})^{\mathbf{0.3}}} \boldsymbol{x}\ \mathbf{0.017}$$

Where;

$E_{PM10/PM2.5}$	: Emissions of $PM_{10}/PM_{2.5}$ (kg/m^3)
d	: drop height (as average 2 meter was used)
M	: Moisture content (7.9 % was used)

According to these equations, excavation emission factors are calculated as follow;

$$\mathbf{E_{PM10}} = \frac{\mathbf{0.0029}(\mathbf{2})^{\mathbf{0.7}}}{(\mathbf{7.9})^{\mathbf{0.3}}} \boldsymbol{x}\ \mathbf{0.75} = \mathbf{0,\ 0019\ kg/m^3}$$

$$\mathbf{E_{PM2.5}} = \frac{\mathbf{0.0046}(\mathbf{2})^{\mathbf{1.1}}}{(\mathbf{7.9})^{\mathbf{0.3}}} \boldsymbol{x}\ \mathbf{0.017} = \mathbf{0,\ 00009\ kg/m^3}$$

Within the scope of the project, regular irrigation will be conducted to reduce emissions resulting from excavation activities during the construction phase. Mojave Desert Air Quality Management District Antelope Valley Air Pollution Control District Emissions Inventory Guidance Mineral Handling and Processing Industries is stated in section VI-D that emission measures in these activities provide a 75% reduction. Therefore, in the modelling study, a value of

E_{PM10} = 0. 0019 kg/m^3 × 0.25 = 0. 000475 kg/m^3

$E_{PM2.5}$ = 0. 0009 kg/m^3 × 0.25 = 0. 0000225 kg/m^3 has been used.

Loading/Unloading to trucks

Particulate related emissions from excavation is calculated by emission factors derived from US EPA AP-42 Section 11. Western Surface Coal Mining Table 11.9-2. These emission factors are shown below. Moisture content of the material are obtained from Table 11.9-3 of same document

$$\mathbf{E_{PM10}} = \frac{\mathbf{0.0596}}{(\boldsymbol{M})^{\mathbf{0.9}}} \boldsymbol{x}\ \mathbf{0.75}$$

$$\mathbf{E_{PM2.5}} = \frac{\mathbf{0.580}}{(\boldsymbol{M})^{\mathbf{1.2}}} \boldsymbol{x}\ \mathbf{0.019}$$

Where;

$E_{PM10}/_{PM2.5}$	: Emissions of $PM_{10}/PM_{2.5}$ (kg/ton)
M	: Moisture content (7.9 % was used)

According to these equations, excavation emission factors are calculated as follow;

$$\mathbf{E_{PM10}} = \frac{\mathbf{0.0596}}{(\mathbf{7.9})^{\mathbf{0.9}}} \boldsymbol{x}\ \mathbf{0.75} = \mathbf{0.0069\ kg/ton}$$

As material density is 1.5 ton/m^3

$$\mathbf{E_{PM10} = 0.0046\ kg/m^3}$$

$$\mathbf{E_{PM2.5}} = \frac{\mathbf{0.580}}{(\mathbf{7.9})^{\mathbf{1.2}}} \boldsymbol{x}\ \mathbf{0.019} = \mathbf{0.00092\ kg/ton}$$

As material density is 1.5 ton/m^3

$$\mathbf{E_{PM2.5} = 0.00061\ kg/m^3}$$

In order to reduce dust emissions from the loading and unloading activities, regular irrigation will be conducted. Emissions Inventory Guidance Mineral Handling and Processing Industries[42] states in section VI-D Table-5 that emission measures in these activities provide a 75% reduction.

$$E_{PM10} = 0.0046\ kg/m^3 \times 0.25 = 0.00115\ kg/m^3$$

$E_{PM2.5}$ = 0.00061 kg/m^3 × 0.25 = 0.0001525 kg/m^3 has been used.

Vehicle Movements (Transportation)

Emissions from transportation of raw material are calculated by emission factors derived from The EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019-Quarrying and mining of minerals other than coal- Section 3.3.3 Internal Transport document for unpaved roads. These emission factors are shown below.

[42] Emissions Inventory Guidance Mineral Handling and Processing Industries, Mojave Desert Air Quality Management District Antelope Valley Air Pollution Control District, April 2020.

$$E_{PM10} = k_{PM10} \times \left(\frac{s}{k_s}\right)^{0.9} \times \left(\frac{W_{dumper}}{k_W}\right)^{0.45} \times d_{unpaved} \times \left(1 - \frac{p}{k_{day}}\right) \times (1 - ER)$$

$$E_{PM2.5} = k_{PM2.5} \times \left(\frac{s}{k_s}\right)^{0.9} \times \left(\frac{W_{dumper}}{k_W}\right)^{0.45} \times d_{unpaved} \times \left(1 - \frac{p}{k_{day}}\right) \times (1 - ER)$$

Where;

$E_{PM10}/_{PM2.5}$	: Emissions of $PM_{10}/PM_{2.5}$ (kg/h)
S	: Silt content (3.9% was used)
W_{dumper}	: Dumper weight (40 ton was used)
$d_{unpaved}$	: Total distance (approx. use of 1 km per hour)
ER	:Abatement factor (0)
p	:Number of days per year with at least 0.254 mm natural precipitation (average 143 days was used)
k_{PM10}	: 0.422 (kg/km)
$k_{PM2,5}$	: 0.042 (kg/km)
k_w	: 2.72 (t)
k_s	: 12
k_{day}	: 365

According to these equations, vehicle movement emissions factors are calculated as follow;

When it is assumed that each truck carries 10 cubic meters of material, the emission factor will be as follows.

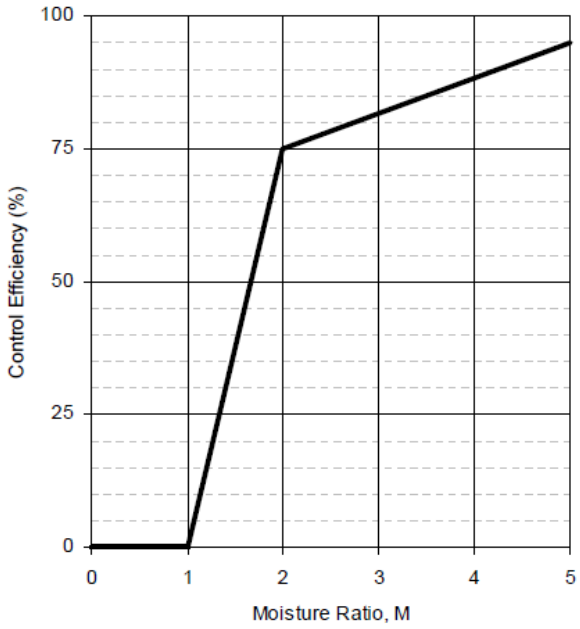
E_{PM10} = 0.313 kg/h / 10 m^3/h =0.0313 kg/m^3

$E_{PM2,5}$= 0.0422 x (3.9/12)$^{0.9}$ x (40/2.72)$^{0.45}$ x 1 x (1-143/365) = 0.0313

When it is assumed that each truck carries 10 cubic meters of material, the emission factor will be as follows.

$E_{PM2.5}$ = 0.0313 kg/h / 10 m^3/h =0.00313 kg/m^3

In order to reduce dust emissions, haul roads will be regularly watered. In the in Figure 13.2.2-2 of the relevant document emission factors were taken, the dust reduction efficiency achieved by road watering is provided as follows.



Transportation roads will be regularly watered to ensure a constant moisture level above 5%. This will result in an emission reduction value of 95%. After emission measures, emission factors will be,

E_{PM10} = 0.0313 kg/m^3 × 0.05 = 0.0015 kg/m^3 and

$E_{PM2.5}$ = 0.00313 kg/m^3 × 0.05 = 0.00015 kg/m^3 has been used.

Overall emission factor

Since all emission factors obtained in the calculations above are in the same unit and will be applied to the total excavation quantity, they have been combined into a single emission factor. This unified emission factor has been used in the calculations. The combined emission factor has been calculated as follows.

$TOTAL_{EPM10}$ = $Excavation_{EPM10}$ + $Loading_{EPM10}$ + $Transportation_{EPM10}$ + $Unloading_{EPM10}$

$TOTAL_{EPM10}$ = 0.000475 kg/m^3 + 0.00115 kg/m^3 + 0.0015 kg/m^3 + 0.00115 kg/m^3

$TOTAL_{EPM10}$ = 0.004275 kg/m^3

$TOTAL_{EPM2.5}$ = $Excavation_{EPM2.5}$ + $Loading_{EPM2.5}$ + $Transportation_{EPM2.5}$ + $Unloading_{EPM2.5}$

$TOTAL_{EPM2.5}$ = 0.0000225 kg/m^3 + 0.0001525 kg/m^3 + 0.00015 kg/m^3 + 0.0001525 kg/m^3

$TOTAL_{EPM2.5}$ = 0.0004775 kg/m^3

Road Construction Emissions

The road construction emissions calculated based on the emission factors obtained from the calculations in the previous section are presented in the Roads which will be constructed within the Project and calculated emissions are shown in Table 7-3.

Table 7-3: Road Construction Emissions

Road Name	Excavation Area (m^3)	Fill Area (m^3)	Total Area (TA) (m^3)	EF ($kg/m^{3)}$		Working Period (WP)	Emissions (EF x TA / WP) (kg/h)	
				PM_{10}	$PM_{2,5}$		PM_{10}	$PM_{2,5}$
Road-A	250.74	342.12	592.86				0.0066	0.0007
Transport1	720.00	1151.00	1871.00				0.0208	0.0023
Transport2	1033.45	1421.58	2455.03				0.0273	0.0031
Road-Kvs	3316.16	1337.38	4653.54				0.0518	0.0058
Road-B1	3710.57	6398.03	10108.60				0.1125	0.0126
Road-B2	25835.06	19941.59	45776.65				0.5096	0.0569
Road-B3	90388.08	20502.68	110890.7				1.2345	0.1379
Road-B4	7243.08	4561.14	11804.2				0.1314	0.0147
Road-C	38625.14	66028.39	104653.5				1.1651	0.1301
Road-D	11070.91	10553.85	21624.7			48 days x 8 hours/day = 384 hours	0.2407	0.0269
Road-F	48303.80	33845.30	82149.1	0.004275	0.0004775		0.9146	0.1022
Road-TM	613.61	32.53	646.14				0.0072	0.0008
Road-1	17802.98	273.48	18076.46				0.2012	0.0225
Road-2	65.66	459.50	525.16				0.0058	0.0007
Road-4	7421.60	5277.41	12699.01				0.1414	0.0158
Road-5	1480.87	11608.10	13088.97				0.1457	0.0163
Road-6	8157.75	5721.79	13879.54				0.1545	0.0173
Road-7	5853.01	2067.95	7920.96				0.0882	0.0098
Road-8	19626.40	179.09	19805.49				0.2205	0.0246
Road-9	8057.01	26477.71	34534.72				0.3845	0.0429
Road-10	15243.74	2807.08	18050.82				0.2010	0.0224

Turbine Construction Emissions

The road construction emissions calculated based on the emission factors obtained from the calculations in the previous section are presented in Table 7-4.

Table 7-4 Turbine platform construction emissions

Turbine No	Excavation Area (m^3)	Fill Area (m^3)	TA (m^3)	EF (kg/m3)		WP	Emissions (EF x TA / WP) (kg/h)	
				PM_{10}	$PM_{2.5}$		PM_{10}	$PM_{2.5}$
T1	72126.00	0.00	72126.00	0.004275	0.0004775		0.8030	0.0897

T2	10271.37	9523.87	19795.24		0.2204	0.0246
T3	20111.83	9859.11	29970.94		0.3337	0.0373
T4	27763.76	114.00	27877.76		0.3104	0.0347
T5	18124.68	8699.24	26823.92	48 days x 8 hours/day = 384 hours	0.2986	0.0334
T6	20009.03	3560.04	23569.07		0.2624	0.0293
T7	11036.50	3722.06	14758.56		0.1643	0.0184
T8	23092.93	10352.15	33445.08		0.3723	0.0416
T9	17613.35	6428.17	24041.52		0.2676	0.0299
T10	12122.62	3084.34	15206.96		0.1693	0.0189
TM	26123.71	4015.19	30138.90		0.3355	0.0375

Blasting Emissions

According to the blasting design, 1036 square meters of material will be extracted in a single blast. Based on this, the emissions generated for each blast have been calculated as follows:

EPM10= 0.52 x 0.00022 x (1036)1,5 = 3.81 kg/blast

EPM2.5= 0.03 x 0.00022 x (1036)1,5 = 0.22 kg/blast

Crusher Emissions

The Project will include a mobile crushing and screening plant with a capacity of 68.75 tons/hour. Based on the emission factors provided above, the emissions from the mobile crushing and screening plant have been calculated as follows:

PM_{10}= 0.00012 (kg/t) x 68.75 (t/h) = 0.00825 kg/h

$PM_{2.5}$= 0.00006 (kg/t) x 68.75 (t/h) = 0.0041 kg/h

ETL Construction Emissions

In addition to the activities described above, ETL construction will also be carried out. During this activity, the emission source will be the excavation of the foundations of the high-voltage power line pylons. For each pylon, four excavations will be carried out with dimensions of 3x3x3 meters, resulting in a total excavation volume of 108 m^3. The emissions from this activity have been calculated and are presented in the Table 7-5.

Table 7-5: ETL Pylon construction emissions

Activity	Excavation Area (m^3)	Fill Area (m^3)	Total Area (TA) (m^3)	EF (kg/m^3)		Working Period (WP)	Emissions (EF x TA / WP) (kg/h)	
				PM_{10}	$PM_{2.5}$		PM_{10}	$PM_{2.5}$
Pylon Excavation	108	-	108	0.004275	0.0004775	8 Hours	0.0577	0.0064

Due to their separate timing from other construction activities and their very low mass flow rates the ETL and pylon excavation activities have been excluded from the modelling study.

Engine Activities

Engine emission factors are derived from the EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019-Non-Road mobile sources and machinery Table 3-2. Vehicle emission factors were shown in Table 7-6. Average fuel consumption is compiled from heavy duty machine producers as 25 l/h (20 kg/h = 0.02 t/h).

Table 7-6: Vehicle Emission Factors

Parameter	Emission Factor
	Non-Road (g/kWh-equipment)
Nox	7663 g/tones fuel
CO	7352 g/tonnes fuel
PM_{10}	116 g/tonnes fuel
$PM_{2.5}$	116 g/tonnes fuel
SO_2	14 g/kg fuel*
VOC	930 g/tonnes fuel
Fuel consumption	20.000 g/h

*Calculated by 0.7% Sulphur content
** Because of the lack of explicit data, sample data was used in accordance with the EMEP/EEA 1.a.4 Section 3.2.3

Engine Activities Within the scope of Construction Phase

Engine emissions include engine emissions from all motor vehicles that can be used for the Project. It is projected that different number of equipment will be used at the Project area. The equipment information to be used in the Project is as presented in Table 7-7:

Table 7-7: Number of Equipment to be Used for the Construction Phase

Type of Equipment	Number
Concrete mixer	18
Loader	2
Crawler Dozer	2
Excavator	12
Truck	6
Crane	4
Generator	1
Welder	1
Water Tank	2
Grader	1
Rock Drill	1
Iron Cutting	1
Iron Bending	1
Mobile Crushing	1

Grand Total (Equipment/Day)	53

According to this information, emission calculations are shown in Table 7-8.

Table 7-8: Emission Calculation for the Construction Phase

Pollutant	Emission Factor	Fuel consumption (t/h)	Emission Per Vehicle (kg/h)	Total Equipment (Equipment/Day)	Total Emission (kg/h)	Threshold Value (kg/h)
NO_X	7663 g/tonnes fuel	0.02	0.15326	54	8.28	40
CO	7352 g/tonnes fuel	0.02	0.14704	54	7.94	500
PM	116 g/tonnes fuel	0.02	0.00232	54	0.13	10
SO_2	14 g/kg fuel	0.02	0.28	54	15.12	60
VOC	930 g/tonnes fuel	0.02	0.0186	54	1.00	30

The emissions caused by vehicles in the above table have been calculated, and their comparison with the threshold values in Annex-2 Table 2.1 of the RCAPOI is provided. Since the exhaust emissions are very lower than threshold values, engine emissions are not included in the air quality modelling study.

7.2.5 Determining Magnitude, Sensitivity and Impact Significance

The significance of potential impacts is a function of the presence and sensitivity of receptors, and magnitude of the impact.

While evaluating the contribution of the construction phase effects of the Project to the air quality, the change in the concentrations (process contribution) caused by the Project in sensitive receptors has been taken into account.

Changes in ambient concentrations over 25% of the relevant standards are considered to represent an impact of ‘Major’ magnitude as the WBG General EHS Guidelines note that Projects should: “…prevent or minimize impacts by ensuring that …emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards. As a general rule, this guideline suggests 25 percent of the applicable air quality standards to allow additional future sustainable development in the same airshed.”

The WBG General EHS Guidelines classify ‘poor quality airsheds’ as those where national standards are exceeded significantly. Therefore, receptors experiencing existing ambient pollutant concentrations above the relevant standards are concluded to be of ‘High’ sensitivity.

Impact magnitude and receptor sensitivity criteria are presented in in Table 7-9 and Table 7-10. Where a project creates a new exceedance of an air quality standard, the impact is described as significant irrespective of the receptor sensitivity and impact magnitude.

Table 7-9: Determination of Receptor Sensitivity

Ground Level Pollutant Concentrations in Relation to Standard	Receptor Sensitivity
Above Standard	High
75 to 100% of the Standard	Medium
50 to 75% of the Standard	Low
Below 50% of the Standard	Negligible

Table 7-10: Determination of Impact Magnitude

Change in Concentrations as % of Standard	Impact Magnitude
Increase >25%	Major
Increase 15-25%	Moderate
Increase 5-15%	Minor
Increase <5%	Negligible

The significance has been determined by the interaction between the magnitude of impacts and the sensitivity of receptors affected, as depicted in the significance matrix shown in Table .7-11.

Table .7-11: Impact Significant Matrix

	Sensitivity of Receptors			
Magnitude of Impact	**Negligible**	**Low**	**Medium**	**High/Very High**
Negligible	Insignificant	Insignificant	Insignificant	Insignificant
Minor	Insignificant	Minor	Minor	Moderate
Moderate	Insignificant	Minor	Moderate	Major
Major	Insignificant	Moderate	Major	Critical

7.3 Baseline Conditions and Measurements

7.3.1 Background Measurements

The Project is planned to use a total road length of 14,061 meters. The majority of transportation is possible through existing forest roads, with approximately 9,655 meters of road expansion and improvement work to be carried out within the scope of the Project, and approximately 4,406 meters of new road to be opened in accordance with the zoning plans. The Project, which is planned to be located on 1/25,000 Scale Topographic Maps H7d1 and H17d2, is situated approximately 17.70 kilometers from Çanakkale city center, 17.70 kilometers from the central district of Çanakkale Province, and 17.96 kilometers from the center of Lapseki District (Approximate and as the crow flies distances are provided).

Air quality measurements were conducted by AIRS Hava Kalitesi Yonetim Hizmetleri Ltd Sti (AIRS Air Quality Management Services Ltd) for the particulate matters (PM_{10} and $PM_{2.5}$) at the points specified in Section 7.2.4 using Sensirion SEN54-based air quality measurement stations according to the EPA/600/R-22/080 standard. Figure 7-2 shows the selected particulate matter (PM) monitoring locations. Estimated locations of monitoring locations at macro level were determined by following the pre-modelling study and systematic grid method suggested in the literature (Cruz-Orive and Gual-Arnau, 2002; Falk at al., 2011; Ferrer-Paris at al., 2013; Gallego, 2005; Gardner at al., 2008; Nest and Meyer, 2002)[43]. After macro level determination, a field

[43] Cruz-Orive, L. M., Gual-Arnau, X. 2002. "Precision of circular systematic sampling", Journal of Microscopy-Oxford, 207 225-242.

study was carried out and final points were determined. Monitoring locations have been determined as described in the previous section to represent settlements, forest lands, agricultural lands, and, if applicable, other sensitive receptors. At each location, monitoring was carried out for 30 days.

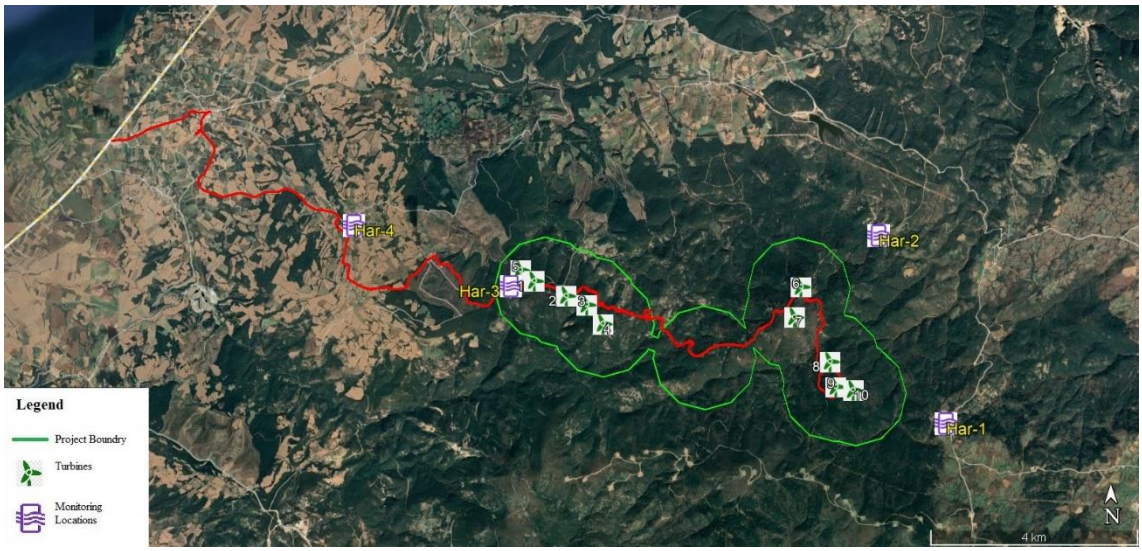


Figure 7-2: PM Sampling Points

The characteristics of the receptors and the sources of pollution represented by each measurement location are presented in Table 7-12.

Table 7-12: Measurement Location characteristics

Measurement Location	Representative Area	Representative Sources
HAR1	This is a residential location and represents Ucpinar Village	Road-F, Road-8, Road-9, Road-10, T8, T9, T10
HAR2	Individual Houses around T7 Turbine, forest and agricultural areas around the location	Road-D, Road-F, Road-6, Road-7, T6, T7
HAR3	Individual Houses around T2 Turbines, forest and agricultural areas around the location	Road-Tm, Road-C, Road-2, Road-B-3, Road-B-4, Road-5, T1, T2, T3, T4,T5
HAR4	This is a residential location and represents Kizilkecili Village. Also because of the geographical similarities, it also represents Yukariokcular Village	Road-B-1, Road-B-2

The measurement locations were selected based on the criteria provided in Section 7.2.4. According to these criteria, the Project study area was evaluated in two groups: settlements, forests, and agricultural land. Based on this grouping, the settlements in the Project impact area

Falk, M. G., Denham, R. J., Mengersen, K. L. 2011. "Spatially stratified sampling using auxiliary information for geostatistical mapping", Environmental and Ecological Statistics, 18 (1), 93-108,

Ferrer-Paris, J. R., Rodriguez, J. P., Good, T. C., Sanchez-Mercado, A. Y., Rodriguez-Clark, K. M., Rodriguez, G. A., Solis, A. 2013. "Systematic, large-scale national biodiversity surveys: NeoMaps as a model for tropical regions", Diversity and Distributions, 19 (2), 215-231

Gallego, F. J. 2005. "Stratified sampling of satellite images with a systematic grid of points", Isprs Journal of Photogrammetry and Remote Sensing, 59 (6), 369-376

Gardner, R. H., Lookingbill, T. R., Townsend, P. A., Ferrari, J. 2008. "A new approach for rescaling land cover data", Landscape Ecology, 23 (5), 513-526

Nest, M., Meyer, H. D. 2002. "Improving the mapping mechanism of the mapped Fourier method", Chemical Physics Letters, 352 (5-6), 486-490

are located mostly to the west of the project. To the north, south and east of the Project, there are mostly forest areas and settlements located outside the Project impact area. The significance of associated impacts at the identified measurement locations are determined as a result of the modelling study. For any individual receptor to be identified during the implementation of the Project or for any grievance received from a nearby user (either during construction or operation phase), the Project Company will identify the impact (e.g. through monitoring, modelling etc.) and will take necessary mitigation measures as defined in Section 7.4. The baseline air quality measurement results are given in Table 7-13 for dust emissions.

Table 7-13:Baseline Air Quality (Dust) Measurement Results

Measurement Location	Description of the Receptor	30 Days Average (23 October 2023 to 23 November 2023)	
		PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
HAR1	Settlements	16.59	7.35
HAR2	Forest Land	10.69	5.51
HAR3	Forest Land	7.58	5.20
HAR4	Settlements	14.85	7.41
	Turkish Limit Values (µg/m^3)	40	-
	EU Limit Values(µg/m^3)	40	20
	WHO Limit Values (µg/m^3)	15	5
	Project Standard (µg/m^3)	**15**	**5**

As it is seen from Table 7-13, PM_{10} and $PM_{2.5}$ results exceed long term project standard at location HAR1, HAR2 and HAR4. At the HAR3 point, the $PM_{2.5}$ parameter exceeds the limit, while meeting the limit value for the PM_{10} parameter.

As previously indicated in the preceding sections, values recommended by the WHO have been adopted as the project standard. Following a 15-year study, WHO significantly lowered the standards set for particulate matter in the year 2021. Considering the diverse sources of dust and the prevalence of dust transport in the region, even in isolated areas in Türkiye, it is deemed challenging to maintain these standards, especially in the long term. The identified dust concentration specifically reflects the impact of the entire spectrum of natural sources transported to the region and does not possess a quality that can be mitigated through any preventive measures. It is observed that both PM_{10} and $PM_{2.5}$ values comply with both national and EU limit values.

7.4 Impact Assessment

7.4.1 Construction

Construction activities associated with the proposed expansion is associated with the site preparation and building activities. These activities are expected to result in temporary dust.

Construction activities include two main parts. The first one is earthworks and site preparation of the Project area. In this part, dust emissions generated from excavation, load and unloading process and engine emissions from construction equipment and vehicles. The second one involves building construction. In this part, construction equipment's movement such as cement mixers, trucks, backhoes, asphalt pavers etc. will cause particulate matter emissions from land and engine emissions.

Air Pollution Contribution Values (APCV) determined from the modelling studies for PM_{10}, and $PM_{2,5}$ are listed in Table 7-14. These results are the maximum predicted across the study area.

Table 7-14: Modelling Results for Construction Phase

Parameter	Averaging Period	Maximum APCV and Coordinates (X, Y)	Project Standards
PM_{10} (µg/m^3)	Daily	26.58 (473265,4445591)	45 µg/m^3
	Annual	5.54 (472870,4447385)	15 µg/m^3
$PM_{2,5}$ (µg/m^3)	Daily	3.07 (473265,4445591)	15
	Annual	0.63 (472870,4447385)	5 µg/m^3

As seen in Table 7-15Table 7-14, PM_{10} and $PM_{2.5}$ parameters comply with project standards. The cumulative assessment of air quality contribution values resulting from the construction phase of the Project, along with background measurements, is summarized in Table 7-15. Monthly measurement results were taken as long-term background concentration. Maximum daily and annual average emissions for PM_{10} and $PM_{2.5}$ are shown in Figure 7-3 to Figure 7-6. These monitoring locations are broadly representative of nearby receptors likely to experience the greatest impacts from the construction activities associated with the Project.

Table 7-15: Cumulative Evaluation of the Construction Phase

Measurement Location	Background Concentration		Air Emission due to Project Activities				Cumulative Value at the Measurement Points			
			PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3)		PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3)	
	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	Daily	Annual	Daily	Annual	Daily	Annual	Daily	Annual
HAR1	16.59	7.35	0.70	0.01	0.08	<0.01	17.29	16.60	7.43	7.36
HAR2	10.69	5.51	1.44	0.03	0.18	<0.01	12.13	10.72	5.69	5.52
HAR3	7.58	5.20	6.26	0.53	0.74	0.06	13.84	8.11	5.94	5.26
HAR4	14.85	7.41	2.83	0.13	0.35	0.01	17.68	14.98	7.76	7.42
Turkish Limit Values (µg/m^3)			50	40	-	-	50	40	-	-
EU Limit Values (µg/m^3)			50	40	-	20	50	40	-	20
WHO Limit Values (µg/m^3)			45	15	15	5	45	15	15	5
Project Standard (µg/m^3)			**45**	**15**	**15**	**5**	**45**	**15**	**15**	**5**

According to the cumulative emission calculation based on the modelling study and measurement results, the emissions resulting from the Project comply with daily limit values, while $PM_{2.5}$ emissions do not meet the long-term Project standards. The fundamental reason for this lies in the background concentrations exceeding the project standards. As explained in the previous section, WHO recommended values have been adopted as project standards, but these values are not highly applicable under Turkish conditions. Upon examination of the EU and Turkish national standards, it is evident that the values remain below the limit values. On the other hand, the contribution of the Project to the existing background is observed to be negligible. The overall significance of the predicted impacts from the construction phase is presented through Table 7-16 - Table 7-19. The significance takes into account the current

pollutant concentrations along with the effects of the Project. The significance assessment has been conducted for the PM_{10} and $PM_{2.5}$ parameters, relying on either short-term or long-term worst-case scenarios for each monitoring points.

Table 7-16: Impact Significance of Daily PM_{10}

Activity	Receptor	Project Standard	Receptor Sensitivity			Impact Magnitude			Impact Significance
			Baseline Air Quality ($\mu g/m^3$)	Relation to Standard	Sensitivity Score	Cumulative Emission Values ($\mu g/m^3$)	Change in Conc. as % of Standard	Magnitude Score for	
Construction Activities	**HAR-1**	**45**	16.59	Below 50% of the Standard	Negligible	17.29	Increase <5%	Negligible	Insignificant
	HAR-2	**45**	10.69	Below 50% of the Standard	Negligible	12.13	Increase <5%	Negligible	Insignificant
	HAR-3	**45**	7.58	Below 50% of the Standard	Negligible	13.84	Increase <5%	Negligible	Insignificant
	HAR-4	**45**	14.85	Below 50% of the Standard	Negligible	17.68	Increase <5%	Negligible	Insignificant

Table 7-17: Impact Significance of Yearly PM_{10}

Activity	Receptor	Project Standard	Receptor Sensitivity			Impact Magnitude			Impact Significance
			Baseline Air Quality ($\mu g/m^3$)	Relation to Standard	Sensitivity Score	Cumulative Emission Values ($\mu g/m^3$)	Change in Conc. as % of Standard	Magnitude Score for	
Construction Activities	**HAR-1**	**15**	16.59	Above Standard	High	16.60	Increase <5%	Negligible	Insignificant
	HAR-2	**15**	10.69	50 to 75% of the Standard	Low	10.72	Increase <5%	Negligible	Insignificant
	HAR-3	**15**	7.58	50 to 75% of the Standard	Low	8.11	Increase <5%	Negligible	Insignificant
	HAR-4	**15**	14.85	75 to 100% of the Standard	Medium	14.98	Increase <5%	Negligible	Insignificant

Table 7-18: Impact Significance of Daily $PM_{2.5}$

Activity	Receptor	Receptor Sensitivity	Impact Magnitude

		Project Standard	Baseline Air Quality ($\mu g/m^3$)	Relation to Standard	Sensitivity Score	Cumulative Emission Values ($\mu g/m^3$)	Change in Conc. as % of Standard	Magnitude Score for	Impact Significance
Construction Activities	**HAR-1**	**15**	7.35	Below 50% of the Standard	Negligible	7.43	Increase <5%	Negligible	Insignificant
	HAR-2	**15**	5.51	Below 50% of the Standard	Negligible	5.69	Increase <5%	Negligible	Insignificant
	HAR-3	**15**	5.20	Below 50% of the Standard	Negligible	5.94	Increase <5%	Negligible	Insignificant
	HAR-4	**15**	7.41	Below 50% of the Standard	Negligible	7.76	Increase <5%	Negligible	Insignificant

Table 7-19: Impact Significance of Yearly $PM_{2.5}$

Activity	Receptor	Project Standard	Receptor Sensitivity			Impact Magnitude			Impact Significance
			Baseline Air Quality ($\mu g/m^3$)	Relation to Standard	Sensitivity Score	Cumulative Emission Values ($\mu g/m^3$)	Change in Conc. as % of Standard	Magnitude Score for	
Construction Activities	**HAR-1**	**5**	7.35	Above Standard	High	7.36	Increase <5%	Negligible	Insignificant
	HAR-2	**5**	5.51	Above Standard	High	5.52	Increase <5%	Negligible	Insignificant
	HAR-3	**5**	5.20	Above Standard	High	5.26	Increase <5%	Negligible	Insignificant
	HAR-4	**5**	7.41	Above Standard	High	7.42	Increase <5%	Negligible	Insignificant

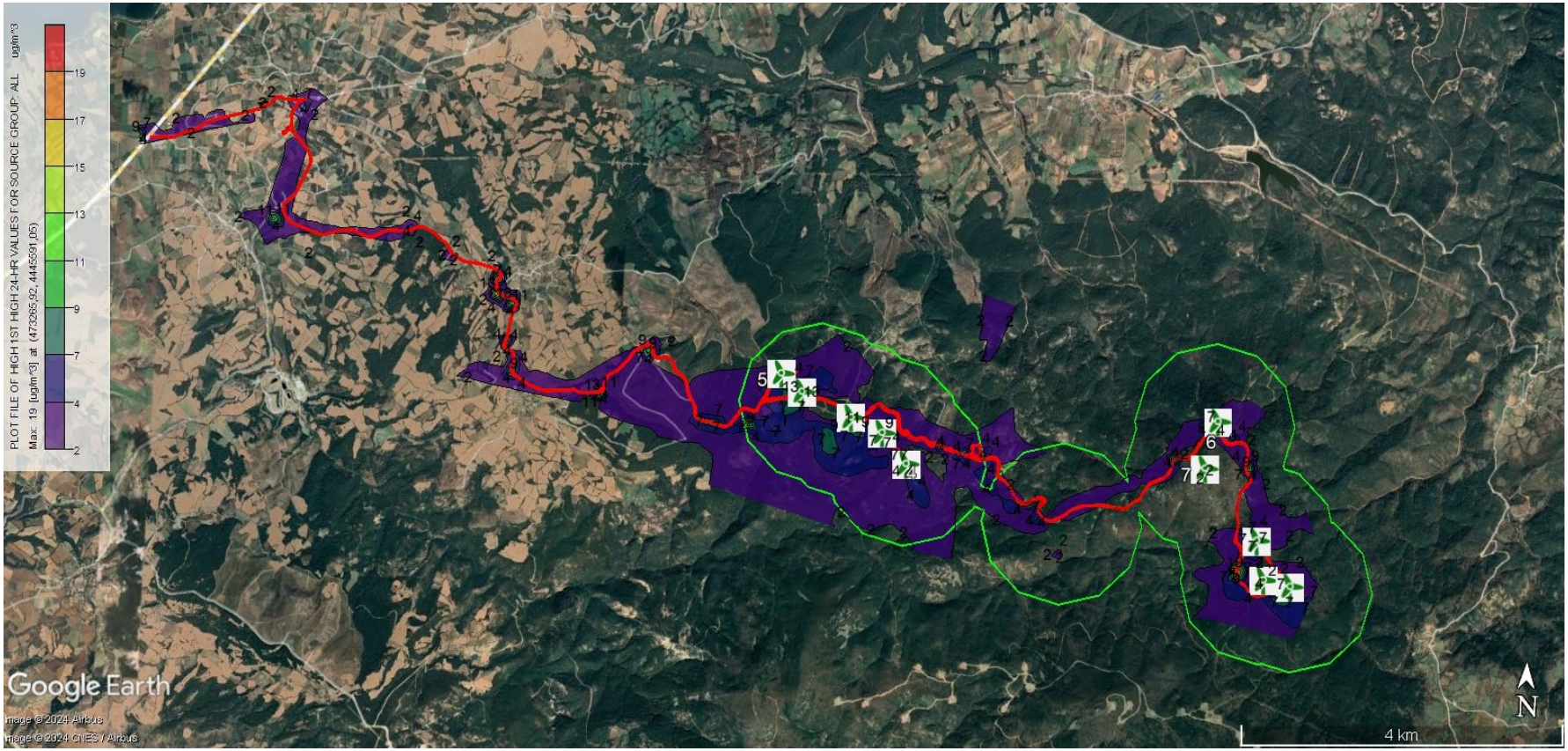


Figure 7-3: Maximum Daily Average PM_{10} Emissions for Construction Phase

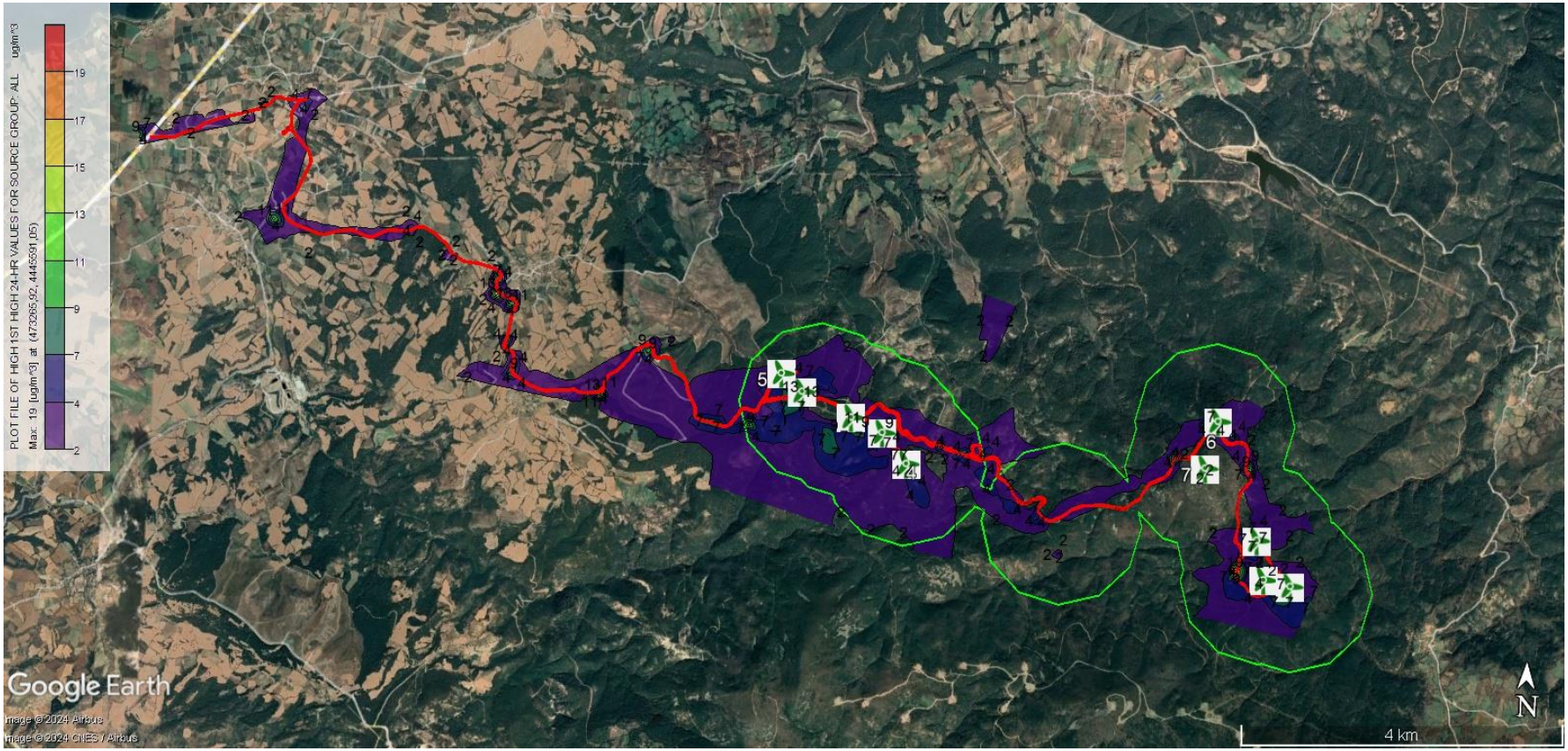


Figure 7-4: Maximum Annual Average PM_{10} Emissions for Construction Phase

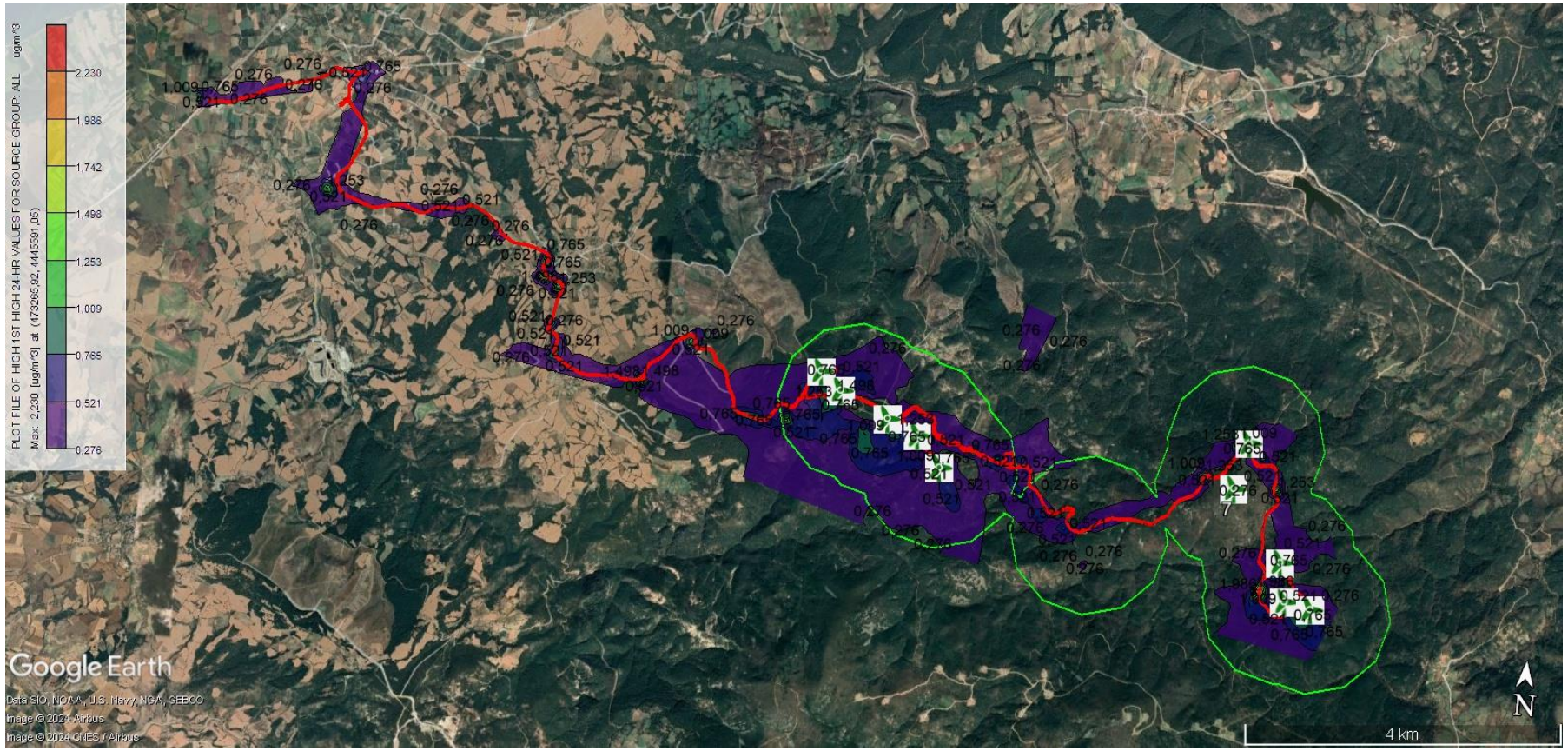


Figure 7-5: Maximum Daily Average $PM_{2.5}$ Emissions for Construction Phase

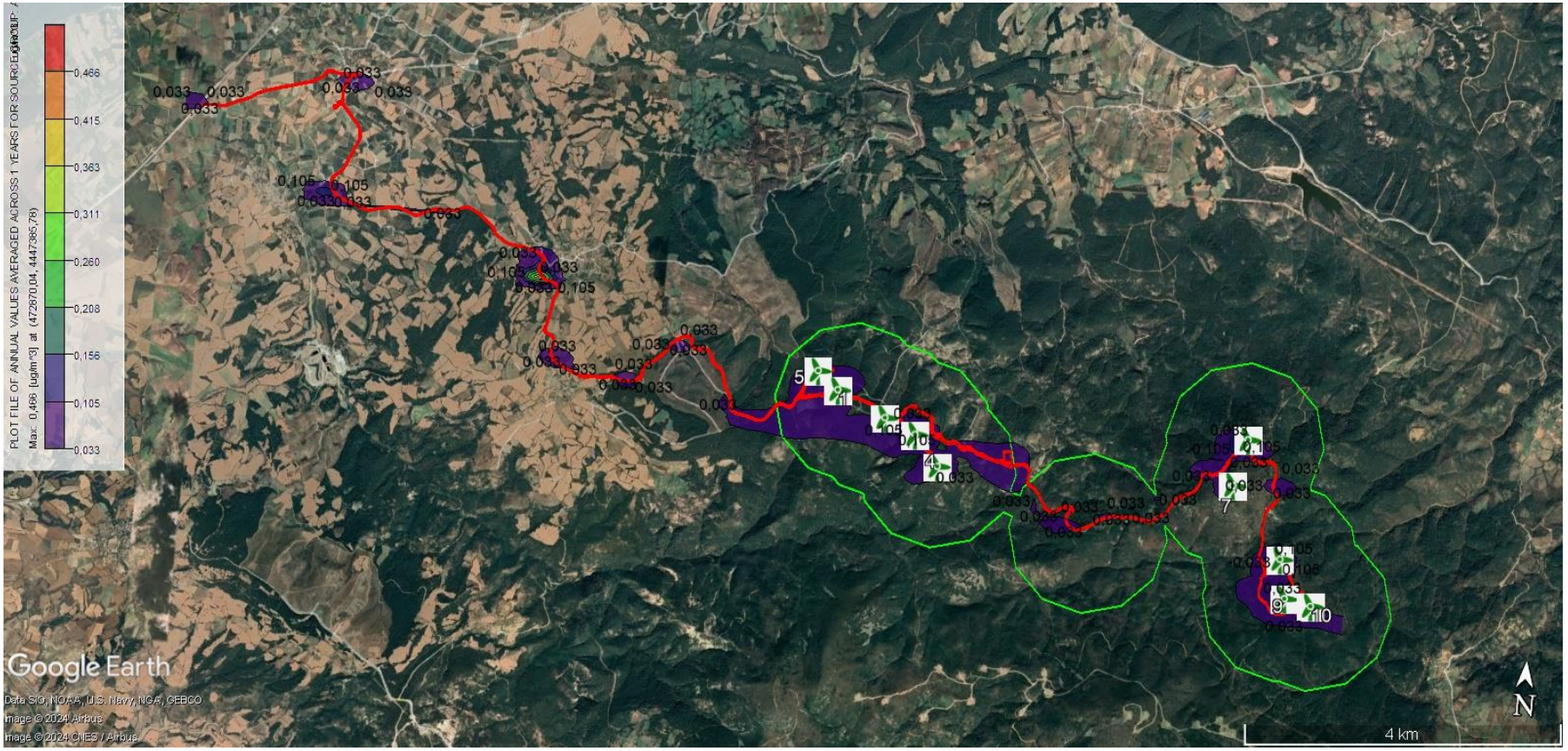


Figure 7-6: Maximum Annual Average $PM_{2.5}$ Emissions for Construction Phase

7.4.2 Impact Mitigation & Residual Impact

The WBG General EHS Guidelines document was used for air emission abatement techniques concerning to the construction phase.

During the construction phase of the Project, dust emission will occur due to excavation activities and movements of construction machinery. Secondly, exhaust emissions from the engines of the vehicles will occur.

Mitigation measures will include:

- All the provisions provided in Air Quality Management Plan will be complied with.
- Community grievances regarding air quality including air emissions and dust generation will be collected through Community Grievance Mechanism established as part of Stakeholder Engagement Plan (SEP) and will be addressed by the Project Company.
- Any unnecessary soil moving/clearing will be avoided to minimize dust.
- All vehicles that generate dust due to transportation or construction works will move within a speed limit of 30 km/h and speed limit signs will be posted on Project area. All vehicles that are loaded with sand, soil, gravel or any other material will be covered to prevent the load from spilling and forming dust. In addition, 20km/h speed limit will be applied on unpaved surfaces close to settlements.
- All vehicles will undergo regular maintenance according to the manufacturer's recommended intervals and individual maintenance schedules will be created for each vehicle.
- Operators will be trained to take appropriate action in case of abnormal events (e.g., black smoke emission).
- Vehicles will be turned off when idling is necessary, provided that the ambient temperature is above 0°C. For ambient temperatures below 0°C, vehicles will be turned off if the idling time exceeds 5 minutes. Exceptions to this rule may apply in emergency situations, for occupational health and safety reasons, or due to traffic conditions. Operators will be informed about these exceptions during their training.
- Drivers will be instructed about the importance of adhering to speed limits and smooth acceleration to minimize fuel consumption and emissions.
- All piling of materials/soils will be stabilized in a manner that minimizes the occurrence of dust by wetting the top layer. Seeding will also be applied, if necessary, so that vegetation will prevent wind erosion.
- All excavation activities will be organized according to wind direction.
- Travel route will be dampened using a bowser and dust screens utilized if necessary.
- To reduce fugitive dust emission during vehicle operation on public roads and at construction sites, service roads and material storage sites, dust suppression methods (i.e. watering with water trucks, speed limits for mobile vehicles, using well-maintained vehicles/equipment) will be used.
- Dust generating activities will cease during excessively windy periods. Excessive wind periods and dust generation will be subjectively assessed by field personnel.
- Any loose material that could produce dust when travelling will be covered and/or maintained appropriate freeboard (+0.3m) on trucks or vessels hauling.
- Stockpiles will be inspected regularly.
- Excessive vehicular movement will be avoided.
- If necessary, haul roads and areas of hard standing of excessive dust will be cleaned.
- Covers and/or control equipment can be used to minimize dust from material handling.

- Vehicles will be kept clean, so that no dirt is carried on the vehicles into and out of the area. Wheel washing will be done for all construction vehicles prior to exiting the construction site
- Stockpiling of stripped surface material, e.g. rock, sand and soil, stockpiling of unwashed materials, will be limited.
- Design of stockpiles will be optimized to maintain a low profile without a sharp change in shapes.
- Good practice will be applied for selection of Project vehicles that meet the latest emission standards (e.g. EURO 5 or US EPA Tier 2 emission standards) and maintained in a reasonable working order.
- Emissions from road and off-road vehicles will comply with national or regional programs
- Nationally, exhaust emissions are subject to the conditions set forth in the Exhaust Gas Emission Control Regulation, which was published in the Official Gazette No. 30004 on March 11, 2017. Accordingly, exhaust emissions must be measured at specific intervals that vary depending on the vehicle type. Vehicles to be used within the scope of the project will be subjected to exhaust inspection at the intervals specified in the vehicle categories indicated on their registration certificates. Necessary arrangements will be made for non-compliant vehicles to be sent to technical service.
- A 24-hour monitoring study for PM10 and PM2.5 parameters will be conducted once every quarter to determine the impact of the works on air quality and the effectiveness of emission control measures, as specified in the Air Quality Management Plan Section 2.5.2.

8 Climate & Greenhouse Gases (GHG)

8.1 Introduction

Climate Change

This chapter reports upon the climate change risk assessment (CCRA) conducted in line with the EP IV (Principle 2 and Annex A)[44] for assessing physical climate risks. The climate change risk assessment considers climate-related risks upon physical project receptors (as identified within Section 8.2), as well as nearby social and environmental receptors as outlined within other chapters of this ESIA.

Construction phase impacts of climate change on the Project are within the scope of this Assessment considering the fact that impacts of climate change have already been observed. Impacts of climate change on the operational phase of the Project are also within the scope of this Assessment and are considered to be permanent changes that may affect the Project throughout its operational lifetime of 49 years.

Greenhouse Gas Emissions

This chapter also considers the potential greenhouse gas (GHG) effects from operation of the Project, in accordance with IFC, EP IV, and EBRD guidelines.

Consideration of GHG emissions impacts during the construction phase is scoped in for this Assessment to review compliance with IFC PSs[45], which require a GHG emissions assessment to determine whether combined Scope 1 and Scope 2 emissions are expected to be more than 25,000 tonnes of CO_2 equivalent per year. Although there is no anticipated significant GHG emissions arising from the operation of the Project considering its nature (i.e., a renewable energy investment), potential carbon sources during the operation phase of the Project are provided in this Assessment for effective management of GHG emissions. Also, avoided GHG emissions associated with the Project during the operational phase are within the scope of this Assessment.

It is noted that the EBRD guidance[46] requires construction-related emissions to be included in the Assessment where they are likely to be greater than 5% of the emissions or savings associated with the operation of the Project. The compliance with the EBRD guidance is evaluated in line with the results of construction phase GHG emissions assessment and provided in relevant section of this chapter.

[44] Equator Principles IV (2020), Guidance Note on Climate Change Risk Assessment. Last accessed in November 2023 here: Guidance CCRA_May 2023 (equator-principles.com)

[45] International Finance Corporation. Performance Standards on Environmental and Social Sustainability. Last accessed in March 2024 here: https://www.ifc.org/content/dam/ifc/doc/2010/2012-ifc-performance-standard-3-en.pdf.

[46] EBRD (2017) Protocol for Assessment of Greenhouse Gas Emissions. Last Accessed in November 2023 here: https://www.ebrd.com/documents/admin/ebrd-protocol-for-assessment-of-greenhouse-gas-emissions.pdf

8.2 Methodology

8.2.1 Applicable Guidelines and Standards

International standards and guidelines applicable to the Project for the assessment of physical climate change risks to the Project and carbon impacts of the Project during construction and operation phases have been presented in this section as follows.

Equator Principles IV (EP IV)[47]

The EP IV are a voluntary set of standards for determining, assessing, and managing social and environmental risks in project financing, including those related to climate change and GHG emissions. They were established to provide a minimum standard for due diligence to support responsible risk decision-making. The principles apply globally and to various sectors, ensuring that the projects financed are developed in a manner that is socially responsible and reflects sound environmental management practices. As such, the EP IV provides guidance on CCRA and GHG emissions.

International Finance Corporation (IFC): Performance Standards (PSs) on environmental and social sustainability[48]

The IFC PSs are part of the IFC's Sustainability Framework aimed for the IFC's clients. The PSs provide guidance on how to identify, manage, and mitigate the risks and impacts of projects, including those related to changing climate and carbon emissions. As part of PSs, Guidance Notes are provided with specific requirements for enhancing project sustainability.

As part of the guidance, a number of requirements are given to clients when certain thresholds are passed. Regarding GHG emissions, IFC PS3: Resource Efficiency and Pollution Prevention outlines client responsibilities for managing and reducing GHG emissions.

BSI: Publicly Available Specification 2080: 2023 (PAS 2080)[49]

PAS 2080 is a globally recognised framework for managing whole life carbon emissions in infrastructure and buildings. PAS 2080 contains requirements across the value chain to establish effective systems for reducing whole life carbon elicited through a rigorous carbon management process.

Initially published in 2016, the updated 2023 specification introduced changes to help guide and integrate low-carbon decision-making into all aspects of an assets' life cycle. Changes include:

- The scope of the standard now includes buildings in addition to infrastructure.
- A greater emphasis on whole life carbon.
- Alignment with net zero.
- A new clause on procurement.
- Encouraging a holistic view of carbon management through systems thinking, by considering the interconnected relationship between assets, networks, and systems and how all influence or have control of carbon.
- Highlighting the importance of collaboration and promoting early engagement across the value chain to integrate decision-making throughout an assets' lifecycle.

[47] Equator Principles. EP4. Last accessed in March 2024 here:The Equator Principles_EP4_July2020 (equator-principles.com).

[48] International Finance Corporation. Performance Standards on Environmental and Social Sustainability. Last accessed in March 2024 here: 2012-ifc-performance-standards-en.pdf.

[49] British Standards Institution (BSI). Publicly available specification 2080:2023. Last accessed in March 2024 here: PAS 2080:2023 Carbon Management in Infrastructure | BSI (bsigroup.com).

- Links with nature and climate resilience.

Quantifying emissions in the built environment requires a whole life carbon approach across the lifecycle stages of an infrastructure project. Within PAS 2080: 2016, the lifecycle stages of infrastructure projects are broken down into 3 stages to enable GHG emissions quantification.

- Before use stage: A0-5
- Use stage: B1-9
- End-of-life stage: C1-4

RICS: Whole life carbon assessment for the built environment[50]

RICS whole life carbon assessment (WLCA) standard serves as a technical methodology for assessing carbon emissions in the built environment. It provides guidance for tracking carbon emissions across the entire life cycle of buildings and infrastructure projects. This includes emissions from material production, construction processes, usage, and eventual disposal. The WLCA standard provides a holistic view, considering three critical components: embodied carbon, operational carbon, and user carbon.

World Resources Institute: The greenhouse gas (GHG) protocol[51]

The GHG protocol establishes a standardised framework to measure and manage GHG emissions across various contexts. The protocol includes guidance on setting organisational and operational boundaries, managing inventory quality, and reporting GHG emissions. The protocol differentiates emissions by scope:

- Scope 1 Direct emissions from owned or controlled sources (e.g., fuel combustion).
- Scope 2: Indirect emissions from purchased electricity, heat, or steam.
- Scope 3: Indirect emissions from the entire value chain (e.g., supply chain, product use, waste).

8.2.2 Climate Change

The CCRA is conducted using the following methodology. Please note that the same methodology is used to assess physical climate change risks to the Project during construction and operation phases.

- The study area for the CCRA is defined as the Project area itself and the physical, social, and environmental receptors. For example, the physical receptors are those mechanical and electrical equipment and components contained within the Project. Social receptors include staff and local communities (as identified by *Chapter 13: Social Environment*). The environmental receptors are those nearby environments that could be affected by the combined impacts of changing climate and other impacts caused by the Project.
- The climate baseline shall be constructed using the World Bank Climate Change Knowledge Portal (CCKP) (containing the climate projection data that underpins the IPCC WG1 AR6 report). A precautionary approach will be used to understand the future climate for the mid-future (2040-2059) and far-future (2060-2079) based on the following climate change scenarios:
  - SSP1-2.6 for the mid-future (2040-2059) and the far-future (2060-2079)
  - SSP2-4.5 for the mid-future (2040-2059) and far-future (2060-2079)

[50] Royal Institute of Chartered Surveyors. Whole life carbon assessment for the built environment. Last accessed in March 2024 here: Whole life carbon assessment (WLCA) for the built environment (rics.org).

[51] World Business Council for Sustainable Development and World Resources Institute. The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard. Last accessed in March 2024 here: ghg-protocol-revised.pdf (ghgprotocol.org).

  - SSP5-8.5 for the mid-future (2040-2059) and far-future (2060-2079)
- Each climate hazard (e.g., increased average mean and maximum temperatures) shall be analysed using expert knowledge and desk-based review to identify risks to the Project receptors (e.g., increased speed of thermal fatigue and deterioration of metallic or plastic components and joints of moving parts due to extremely high temperatures).
- For each risk identified, the effect of climate change for all scenarios both for the mid-future and the far-future will be assessed, based on a lifespan of 49 years, meaning that the Project will still be in operation to 2079.
- Embedded mitigation that forms part of the design and provides climate resilience will be identified.
- A risk rating for each impact will be determined. The scoring of severity of impact on the Project infrastructure will take into account embedded design aspects, which may provide mitigations for climate risks, based on design information made available. The overall risk rating will then be calculated as the combination of likelihood of occurrence of climate change variable and severity of impact on the Project infrastructure as outlined in Section 8.4. Significant effects are those risks that are calculated as being either high or extreme.
- Additional mitigation measures will be identified where they exist.
- Residual risks to the Project (after the application of additional mitigation measures) will be calculated using the same method.

8.2.2.1 Receptors / Area of Influence (AoI)

The AoI with regard to climate resilience is defined as physical receptors that make up the Project, as well as nearby environmental and social receptors that may be subject to in-combination climate impacts due to the Project. The receptors that have been identified as being in scope for the climate change risk assessment include:

- Turbines,
- Switchyard and Administrative Building,
- Access Roads and Site Roads,
- Associated Facility (i.e., the ETL to be constructed for connection of the generated electricity to the national grid),
- Staff.

Please note that receptors related to construction activities have been also identified within the scope of this Assessment (Please see Table 8-16 for corresponding ones).

8.2.2.2 Impact Assessment

The following qualitative calculation method is used to determine the level of risk associated with present and future climate change impacts to the Project to understand its risk:

$$Impact = likelihood\ of\ impact\ (occurence) \times severity/consequence\ of\ impact$$

Likelihood

The likelihood of impacts to the infrastructure is rated based on the scale in Table 8-1. This has been determined based on an evaluation of current and projected (future) climate data, using a representation of the likelihood of impacts. The current climate impact is based on an estimated impact return period, using the information collected.

Table 8-1: Likelihood of occurrence of the changing climate variable

Rating	Likelihood of recurring events
Rare	Unlikely during next 50 years, or has not occurred in the past five years
Unlikely	May arise once in 25 years, or may have occurred in the last five years
Possible	May arise once in 10 years, or has happened during the past five years but not every year
Likely	May arise about once per year, or has happened at least once in the past year and in each of the previous five years
Almost certain	Could occur several times per year, or is certain to occur

Source: Produced by Mott MacDonald

Severity

The potential severity of the climate impact is rated based on the scale in Table 8-2. This has been determined based on a combination of expert judgement and review of available evidence and literature.

Table 8-2: Potential severity of impact on the Project infrastructure

Rating	Likelihood of recurring events
Insignificant	No infrastructure damage, little change to service.
Minor	Localised infrastructure service disruption. No permanent damage. Some minor restoration work required. Early renewal of infrastructure by 10-20%. Need for new / modified equipment.
Moderate	Limited infrastructure damage and loss of service. Damage recoverable by maintenance and minor repair. Early renewal of infrastructure by 20-50%.
Major	Extensive infrastructure damage requiring major repair. Major loss of infrastructure service. Early renewal of infrastructure by 50-90%. Injury to workforce.
Critical	Significant permanent damage and/or complete loss of the infrastructure and the infrastructure service. Loss of infrastructure support and translocation of service to other sites. Early renewal of infrastructure by >90%. Serious injury to workforce.

Source: Produced by Mott MacDonald

Evaluation and Determination of Significance of Impact

The risk to the assets of the Project is scored using the risk matrix in Table 8-3 below, which categorises the level of risk as low, medium, high, or extreme as defined in Table 8-4.

Table 8-3: Risk scoring matrix

		Severity of Impact				
		Insignificant	Minor	Moderate	Major	Critical
Likelihood	Rare	Negligible	Low	Low	Medium	High
	Unlikely	Negligible	Low	Medium	Medium	High
	Possible	Low	Low	Medium	High	High
	Likely	Low	Medium	Medium	High	Extreme
	Almost certain	Low	Medium	High	Extreme	Extreme

Source: Produced by Mott MacDonald

Table 8-4: Risk category

Rating	Acceptance level	Consequence on the Project
Low	Acceptable	A low level of vulnerability to specific climate risk(s). Remedial action or adaptation may be required.

Rating	Acceptance level	Consequence on the Project
Medium	Tolerable	A moderate level of vulnerability to specific climate risk(s). Mitigation action or adaptation could improve resilience, although an appropriate level of resilience is provided.
High	Intolerable / Tolerable	A high level of vulnerability to specific climate risk(s). Mitigation action or adaptation is recommended.
Extreme	Intolerable	An extreme level of vulnerability to specific climate risk(s). Mitigation action or adaptation is highly recommended.

Source: Produced by Mott MacDonald

8.2.2.3 Assumptions and Limitations

The assessment in this report is based on freely available information from third parties for reporting purposes that is relevant to the Project location. This includes observational data from local weather stations, readily available climate change projections, climate change datasets and literature at the time of writing this assessment. The following limitations and disclaimer should be noted:

- Climate change projections: climate projections are not predictions or forecasts but simulations of potential scenarios of future climate under a range of hypothetical greenhouse gas emissions scenarios and assumptions. The results from the experiments performed by climate models cannot, therefore, be treated as exact or factual, but projection options. They represent representations of how the climate may evolve in response to a range of potential forcing scenarios. For a single emission scenario, projections can vary significantly as a function of the model used and how it is applied, so that there is a wide uncertainty band in the results.

  Scenarios exclude outlying “surprise” or “disaster” scenarios in the literature and any scenario necessarily includes subjective elements and is open to various interpretations. Generally global projections are more certain than regional, and temperature projections are more certain than those for precipitation and wind. Further, the degree of uncertainty associated with all climate change projections increases for projections further into the future. Climate models and associated projections are updated on a regular basis, implying changes in the forecasted future climate. The data is obtained to provide a general ‘sense check’ on the published literature on existing observational and climate projections for the region.
- Use of this report: This report is relevant to the Project information provided and is not intended to address changes in Project configuration or modifications that might occur over time.
- Mott MacDonald has not independently verified the observational or projection data and does not accept responsibility or liability for any inaccuracies or shortcomings in this information.

  We have not undertaken any climate modelling and rely solely on freely available data on climate projections in this region.

Should these information sources be modified by these third parties we assume no responsibility for any of the resulting inaccuracies in any of our reports. Any further research, analysis or decision-making should take account of the nature of the data sources and climate projections and should consider the range of literature, additional observational data, evidence and research available, and any developments in these.

8.2.3 Greenhouse Gas (GHG) Emissions

The data used to calculate GHG emissions resulting from Project activities during construction and operation phases has been provided by the Project Company. Where required data has not

been provided, assumptions were made to quantify emissions. Those assumptions have been provided within related parts in this Assessment.

8.2.3.1 Construction phase

The information received from the Project Company within the scope of assessment of construction-related GHG emissions contains the following:

- Technical information of the wind turbines including:
  - hub height (m)
  - rotor diameter (m)
  - swept area (m^2)
  - total blade length (m)
  - tip height (m)
  - power ratings (kW)
  - volume of the onshore platform and foundation (m^3)
  - the number of turbines
- Information on the material used for the following wind turbine components: the tower, the rotor blade, and the nacelle casing.
- Cables and overhead line construction length (km).
- The total area of road construction (m2) resulting from new road construction and road improvements as well as the material used to construct the roads.
- The total land area taken of the Project (m^2) and the area (m^2) of each land type within the Project: forestry, agricultural, and non-agricultural land.
- Electricity consumption during the construction phase (MWh).
- Fuel use during the construction phase for both on-site equipment and the transportation of workers to site (litres).

Emission factors

To calculate the GHG emissions related to the Project's construction phase requires emission factors for all materials and assets used during the construction phase. Attempts have been made to use the most geographically specific emissions factors, but where these are unavailable due to data limitations, UK based, globally accepted emissions factors have been used. As such, the emissions factors used for this carbon assessment come from the following databases:

- GHG Protocol Calculation Tools and Guidance[52],
- Moata Carbon Portal (Mott MacDonald's in-house carbon calculator),
- ICE v3.0[53],
- Department for Energy Security and Net Zero[54],
- Emissions factors developed from project experience,

[52] Emissions factors obtained from the GHG Protocol Calculation Tools and Guidance. Last accessed in February 2024 here: https://ghgprotocol.org/calculation-tools-and-guidance.

[53] Circular ecology. Embodied Carbon – The ICE Database. Last accessed in March 2024 here: Embodied Carbon Footprint Database - Circular Ecology.

[54] Department for Energy Security and Net Zero. Greenhouse gas reporting: conversion factors 2023. Last accessed in March 2024 here: Greenhouse gas reporting: conversion factors 2023 - GOV.UK (www.gov.uk).

- The International Energy Agency[55],
- JBA consulting[56],
- Forest Research[57].

Material quantities

The specific quantities of materials for the wind turbine components were not provided for this Assessment. To determine the quantity of materials used for the construction of the Project from the data provided, required several assumptions in relation to the wind turbine materials. The National Renewable Energy Laboratory's Wind Turbine Design Cost and Scaling Model[58] was used to determine material quantities for specific wind turbine components within the rotor and nacelle and was used to determine the weight of the wind turbine towers. Further, assumptions have been made relating to material types, overhead line specifications, roads, and fuel use. The full list of assumptions made is provided below under "Assumptions and Limitations" in this section.

Carbon calculation methodology

Having determined quantities, material types, and emissions factors for the construction phase, the following equation has been used to calculate the expected GHG emissions from the Project:

$$Emissions\ (tCO2e) = rate\ of\ activity\ (unit) \times emission\ factor\ (tCO2e/unit)$$

Here, related terms in the above equation refers to the following:

- The rate of activity in the above equation refers to detailed information on the Project (e.g., the mass of materials used).
- The emission factor in the above equation refers to the quantity of emissions produced per unit of activity data obtained from the internationally recognized sources.

Assessment scope

As the scope of this Assessment considers construction-related GHG emissions, the before-use-stage emissions A1-A5 are calculated. These stages are highlighted in Figure 8-1.

Emissions resulting from land-use change are reported separately in Section 8.4.2.1 since they are not direct construction-related emissions. These land-use change emissions, resulting from forestry clearance, are assumed to be life-cycle stage A5 and Scope 1 emissions. The emissions from the loss of sequestration potential due to the land-use change is assumed to be lifecycle stage B2 and Scope 1 emissions. The justification for these assumptions is also provided below under "Assumptions and Limitations" in this section.

[55] The International Energy Agency. Emissions factors 2022. Last accessed in March 2024 here: Emissions Factors 2022 - Data product - IEA

[56] JBA Consulting. Exploring the economics of land use change for increasing resilience to climate change in England. Table C-4. Last accessed in March 2024 here: theccc.org.uk/wp-content/uploads/2018/12/JBA-Consulting-Exploring-the-economics-of-land-use-change-for-increasing-resilience-to-climate-change-in-England.pdf.

[57] Forest Research. The storage of carbon in trees and timber. Last accessed in March 2024 here: The storage of carbon in trees and timber (forestresearch.gov.uk).

[58] The National Renewable Energy Laboratory's Wind Turbine Design Cost and Scaling Model. Last accessed in March 2024 here: Wind Turbine Design Cost and Scaling Model (nrel.gov)

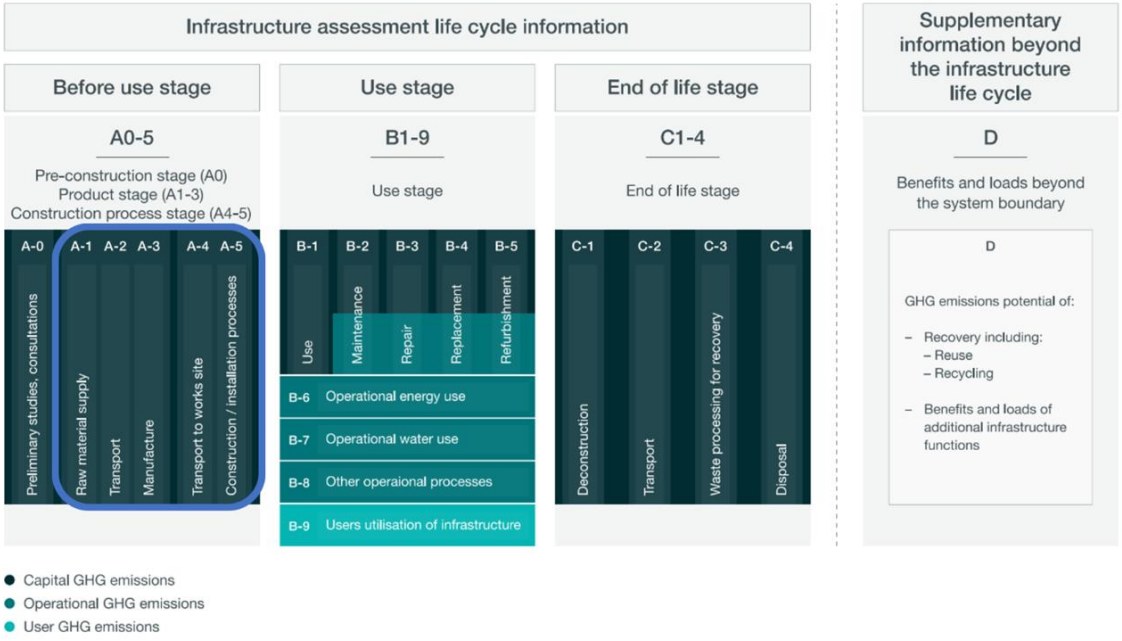


Figure 8-1: PAS 2080: 2016 Lifecycle stages for infrastructure[59]

On a whole life carbon basis, the following construction-related activities are within the scope of this Assessment.

- A1 – A3 (Product stage):
  - A1: Raw material supply
  - A2: Raw material transport
  - A3: Manufacture
- A4 (Transport):
  - A4: Transportation of materials from factory gate to and from project site
- A5 (Construction process stage)
  - A5.1: Preconstruction demolition (reported separately under land-use change emissions)
  - A5.2: On-site activities
  - A5.3: On-site waste
  - A5.4: Worker transport
- B2: Maintenance (report separately under land-use change emissions)

On an emissions scope basis, the following activities are within the scope of the Assessment:

- Scope 1:
  - On site activities (fuel consumption)
  - Land-use change (however these are reported in Section 8.4.2.1 separately from construction emissions)
- Scope 2:
  - On site activities (purchased electricity)
- Scope 3:
  - Raw material supply

[59] British Standards Institution (BSI). Publicly available specification 2080:2023. Last accessed in March 2024 here: PAS 2080:2023 Carbon Management in Infrastructure | BSI (bsigroup.com).

- Raw material transport
- Manufacture
- Transportation of materials
- On-site waste
- Worker transportation

The scope of the Assessment on a whole life carbon basis and a scope basis is summarised in Table 8-5.

Table 8-5: Assessment scope

Project section	Whole-life carbon lifecycle stage	Scope	Comments
Wind turbine components	A1-A3	Scope 3	Purchased goods
Road materials	A1-A3	Scope 3	Purchased goods
Transmission cables	A1-A3	Scope 3	Purchased goods
Material transport from factory to site	A4	Scope 3	Transport & distribution
Power consumption in construction	A5	Scope 2	Purchased electricity
On-site waste	A5	Scope 3	Subcontractor activity
Worker transport to site	A5	Scope 3	Employee and or subcontractor commuting
Fuel consumption in construction	A5	Scope 1	Emissions come from operations or lands owned or controlled by the Project Company.
Land-use change: vegetation (tree) loss	A5	Scope 1	Emissions come from operations or lands owned or controlled by the Project Company.
Land-use change: loss of sequestration potential	B2	Scope 1	Emissions come from operations or lands owned or controlled by the Project Company.

Due to an absence of information splitting worker transport, power consumption, and fuel use activities between the Project Company and sub-contractors, this Assessment has assumed the Project Company has sub-contracted out all construction and transportation activities. Therefore, the majority of emissions across the Project are assumed to be Scope 3 as summarised in Table 8-5.

Assumptions and Limitations

High level assumptions made specifically for the assessment of construction-related GHG emissions are outlined in Table 8-6. The full details and values of each assumption are provided in the calculation spreadsheet.

Table 8-6: Assumptions made

Category	Asset / Component	Assumption	Further comments
Material transport to site	Transport distance	Scaled RICS transport distances for the UK to Türkiye where appropriate – for national transport distances.	This assumption was made due to a lack of data on the transport distances of materials to site
	Sourcing of materials	The location and origin of materials – either locally manufactured, regionally manufactured, or European manufactured, was made based on professional judgement and experience.	This assumption was made due to a lack of information on the origin of project materials.

Category	Asset / Component	Assumption	Further comments
	Fiberglass	The fiberglass used for the wind turbines was sourced from Europe.	This assumption was made due to a lack of information.
On-site waste	Excavated excess soil	Disposed excavated excess soil is out of scope.	This assumption was made due to a lack of information on the mass of disposed excavated excess soil.
Worker transport to site	Diesel used per worker for transportation to site	Data provided for 4 projects on the volume of diesel used to worker transportation to site was used to derive an average volume of diesel used per worker for transportation to site.	This assumption was made due to incomplete data on the use of regular vehicle fuel used across all projects and an absence of shuttle bus fuel used.
Road construction	Road width	A road width of 6m.	Provided by project company
	Road depth	9.19 inches assumed as it is in the 75th percentile of gravel road depths given the road will be used to transport heavy materials	Assumption was made as data was only provided on area of road constructed, not the volume of material used to construct the road.
	Gravel density	The mid-point of gravel density averages was chosen.	This assumption was made to calculate the volume of gravel used in road construction
Substation	Electrical substation	The substation is outside the scope of this assessment.	The substation was installed by a separate company, the Turkish Electricity Transmission Corporation, and no information was provided on its construction.
Fuel	On site fuel consumption and worker transport	Assumed that 100% mineral diesel is used to power on site machinery and equipment as well as to power worker transportation vehicles.	Based on professional judgement and industry practice.
Wind turbines	Foundations	The provided volume of concrete for each sub-project is assumed to be the total volume of concrete used and not concrete used per turbine.	Based on professional judgement.
	Foundations and platform	Only concrete is assumed to be used for the foundations and platform.	Based on professional judgement and an absence of data on materials used.
	Foundation concrete	RC 28 / 35 concrete is assumed to be used.	Based on ICE v3.0 concrete descriptions and professional judgement.
	Turbine components	Gearbox, generator, and the cooling system are all excluded from the assessment as emissions are expected to be a de minimis portion of total emissions.	Based on professional judgement.
	Turbine components	The assumed components are: • Hub • Pitch bearing • Pitch bearing system • Low speed shaft • Bearing housing • Mechanical brakes • Yaw drive and bearing • Mainframe • Nacelle cover • Nose cone	The components within the turbines is assumed based on literature and industry common practice. These assumptions were made as data was not provided on the specific components within each turbine.

Category	Asset / Component	Assumption	Further comments
	Turbine components	Material assumptions are made for: • Hub (Iron) • Pitch bearing (engineering steel) • Bearing system (steel, finished cold-rolled coil) • Low speed shaft (engineering steel) • Bearing housing (Steel pickled hot-rolled coil) • Mechanical brake (Steel, finished cold-rolled coil) • Yaw drive and bearing (Engineering steel) • Mainframe (Engineering steel) • Nacelle cover (Composite fiberglass) • Nose cone (Composite fiberglass)	The materials for components are assumed based on literature and industry common practice. Specific materials e.g., engineering steel is assumed based on ICE v3.0 material descriptions
	Turbine components mass	The mass for the assumed components was derived from an NREL technical report which provides equations using technical information to quantify the mass of the assumed components. The equations used are contained in the calculation spreadsheet.	
Land use change emissions	Vegetation (tree loss)	As the project is going to take and use forest area, it is assumed that trees will be felled to make room for turbine and road construction. These trees are assumed to decay and not have a final use. The related emissions are assumed to be scope 1 following greenhouse gas protocol guidance. Scope 1 emissions are “Emissions from operations or lands owned or controlled by the reporting company”. Emissions are also assumed to be whole-life carbon stage A5. There is an absence of detailed information regarding the proportion of tree species within the forestry area taken by the sub-projects. Therefore, the proportion of each habitat within “woodland” is uplifted from a proportion of the total species distribution of the construction area, provided in the relevant environmental chapter, to the proportion of total woodland. Given the absence of data on carbon stored in Turkish trees, the carbon stored in British trees (for which data exists) is assumed to be comparable. The tree types provided in the relevant environmental chapter are mapped onto trees for which data exists on carbon stored per area of land. Mapping is based on characteristics such as tree height, weight, diameter at breast height. The full mapping of the trees is provided in the calculation spreadsheet.	From Greenhouse Gas Protocol: Land Sector and Removals Guidance. Part 1: Accounting and Reporting Requirements and Guidance. Available at: Land-Sector-and-Removals-Guidance-Pilot-Testing-and-Review-Draft-Part-1.pdf (ghgprotocol.org)
	Loss of sequestration potential.	As construction activities change the project land due to road and turbine construction, it is assumed that there will be a proportionate	

Category	Asset / Component	Assumption	Further comments
		loss of sequestration potential of the given forestry land. As such, land-use change due to the project is assumed to lead to half as much carbon sequestration across the land area taken by the project. It is assumed only the sequestration rates of the forestry area will be significantly impacted by the project, as such only forestry area sequestration potential is quantified. These emissions are assumed to be scope 1 based on greenhouse gas protocol guidance and are considered whole-life carbon stage B2, as it is assumed the land will be maintained in such a manner as to prevent the regrowth of trees.	

8.2.3.2 Operation phase

The information received from the Project Company within the scope of assessment of operational GHG emissions contains the following:

- Fuel consumption during the operation phase for on-site generators and maintenance and refurbishment activities (litres),
- Electricity consumption during the operation phase (e.g., for lightning and security purposes purposes) (MWh).

Emission factors

Emission factors obtained from recognized sources are employed to assess operational GHG emissions, including the following:

- GHG Protocol Calculation Tools and Guidance[60],
- Turkish national electricity grid emissions factors[61],
- Turkish electricity generation and electricity consumption point emissions factors information form[62]

Carbon calculation methodology

GHG emissions during the operation phase are calculated using the bottom-up approach outlined in Section 8.2.3.1, based on publicly available emissions factor data for operating activities. For example, the use of on-site generators is in L/yr x emissions factor for the fuel consumption.

[60] Emissions factors obtained from the GHG Protocol Calculation Tools and Guidance. Last accessed in February 2024 here: https://ghgprotocol.org/calculation-tools-and-guidance.

[61] Turkish national electricity grid emission factors published by the Ministry of Energy and Natural Resources Last accessed in November 2023 here: https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/Bform2020.pdf.

[62] Turkish lectricity generation and electricity consumption point emissions factors information form. Last accessed in February 2024 here: https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/EmisyonFaktorleri/TEUVETN_Emisyon_Fakt%C3%B6rleri_Bilgi_Formu.pdf.

Assessment scope

Although there is no anticipated significant GHG emissions arising from the operation of the Project considering the nature of the Project (i.e., a renewable energy investment), potential Scope 1 and Scope 2 emission sources during the operation phase of the Project are provided in this Assessment for effective management of GHG emissions. Also, avoided GHG emissions associated with the Project during the operational phase are within the scope of this Assessment.

Assumptions and Limitations

Potential GHG emission sources during the operational phase of the Project and approach to their assessment are provided in this Assessment. However, calculations have not been made due to lack of data on consumptions at this stage of the Project.

The avoided GHG emissions presented within this Assessment are based on the assumption associated with energy production, and therefore inherently obtain a large degree of uncertainty.

8.3 Baseline Conditions

8.3.1 Climate Change

As part of this section, the resilience of the Project to climate change is being assessed. The Project is location in Çanakkale province. Based on the Project location, climatic conditions in Canakkale is considered in this Assessment. Please note that the physical climate change risk assessment has been carried out for one Project site located in Çanakkale province, hence data for Çanakkale region has been used.

The climate baseline is presented in two stages. The first is the present-day climate, which shows the current climatic conditions in Canakkale. The second is the future baseline, which describes projected climate change (presented as a departure from baseline).

Based on an expected operational lifetime of 49 years, the projected climate conditions for a mid-future (2040-2059) and far-future (2060-2079) are presented. Using a precautionary principle and in line with EP IV, SSP1-2.6 (Shared Socioeconomic Pathway 1) scenario, SSP2-4.5 (Shared Socioeconomic Pathway 2) scenario, and SSP5-8.5 (Shared Socioeconomic Pathway 5) scenario (i.e., the worst-case scenario available) are used to present projected climate change for the mid-future and the far-future.

The data is drawn from the World Bank CCKP, using data from the IPCC's sixth Assessment Report (AR6) published in 2021[63]. This data is recent, using the latest climate science, and is also available at the subnational level (specific to Canakkale); however, it has not been dynamically downscaled to improve accuracy and to correct bias for local climate systems. The highest emissions scenario available from this dataset is referred to as SSP5-8.5 as mentioned above. A summary of the data source is presented in Table 8-7.

[63] Climate Change 2021: The Physical Science Basis. Working Group I Contribution to the IPCC Sixth Assessment Report, Last accessed in November 2023 here: https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/.

Table 8-7: Data source employed to establish the future climate baseline

Data source	Mid-future time horizon	Far-future time horizon	Reference period	Future scenario used
World Bank CCKP	2040-2059	2060-2079	1995-2014	SSP1-2.6
World Bank CCKP	2040-2059	2060-2079	1995-2014	SSP2-4.5
World Bank CCKP	2040-2059	2060-2079	1995-2014	SSP5-8.5

8.3.1.1 Present-day climate

According to the data obtained from the Turkish State Meteorological Service[64] for the period 1929 – 2022, the hottest months of the year are July and August, and the coldest months of the year are January and February (Figure 8-2). The mean, maximum summer, and minimum winter temperatures for this period are 15.18 ºC, 30.8 ºC in July, and 3.2 ºC in January, respectively. The maximum and minimum temperatures measured in this period are 39.7 ºC in August and -11.5 ºC in February, respectively.

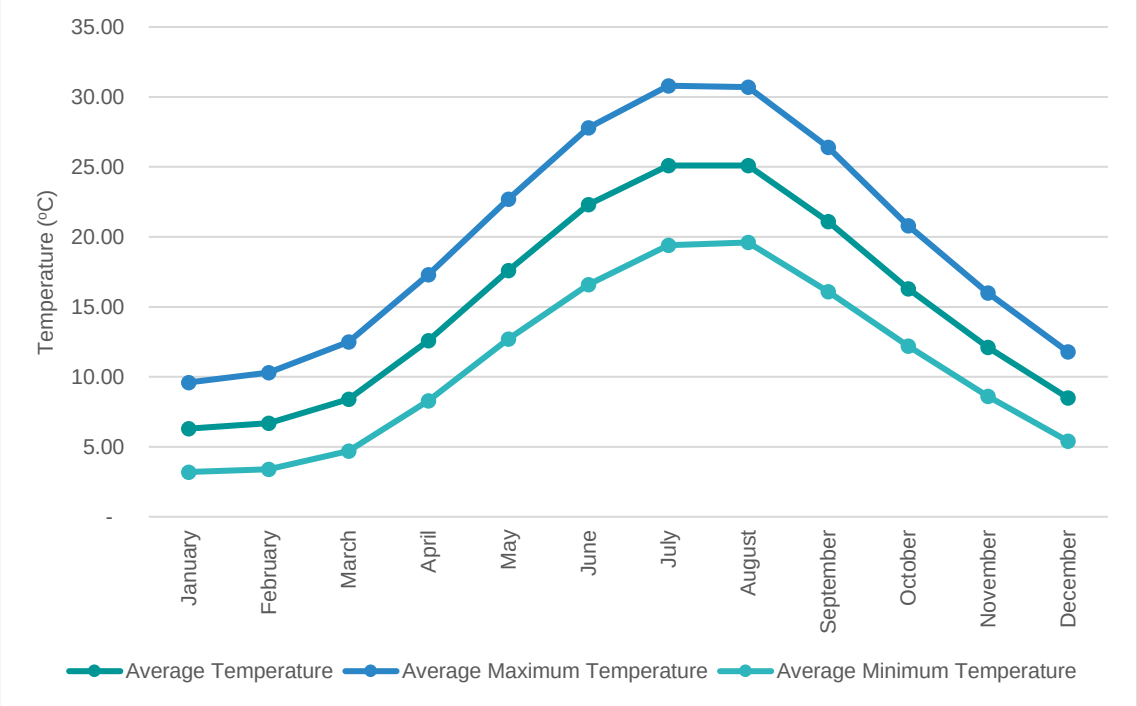


Figure 8-2: Monthly average mean, maximum and minimum temperatures, Canakkale, present-day (1929 – 2022)[65]

The highest recorded average precipitation is 104.9 mm in December for the period 1929 – 2022, whereas the lowest recorded one is 10.9 mm in August (Figure 8-3). For this period, the annual mean of total precipitation is 624.4 mm.

[64] Obtained from Meteoroloji Genel Müdürlüğü (mgm.gov.tr). Last accessed in November 2023.

[65] Produced by Mott MacDonald based on the temperature data obtained from the Turkish State Meteorological Service

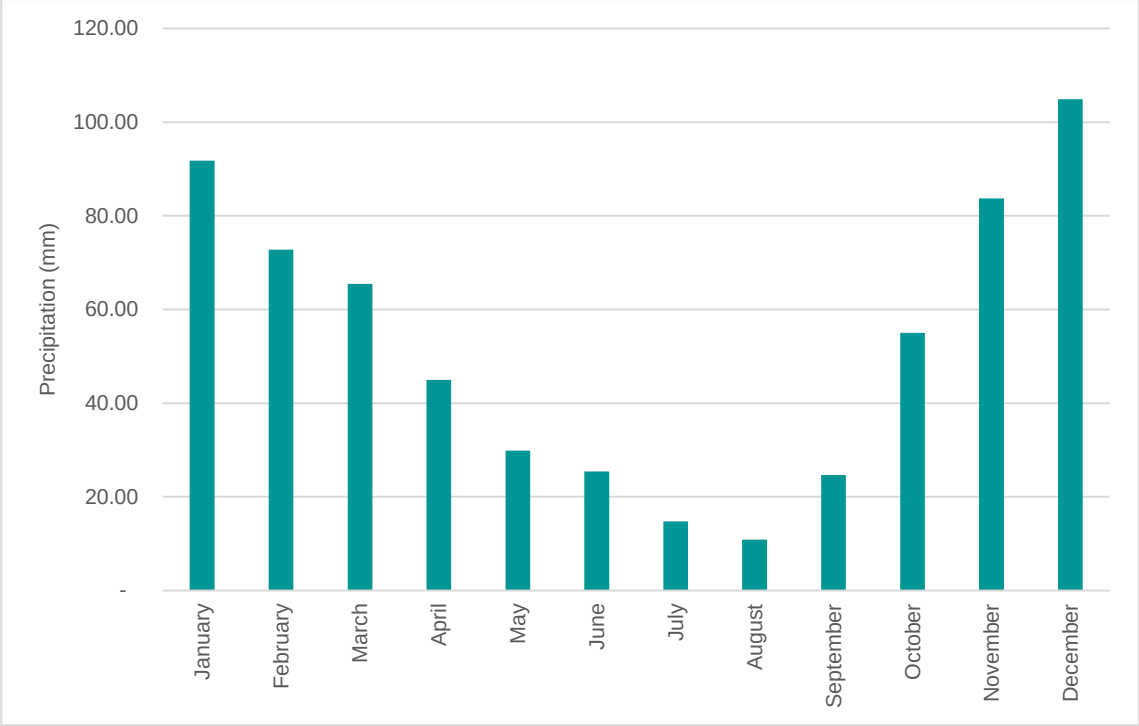


Figure 8-3: Monthly average precipitation data, Canakkale, present-day (1929 – 2022)[66]

The present-day (1929-2022) climate in Canakkale is summarised in Table 8-8 as follows:

Table 8-8: Present-day (1930 – 2022) climate

Climate variable	Value
Mean temperature	15.18 ºC
Max. summer temperature (July)	30.80 ºC
Min. winter temperature (January)	3.20 ºC
Average annual precipitation	52.03 mm per month
Average summer precipitation (June / July / August)	17.03 mm per month
Average winter precipitation (December / January / February)	89.83 mm per month

8.3.1.2 Future climate baseline

The mid-future and far-future projected climate for Canakkale according to the World Bank CCKP SSP1-2.6, SSP2-4.5, and SSP5-8.5 climate change scenarios are presented in Table 8-9. These are projected values calculated for SSP1-2.6, SSP2-4.5, and SSP5-8.5 scenarios as a departure from the modelled climate for a reference period (1995-2014) and are specific for the Canakkale region.

[66] Produced by Mott MacDonald based on the precipitation data obtained from the Turkish State Meteorological Service

Table 8-9: Future climate baseline, SSP1-2.6, SSP2-4.5 & SSP5-8.5, reference period 1995-2014 (50th percentile)[67]

Climate variable	Future climate scenarios	Reference value (1995-2014)	Climate value for the mid-future (2040-2059)	Climate value for the far-future (2060-2079)
Mean average temperature	SSP1-2.6	15.02 ºC	16.41 ºC	16.54 ºC
	SSP2-4.5		16.52 ºC	17.09 ºC
	SSP5-8.5		17.11 ºC	18.30 ºC
Max. temperature (July)	SSP1-2.6	28.95 ºC	31.14 ºC	31.13 ºC
	SSP2-4.5		31.04 ºC	31.80 ºC
	SSP5-8.5		32.04 ºC	33.56 ºC
Min. temperature (January)	SSP1-2.6	3.50 ºC	4.40 ºC	4.50 ºC
	SSP2-4.5		4.40 ºC	5.10 ºC
	SSP5-8.5		4.90 ºC	5.80 ºC
Mean precipitation (August)	SSP1-2.6	8.82 mm	8.71 mm	10.17 mm
	SSP2-4.5		9.19 mm	7.47 mm
	SSP5-8.5		6.98 mm	4.75 mm
Mean precipitation (December)	SSP1-2.6	124.63 mm	121.54 mm	127.61 mm
	SSP2-4.5		119.49 mm	119.98 mm
	SSP5-8.5		116.55 mm	111.89 mm

The present-day climate is established using the climate data covering the period 1929 – 2022, whereas the future climate baseline is constructed based on the baseline period (1995 – 2014) available in the World Bank CCKP. Since the timeframes used for the present-day climate and future climate baseline are different, there is a difference in the value of climate variables in Table 8-8 and Table 8-9.

The projected changes in maximum and minimum temperatures and precipitation seen in Table 8-9 are also shown schematically below.

Projected changes in maximum and minimum temperatures for climate change scenarios for the mid-future and the far-future are shown in figures below.

[67] Obtained from https://climateknowledgeportal.worldbank.org/. Last accessed in October 2023.

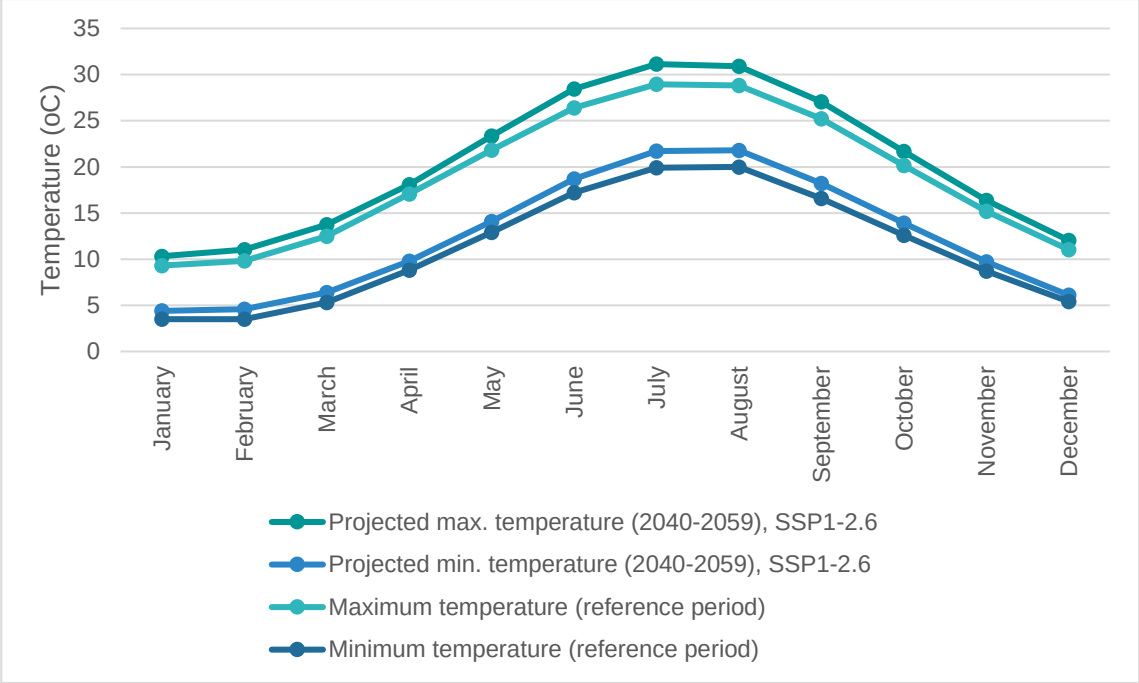


Figure 8-4: Projected changes in maximum and minimum air temperatures for the mid-future, Canakkale, SSP1-2.6 1995-2014 reference period (50th percentile)[68]

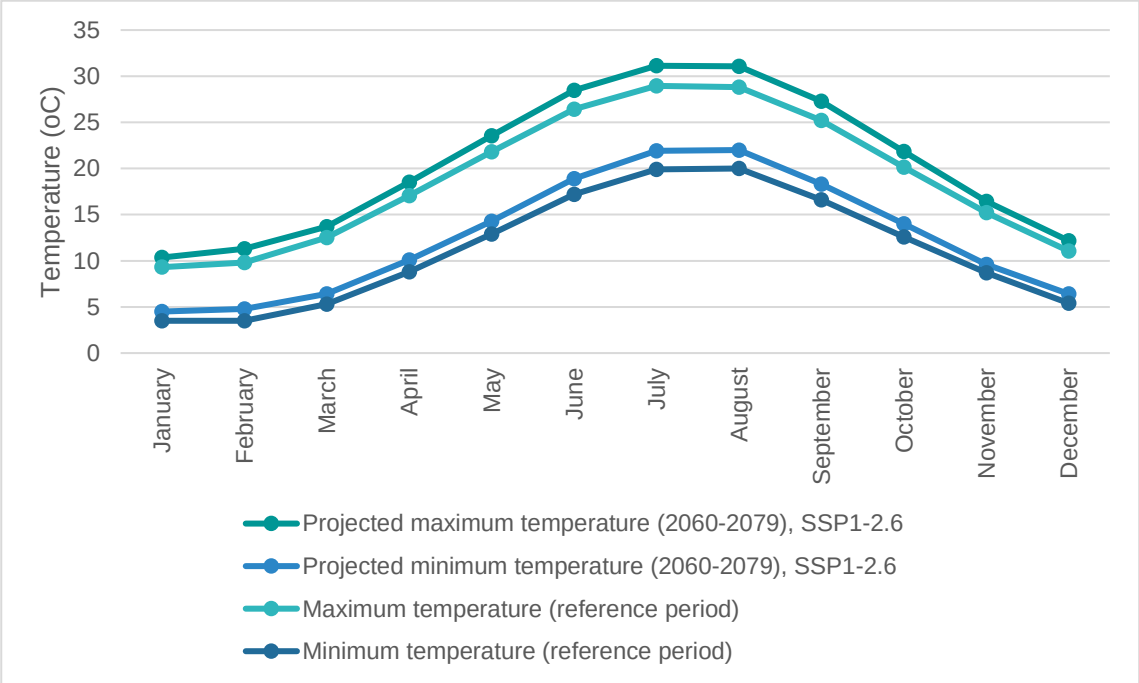


Figure 8-5: Projected changes in maximum and minimum air temperatures for the far-future, Canakkale, SSP1-2.6, 1995-2014 reference period (50th percentile)[69]

[68] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

[69] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

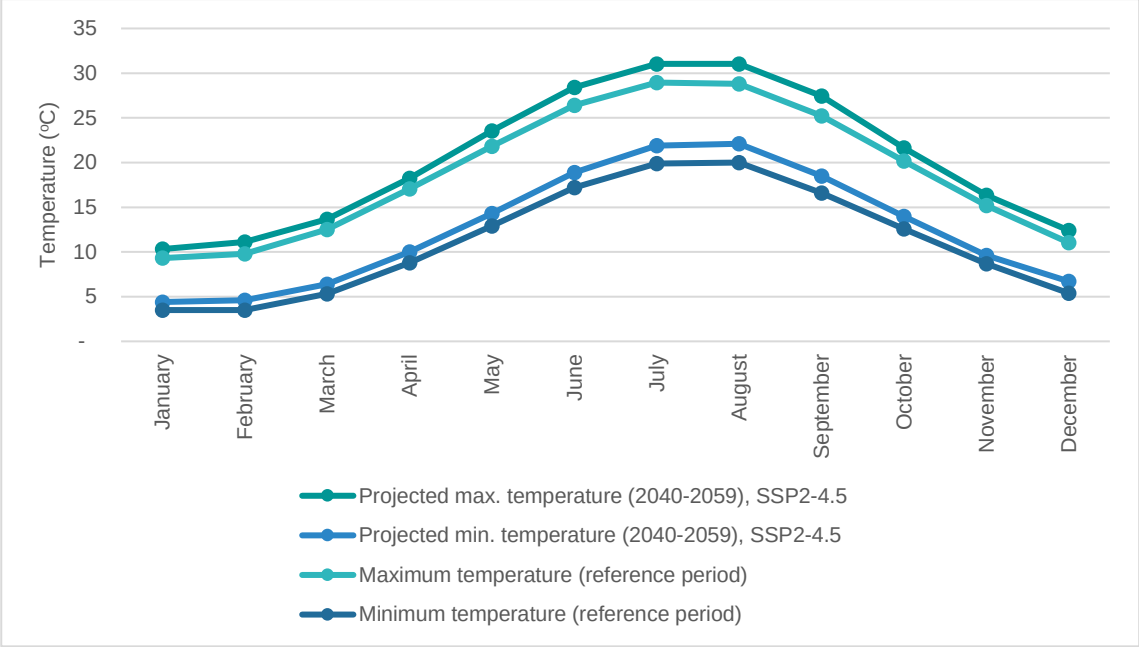


Figure 8-6: Projected changes in maximum and minimum air temperatures for the mid-future, Canakkale, SSP2-4.5, 1995-2014 reference period (50th percentile)[70]

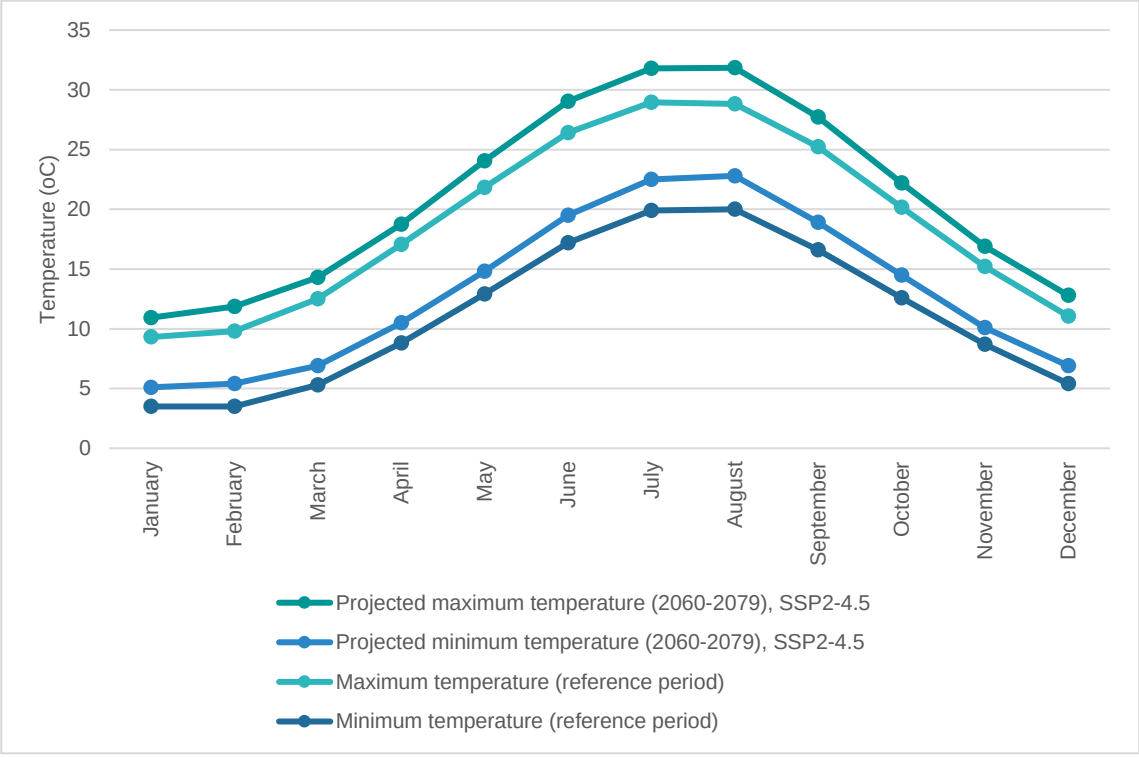


Figure 8-7: Projected changes in maximum and minimum air temperatures for the far-future, Canakkale, SSP2-4.5, 1995-2014 reference period (50th percentile)[71]

[70] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

[71] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

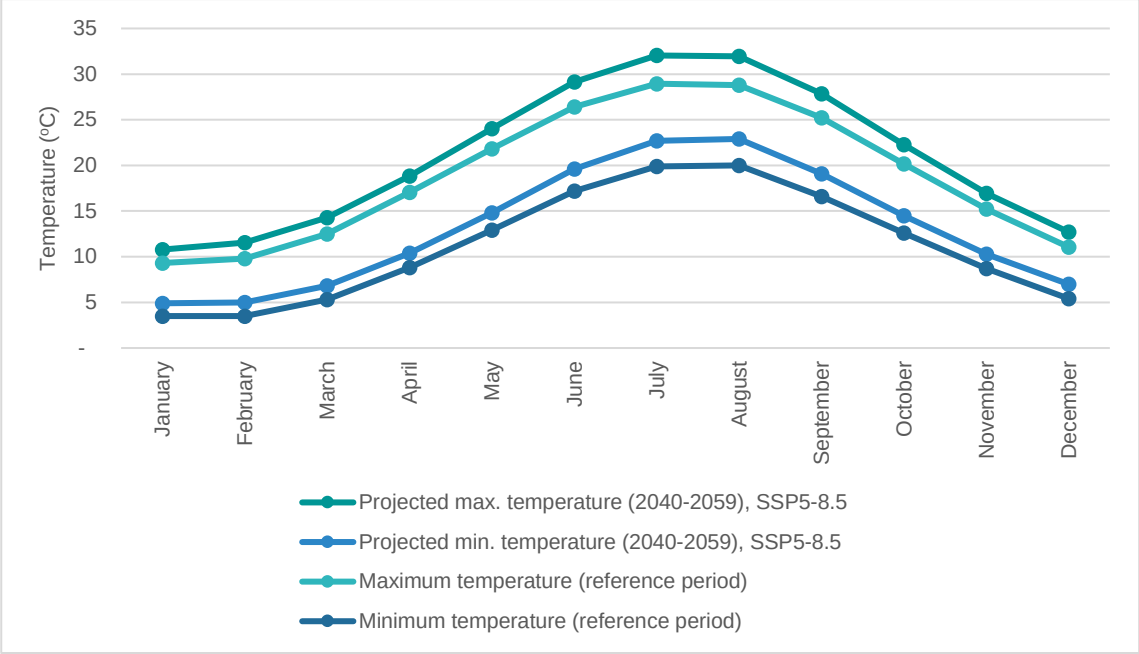


Figure 8-8: Projected changes in maximum and minimum air temperatures for the mid-future, Canakkale, SSP5-8.5, 1995-2014 reference period (50th percentile)[72]

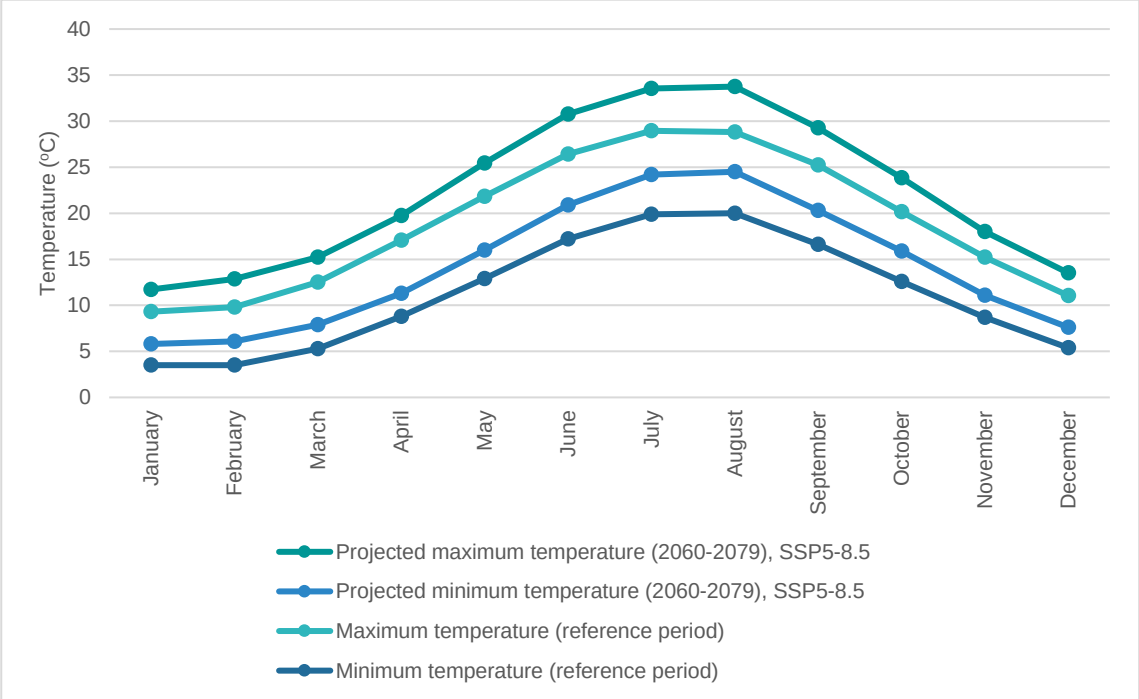


Figure 8-9: Projected changes in maximum and minimum air temperatures for the far-future, Canakkale, SSP5-8.5, 1995-2014 reference period (50th percentile)[73]

In Figure 8-10, Figure 8-11, and Figure 8-12, the projected changes in the monthly average precipitation for the mid-future and far-future are presented for SSP1-2.6, SSP2-4.5 and SSP5-

[72] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

[73] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

8.5 climate change scenarios, respectively, based on the data accessed via the World Bank CCKP.

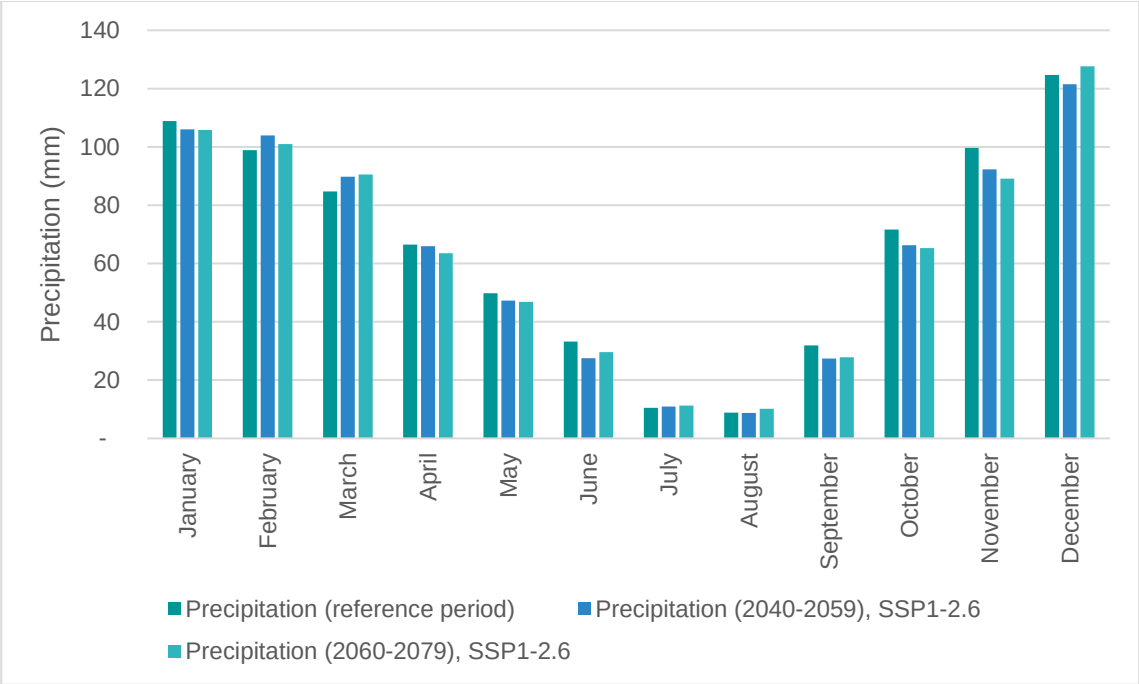


Figure 8-10: Projected changes in monthly average precipitation for the mid-future and far-future, Canakkale, SSP1-2.6, 1995-2014 reference period (50th percentile) [74]

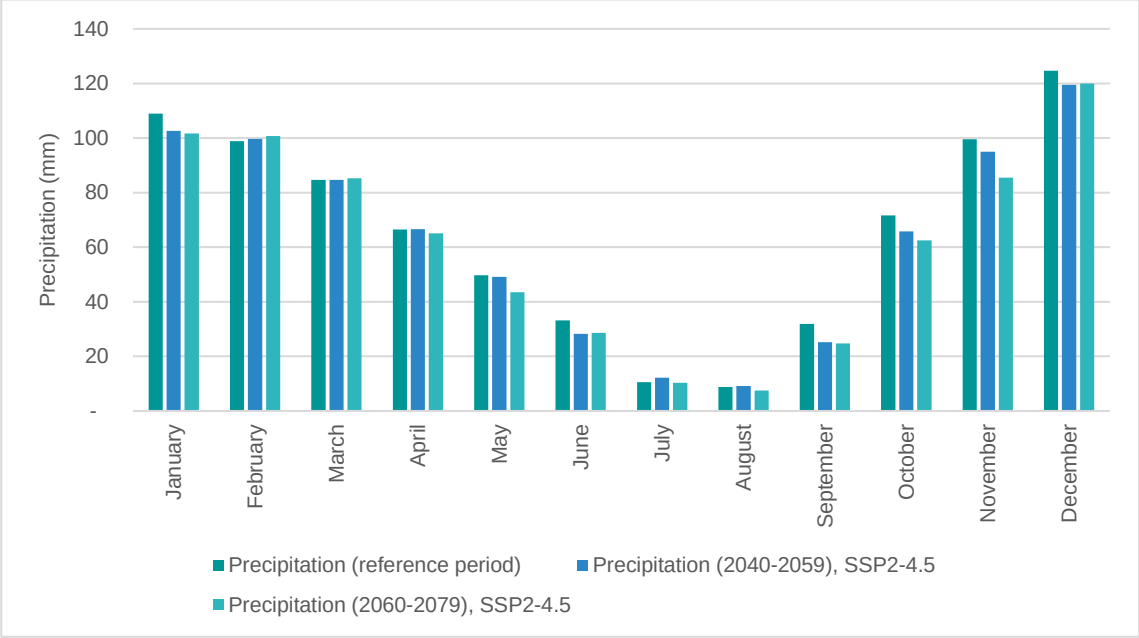


Figure 8-11: Projected changes in monthly average precipitation for the mid-future and far-future, Canakkale, SSP2-4.5, 1995-2014 reference period (50th percentile)[75]

[74] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

[75] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

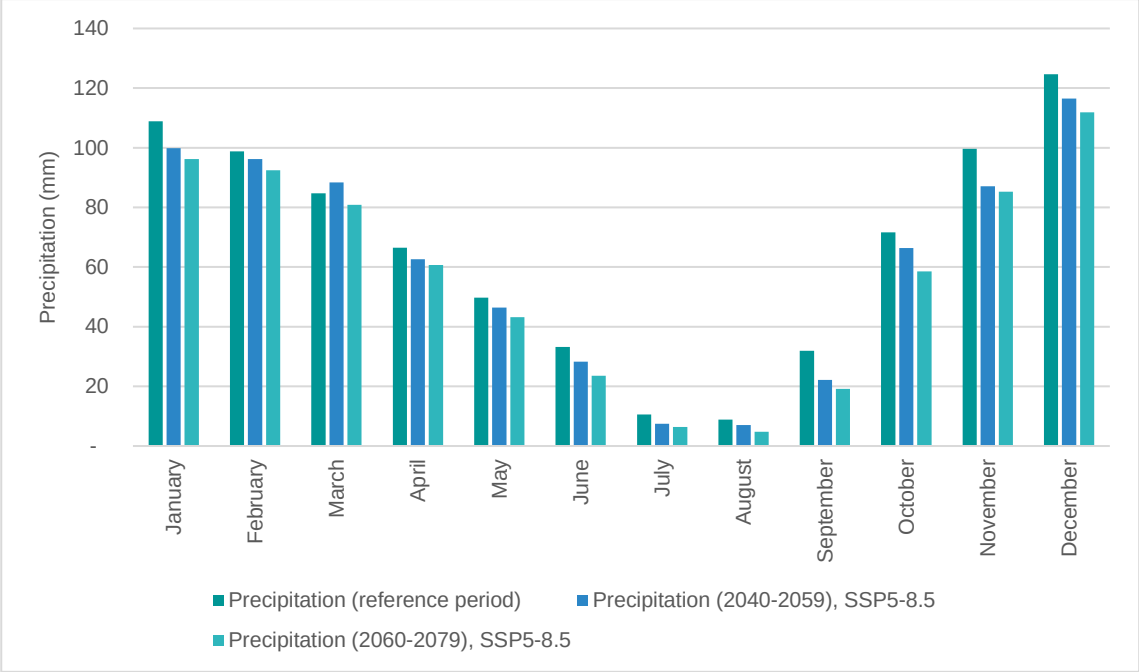


Figure 8-12: Projected changes in monthly average precipitation for the mid-future and far-future, Canakkale, SSP5-8.5, 1995-2014 reference period (50th percentile)[76]

Changes in extreme weather events

In addition to changes in average mean, maximum and minimum temperatures and precipitation regimes, climate change may also result in changes in extreme weather events.

Extreme Precipitation

Climate projections data for extreme precipitation events are available in the World Bank CCKP. The mid-future and far-future projected changes in the average largest 5-day cumulative precipitation and number of days with precipitation greater than 20 mm in December for SSP1-2.6, SSP2-4.5, and SSP5-8.5 climate change scenarios for Canakkale are presented in Table 8-10 and Table 8-11, respectively.

Table 8-10: Projected changes in the average largest 5-day cumulative precipitation in December for the mid-future and far-future, Canakkale, SSP1-2.6, SSP2-4.5 & SSP5-8.5, 1995-2014 reference period (50th percentile)[77]

Future scenario	Reference value (1995-2014)	Climate value for the mid-future (2040-2059)	Climate value for the far-future (2060-2079)
SSP1-2.6	102 mm	99 mm	103 mm
SSP2-4.5	102 mm	108 mm	111 mm
SSP5-8.5	102 mm	105 mm	108 mm

[76] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

[77] Produced by Mott MacDonald based on the data available in the World Bank CCKP

Table 8-11: Projected changes in the number of days with precipitation >20mm in December for the mid-future and far-future, Canakkale, SSP1-2.6, SSP2-4.5 & SSP5-8.5, 1995-2014 reference period (50th percentile)[78]

Future scenario	Reference value (1995-2014)	Climate value for the mid-future (2040-2059)	Climate value for the far-future (2060-2079)
SSP1-2.6	1.17 days	1.11 days	1.25 days
SSP2-4.5	1.17 days	1.19 days	1.17 days
SSP5-8.5	1.17 days	1.17 days	1.21 days

Although Table 8-11 shows slight changes from the baseline for SSP1-2.6, SSP2-4.5, and SSP5-8.5 scenarios, projections provided in Table 8-10 vary by climate change scenario and time period.

Heatwaves

Figure 8-13, Figure 8-14, and Figure 8-15 show projected changes in number of hot days with temperature greater than 35 ºC for SSP1-2.6, SSP2-4.5, and SSP5-8.5 climate change scenarios, respectively, for the mid-future and far-future based on the data accessed via the World Bank CCKP.

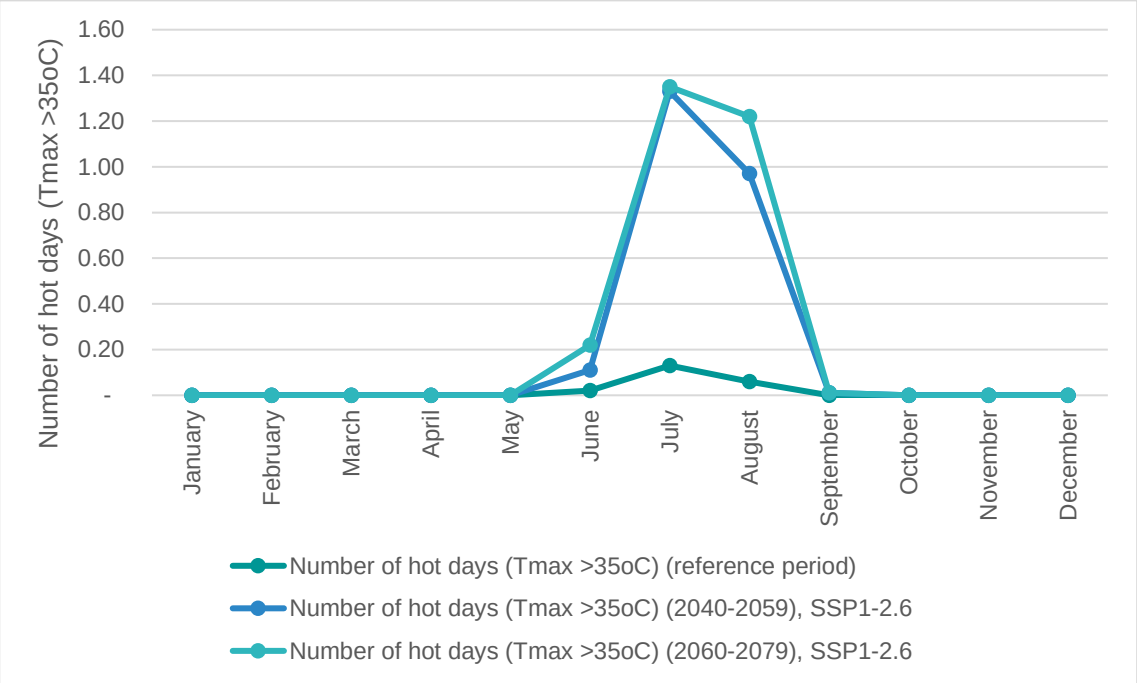


Figure 8-13: Projected changes in number of hot days (Tmax >35 ºC) for the mid-future and far-future, Canakkale, SSP1-2.6, 1995-2014 reference period (50th percentile)[79]

[78] Produced by Mott MacDonald based on the data available in the World Bank CCKP.

[79] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP.

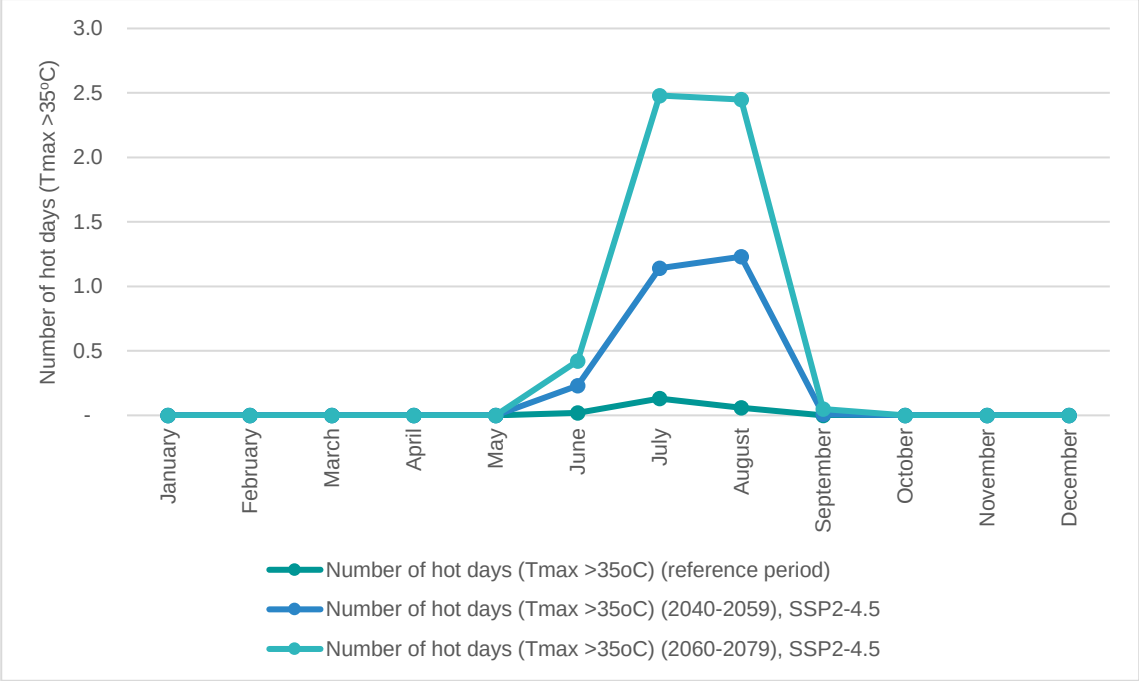


Figure 8-14: Projected changes in number of hot days (Tmax >35 ºC) for the mid-future and far-future, Canakkale, SSP2-4.5, 1995-2014 reference period (50th percentile)[80]

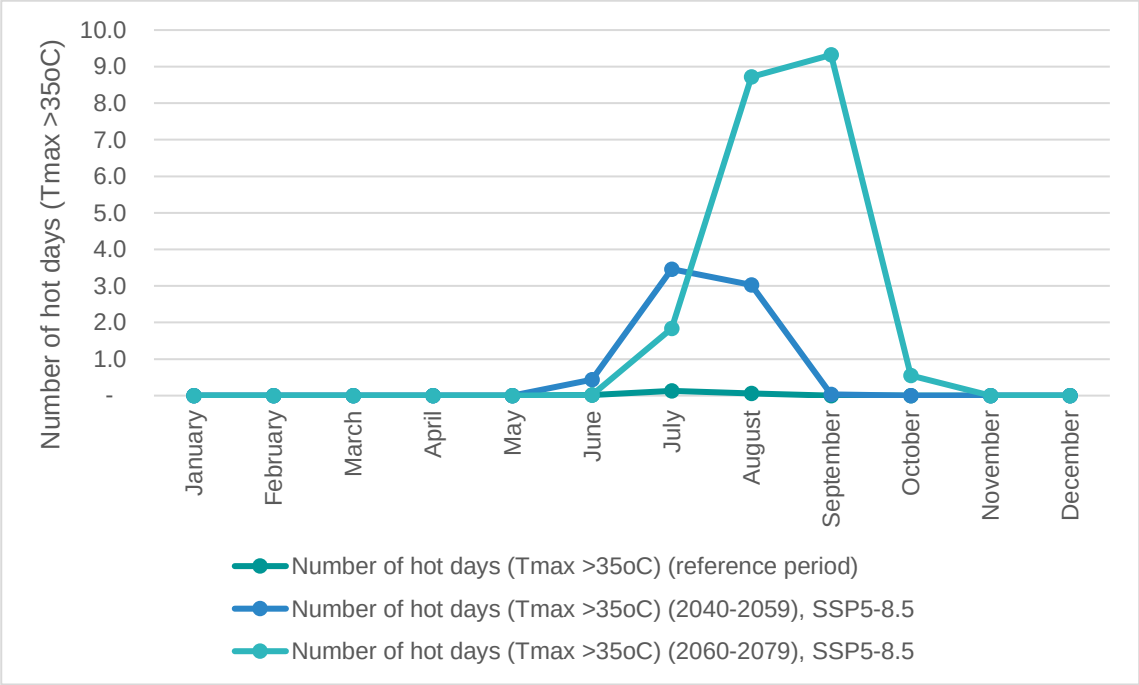


Figure 8-15: Projected changes in number of hot days (Tmax >35 ºC) for the mid-future and far-future, Canakkale, SSP5-8.5, 1995-2014 reference period (50th percentile)[81]

Based on the temperature projections presented before, alongside the projected number of hot days (temperature greater than 35ºC) (Figure 8-13, Figure 8-14, and Figure 8-15), the intensity and frequency of heatwaves are anticipated to follow an increasing trend for all climate change

[80] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP.

[81] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP.

scenarios due to increasing surface temperatures. This might affect the Project through overheating and failure of mechanical and electrical equipment and expansion and warping of metallic and plastic components, as well as reducing water availability for different phases of the Project. This may be exacerbated through solar gain during cloud-free periods of summers.

Cold waves

Table 8-12 and Table 8-13 show projected changes in the number of frost days (Tmin <0ºC) and ice days (Tmax <0ºC) in January for SSP1-2.6, SSP2-4.5, and SSP5-8.5 climate change scenarios for the mid-future and the far-future based on the data accessed via the World Bank CCKP.

Table 8-12: Projected changes in the number of frost days (Tmin <0ºC) in January for the mid-future and the far-future, Canakkale, SSP1-2.6, SSP2-4.5 & SSP5-8.5, 1995-2014 reference period (50th percentile)[82]

Future scenario	Reference value (1995-2014)	Climate value for the mid-future (2040-2059)	Climate value for the far-future (2060-2079)
SSP1-2.6	7.42 days	4.88 days	4.92 days
SSP2-4.5	7.42 days	5.1 days	3.68 days
SSP5-8.5	7.42 days	3.99 days	2.55 days

Table 8-13: Projected changes in the number of ice days (Tmax <0ºC) in January for the mid-future and the far-future, Canakkale, SSP1-2.6, SSP2-4.5 & SSP5-8.5, 1995-2014 reference period (50th percentile)[83]

Future scenario	Reference value (1995-2014)	Climate value for the mid-future (2040-2059)	Climate value for the far-future (2060-2079)
SSP1-2.6	0.3 days	0.1 days	0.1 days
SSP2-4.5	0.3 days	0.1 days	0 days
SSP5-8.5	0.3 days	0 days	0 days

Based on the temperature projections presented before, alongside the projected number of frost days (Tmin <0ºC) and ice days (Tmax <0ºC) (Table 8-12 and Table 8-13), the intensity and frequency of cold waves are not anticipated to increase due to increasing surface temperatures for both timeframes and for all scenarios.

Storms

Increased surface temperatures may cause changes to the intensity and frequency of storms. Although the degree of change in winds and storms is not certain and there is no data for potential changes in storm track, intensity, and speed of storms, the changes are expected to include a trend towards stronger winds and intense storms. This might affect the Project through heavy rainfall and high winds, which may cause additional stress to structure and structural damage.

Flooding

Flooding due to surface runoff (pluvial flooding) may increase due to both development and changes in land cover, as well as changes in rainfall events. Depending on the projected changes in extreme precipitation events, sudden downpours and flash flooding may increase in frequency. Furthermore, hotter temperatures may increase soil dryness and inability to absorb rainfall and thereby increase surface runoff potential and flash flood risk. However, the Project is

[82] Produced by Mott MacDonald based on the data available in the World Bank CCKP

[83] Produced by Mott MacDonald based on the data available in the World Bank CCKP

located in a high mountain area (500-750m above the ground). Therefore, any risks associated with flooding is not anticipated.

Wildfires

The risk of wildfires might increase associated with the increasing intensity and frequency of droughts and heatwaves, which might pose various threats to project receptors, such as damage to the infrastructure. The Project components are surrounded by the forestry area. Therefore, a potential forest fire in the region might significantly affect the continuation of the Project operations.

Extreme mass movements

The intensity and frequency of extreme mass movements (i.e., landslides and land subsidence) might increase due to the increase in the frequency and intensity of extreme precipitation events. This poses a variety of threats for project receptors; for example, extreme mass movements might lead to significant damage to the project infrastructure.

According to the Türkiye Landslide Inventory Map, there are passive landslides were observed around the Project area. The nearest passive landslide is located 1056 m away from the T4 turbine (More detailed information on the subject has been provided in *Chapter 6: Land Use, Soil, and Geology*.)[84]. Additionally, the Project is not located on a steeply sloping area but on a flat and rocky solid ground. Therefore, any risk associated with landslides and land subsidence is not anticipated for the Project.

Sea level rise

The Project is not located on a coastal area (the nearest turbine is around 10km away from the sea). Therefore, any risks associated with sea-level rise is not anticipated.

8.3.2 Greenhouse Gas (GHG) Emissions

According to the International Energy Agency (IEA), the energy sector is estimated to account for more than 75% of total GHG emissions on a global basis[85]. Türkiye's latest national GHG inventory to the UNFCCC disclosed annual emissions of around 524 Mt of CO_2e based on 2020 data[86]. The energy sector is the major source of GHG emissions in Türkiye, constituting 70% of total emissions with 368 Mt of CO_2e. The main contributor is energy industries accounting for 38.9% of total emissions, which is followed by transport sector with 20.5%, other sectors with 21.9%, and manufacturing industries with 16.4%. There is a 163.3% increase in the energy sector related GHG emissions between 1990-2020. In Table 8-14, national GHG emissions for 2020 by sector are also presented.

Table 8-14: 2020 GHG emissions by sector

Sector	Mt CO_2e
Energy	367.6
IPPU	66.8
Agriculture	73.2
Waste	16.4
Land use, land-use change, and forestry (LULUCF)	-56.9

[84] Harmancık WPP National EIA Report, 2023, Savra

[85] IEA (2023), Greenhouse Gas Emissions from Energy Data Explorer, IEA, Paris, Last accessed in November 2023 here: https://www.iea.org/data-and-statistics/data-tools/greenhouse-gas-emissions-from-energy-data-explorer.

[86] UNFCC (2022) Turkey. 2022 National Inventory Report (NIR), Last accessed in November 2023 here: https://unfccc.int/documents/461926.

Sector	Mt CO_2e
Total (excluding LULUCF)	**523.9**
Total (with LULUCF)	**466.9**

According to 2023 national energy statistics shared by the Ministry of Energy and Natural Resources, the shares of resources in energy production are presented in Table 8-15. As seen from Table 8-15, 39.1% of energy is produced by renewable energy sources.

Table 8-15: The share of resources in energy production[87]

Resource	Share in production (%)
Coal	36.3%
Natural gas	21.4%
Hydropower	19.6%
Wind	10.4%
Solar	5.7%
Geothermal	3.4%
Others	3.2%

There is no anticipated significant release of GHG emissions associated with the Project activities during its operation because of the nature of the Project (i.e., wind renewable energy generation). When it becomes operational, the carbon intensity of the energy sector will reduce on a national basis and renewable energy capacity will increase nationally.

A greenhouse gas assessment is required to determine whether combined Scope 1 and Scope 2 Emissions are expected to be more than 100,000 tonnes of CO_2 equivalent annually, according to EP IV[88], and 25,000 tonnes of CO_2 equivalent annually as stated in the IFC performance standards[89]. If the Project is likely to exceed this threshold, then consideration must be given to relevant Climate Transition Risks (as defined by the TCFD) and an alternatives analysis completed which evaluates lower GHG intensive alternatives. However, it is expected that emissions during operation of the Project (e.g., emissions due to maintenance or renewal activities) will be minimal so it will be under the threshold requiring further assessment. Thus, it is aligned with the EP IV, IFC performance standards, and the EBRD requirements.

In this Assessment, the result is presented alongside the broader context of Türkiye's national GHG emissions inventory to provide context for the scale of the Project's contribution to reducing the carbon intensity of the energy sector.

8.4 Assessment of Impacts

8.4.1 Climate Change

As outlined in Section 8.3, climate projections for both timeframes for all climate change scenarios for Canakkale include the following:

- Increase in both average and extreme temperatures particularly during summer
- Increase in minimum temperatures in particular during winter

[87] 2023 national energy statistics on energy shared by the Ministry of Energy and Natural Resources. Last accessed February 2024 here: https://enerji.gov.tr/infobank-energy-electricity.

[88] Equator Principles, Implementation Note, 2020. Last accessed November 2023 here: https://equator-principles.com/app/uploads/Implementation_Note_Sept2020.pdf

[89] IFC, Performance Standard 3, 2012. Last accessed November 2023 here: https://www.ifc.org/content/dam/ifc/doc/2010/2012-ifc-performance-standard-3-en.pdf

- Decrease in monthly average precipitation, particularly during winter[90]
- Increase in the frequency and/or intensity of extreme weather events such as heatwaves, storms, and heavy winds and precipitation.

Based on these climate trends and details provided within the baseline conditions, a range of climate hazards and their potential impacts on the receptors of the Project have been identified both for construction and operation phases and presented in Table 8-16 and Table 8-17.

8.4.1.1 Construction phase

The climate change risk assessment performed for the construction phase of the Project is presented in Table 8-16 and has been undertaken in line with the methodology presented in Section 8.2. It summarises the potential impacts to the Project's construction activities due to climate hazards affecting sensitivities of receptors and applies a risk rating to each potential impact.

Since the construction activities will take place over the short term, this Assessment has been performed only for the mid-future. As outlined in Section 8.3.1.2, projected changes in most of climate variables are quite close to each other for SSP1-2.6, SSP2-4.5, and SSP5-8.5 scenarios, in part due to the time horizon used for this assessment, and as the difference between the scenarios widens more in the latter half of the century. For such cases, the likelihood of occurrence of climate hazard and severity of impact are considered to be similar in a qualitative approach.

[90] For SSP1-2.6 scenario, a slight increase in precipitation is projected for the far-future. This is not taken into consideration in the assessment, since there is no considerable projected increase.

Table 8-16: Climate change impact assessment for the construction phase

Associated climate-hazard	Likelihood of occurrence (of climate-hazard)			Affected receptor(s)	Climate impact	Embedded mitigation action(s)	Severity of impact			Risk Rating			Potential mitigating action(s)	Residual Risk Rating		
	SSP1-2.6	SSP2-4.5	SSP5-8.5				SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5		SSP1-2.6	SSP2-4.5	SSP5-8.5
Increase in mean seasonal temperatures and extreme high summer temperatures during heatwaves	Almost certain			Construction equipment and machinery	Engines may overheat causing the machinery to be unusable.	N/A	Moderate			High			Operators will regularly inspect construction equipment and machinery, for example the coolant levels will be checked on a daily basis. Construction equipment and machinery will be cleaned regularly to prevent dust accumulation, which might block the airflow and cause overheating. Construction equipment and machinery will be shut down when they are not used to protect them from overheating. Construction equipment and machinery will not be stored under the direct influence of sunlight, for example they will be stored in cool and dry storage areas or underneath tarps or trees.	Negligible		
				Office / welfare facilities	Overheating of office or welfare facilities, reducing productivity	N/A	Minor			Medium			Office / welfare facilities will be equipped with proper air conditioning system.	Negligible		
				Staff health and safety	Heat stroke could occur in exposed locations. The decrease of workers will lead to delays to the schedule due to productivity being down if workers are ill or on leave therefore no one is available to operate the machinery.	N/A	Moderate			High			In the construction site, there will be air-conditioned areas for workers to rest. As the day gets warmer, construction workers will be allowed to take frequent breaks in air-conditioned areas and provided with plenty of drinking water. Proper PPE including mesh safety vests helping increase airflow, high-visibility clothing reflecting sunlight, cooling headbands or hardhat sweatbands will be provided to workers. The construction schedule will take into account the coldest and hottest hours of the day to limit the exposure, for example, the more physically demanding works will be carried out during the coldest hours of the day. Training will be provided to workers to raise awareness of heat-related stress symptoms.	Low		
Increase in frequency and intensity of drought associated with low precipitation over a long period of time	Possible			Material storage / soil stockpiles / laydown area	Material and soil stockpiles dry out leading to more dust on site.	N/A	Minor			Low			Stockpile design will include measures to prevent dust generation and runoff (e.g., avoiding steep angles). Windbreaks (e.g. fencing or barriers) will be included around the stockpiles in the design. Dust suppression system will be available on the construction site. Stockpiles will be watered on a regular basis to keep its moisture content at a certain level.	Negligible		

Associated climate-hazard	Likelihood of occurrence (of climate-hazard)			Affected receptor(s)	Climate impact	Embedded mitigation action(s)	Severity of impact			Risk Rating			Potential mitigating action(s)	Residual Risk Rating		
	SSP1-2.6	SSP2-4.5	SSP5-8.5				SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5		SSP1-2.6	SSP2-4.5	SSP5-8.5
													Air quality on the site will be monitored and reported on a regular basis.			
Increase in extreme high wind speeds and storm events	Possible			Material storage / soil stockpiles / laydown area	Materials and soil blown away creating dust on site	N/A	Minor			Low			Windbreaks (e.g., fencing or barriers) will be placed at right angles and spacing to the prevailing wind currents in the design. Dust suppression system will be available on the construction site.	Negligible		
				Office / welfare facilities	Damage from wind to temporary facilities, potentially making them unusable at times.	N/A	Minor			Low			Windbreaks as mentioned above, Items such as partially installed decking, roofs, walls, etc. that might be dismantled or damaged by high winds will be supported.	Negligible		
				Construction workers' health and safety	Unsafe working conditions on site leading to restrictions on working time or activities being carried out. Potential delays to schedule.	N/A	Moderate			Medium			Emergency Response Plan will be prepared and implemented.	Low		
Precipitation changes and increase in rainfall intensity during extreme events	Unlikely	Possible		Material storage / soil stockpiles / laydown area	Materials and soil have potential to runoff into watercourses; this could lead to pollution.	Necessary permission will be obtained from the State Hydraulic Work (DSI) for the material storage / stockpiles / laydown area.	Minor	Minor		Low	Low		Erosion Control Management Plan will be prepared and implemented.	Negligible	Negligible	
				Construction equipment and machinery	Waterlogging of sites restricting ability of machinery to operate on wet ground	N/A	Minor	Minor		Low	Low		Emergency Response Plan will be prepared and implemented.	Negligible	Negligible	
				Access roads and site roads,	Restricted site access/ staff being unable to make it to work leading to delays.	N/A	Minor	Minor		Low	Low		Emergency Response Plan will be prepared and implemented.	Negligible	Negligible	

8.4.1.2 Operation phase

The climate change risk assessment carried out for the operation phase of the Project is presented in Table 8-17 and has been undertaken in line with the methodology presented in Section 8.2. It summarises the potential impacts to the Project due to climate hazards affecting sensitivities of the Project assets and applies a risk rating to each potential impact.

As stated earlier in Section 8.4.1.1, projected changes in most of climate variables for SSP1-2.6, SSP2-4.5, and SSP5-8.5 scenarios are quite close to each other in the mid-future and the far-future. For such cases, the likelihood of occurrence of climate hazard and severity of impact are considered to be similar in a qualitative approach.

Embedded mitigations at this stage of design have been identified and considered in deriving the risk scores, but scores should be updated as design progresses and more detailed design information becomes available.

Table 8-17: Climate change impact assessment for the operation phase

Climate variable	Likelihood of occurrence (of climate-hazard)						Affected receptor(s)	Climate impact	Embedded mitigation action(s)	Severity of impact				Risk Rating				Potential mitigating action(s)	Residual Risk Rating			
	Mid-future			Far-future						Mid-future		Far-future		Mid-future		Far-future			Mid-future		Far-future	
	SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5				SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5		SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5
Increase in mean seasonal temperatures and extreme high summer temperatures during heatwaves	Almost certain						Mechanical and electrical equipment and components	Fatigue and degradation of wind energy converters consisting of wind turbine generators (WTGs), AC-DC convertors, and invertors and components of the switchyard such as power transformers due to extreme temperatures.	The Project will be designed to include SCADA system, which allows for ongoing controlling and monitoring of the system during monitoring and maintenance. Parameters to be monitored will include the status of the wind energy converter and relevant ambient parameters such as rotor speed, temperature, wind speed, blade load, etc. The components of the wind energy converter sensitive to high temperatures will be designed to include a cooling system. In addition, those will be monitored continuously through temperature sensors. When temperatures are high, the wind energy converter then either runs at reduced power or stops.	Insignificant		Minor		Low		Medium		Mechanical and electrical components of the wind energy converters and substation will be reviewed to confirm that temperature tolerances include projected temperature increases. This will include elements such as transformers and other substation equipment that may be vulnerable to high temperatures, Adequate cooling or capacity for fitting additional cooling will be included for the substation in future decades. Components and equipment of wind energy converters and substation will be monitored during and inspected after heatwaves to identify any damage or deterioration and maintenance requirement. Ongoing monitoring of power production will be ensured	Negligible		Low	
								Expansion of metallic or plastic components and joints of moving parts		Insignificant		Minor		Low		Medium			Negligible		Low	
								Increased failure rate of mechanical and electrical equipment, including safety critical equipment		Minor		Minor		Medium		Medium			Low		Low	
								Power storage and transmission reductions within the substation and transformers and hence decrease in net power generation		Insignificant		Insignificant		Low		Low			Negligible		Low	
								Overheating of cables, and lower capacity of the cable to transmit energy		Insignificant		Minor		Low		Medium			Negligible		Low	

Climate variable	Likelihood of occurrence (of climate-hazard)						Affected receptor(s)	Climate impact	Embedded mitigation action(s)	Severity of impact				Risk Rating				Potential mitigating action(s)	Residual Risk Rating					
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future					
	SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5				SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5				
																			during extremes to identify losses if any.					
Increased risk of wildfires, particularly associated with droughts and heatwaves	Possible			Likely			Building structure, Access roads and site roads, Associated facility	Significant structural damage	Fire protection and suppression system will be included in the design.	Critical			Critical The severity of impact is considered as major since the Project components are surrounded by the forestry area.			High			High			Emergency Response Plan will be prepared and implemented.	High			High	
							Staff access and health and safety	Significant risks to workers health		Major			Major			High			High				Medium			Medium	
Reduced number of days with ice and frost (when temperatures are <0°C) Due to increase in mean seasonal and minimum winter temperatures, it is expected to decrease number of days with ice and frost.	Almost certain						Building structure Machinery and equipment	Ice shedding and ice throw-related damage to structures or equipment	Ice shedding and ice throw assessments will be conducted for the final plant layout.	Insignificant			Insignificant Risk of ice-shedding and ice throw related damage will decrease with reduced number of days with temperatures below zero. Therefore, severity of impact is considered as insignificant.			Low			Low			Regular maintenance activities will not be performed when temperatures are below zero.	Insignificant			Insignificant	
Gradual change in average wind speeds	Possible						Power generation capacity	Power generation: Changes in wind patterns and effect on power generation (turbines cannot operate in very high or very low wind speeds)	The blade angle will be automatically adjusted by the monitoring system so that the WPP can operate at low or high wind speeds.	Insignificant			Insignificant			Low			Low			Power production will be continuously monitored to identify losses if any.	Low			Low	
Increase in extreme high wind speeds and storm events	Possible						Mechanical and electrical equipment and components including wind turbine blades, pilling, foundations and grounding, and moving	Increased wear and tear on wind turbine blades resulting in reduced lifespan	The Project will be designed considering high wind speeds typical for the site.	Minor			Minor			Low			Low			Weather data will be monitored, and equipment and infrastructure will be inspected during and after extremes, The effect that any increased wind speeds may have on	Insignificant			Insignificant	
								Damage to infrastructure due to extreme high wind speeds, fallen trees	In extreme wind speeds, • When nominal speed is exceeded by more than 15%, the wind energy converter is to	Moderate			Moderate			Medium			Medium				Low			Low	

Climate variable	Likelihood of occurrence (of climate-hazard)						Affected receptor(s)	Climate impact	Embedded mitigation action(s)	Severity of impact				Risk Rating				Potential mitigating action(s)	Residual Risk Rating			
	Mid-future			Far-future						Mid-future		Far-future		Mid-future		Far-future			Mid-future		Far-future	
	SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5				SSP1-2.6	SSP2-4.5 SSP5-8.5	SSP1-2.6	SSP2-4.5 SSP5-8.5	SSP1-2.6	SSP2-4.5 SSP5-8.5	SSP1-2.6	SSP2-4.5 SSP5-8.5		SSP1-2.6	SSP2-4.5 SSP5-8.5	SSP1-2.6	SSP2-4.5 SSP5-8.5
							parts and joints		be stopped automatically. In addition, overspeed switches are to be placed in the rotor head to respond in case nominal speed is exceeded by more than 25%. • Derating begins at 22m/s; Cut out point at 28 m/s into idling mode, • Storm control is enabled by default. Sensors will be placed at the top of wind energy converter tower to monitor oscillations. When excursions exceed the permissible limits, the wind energy converter stops. Sensors will be placed in the rotor head of wind energy converters to detect loud knocking sounds that might be caused by loose or defective components. In case of noise detection, the wind energy converter stops.								wind energy converters and substation will be reviewed and the need to upgrade equipment as part of operation and maintenance of the Project will be taken into account, in line with projected wind speeds for the lifetime of the Project.				
Potential increase in frequency of lightning strikes due to increased frequency of storms	Unlikely						Electrical equipment Wind energy convertors to catch fire due to lightning strike	Damage to electrical equipment, leading to operation interruption.	Lightning and earthing protection systems will be included in the design.	Minor		Minor		Low		Low		Given that the design will include lightning protection, the risk to infrastructure due to climate change is low. No further action is anticipated.	Insignificant		Insignificant	

Climate variable	Likelihood of occurrence (of climate-hazard)				Affected receptor(s)	Climate impact	Embedded mitigation action(s)	Severity of impact				Risk Rating				Potential mitigating action(s)	Residual Risk Rating			
	Mid-future		Far-future					Mid-future		Far-future		Mid-future		Far-future			Mid-future		Far-future	
	SSP1-2.6	SSP2-4.5 SSP5-8.5	SSP1-2.6	SSP2-4.5 SSP5-8.5				SSP1-2.6	SSP2-4.5 SSP5-8.5	SSP1-2.6	SSP2-4.5 SSP5-8.5	SSP1-2.6	SSP2-4.5 SSP5-8.5	SSP1-2.6	SSP2-4.5 SSP5-8.5		SSP1-2.6	SSP2-4.5 SSP5-8.5	SSP1-2.6	SSP2-4.5 SSP5-8.5
Precipitation changes and increase in rainfall intensity during extreme events	Unlikely	Possible	Possible	Likely	Wind turbine blades	Potential to increase wear on wind turbine blades	Blades will be coated with a polyurethane-based surface coating which allows protection against erosion.	Minor	Minor	Minor	Minor	Low	Low	Low	Medium	Weather data will be monitored and equipment and infrastructure will be inspected during and after extremes.	Negligible	Low	Negligible	Low
					Electrical equipment	Damage to electrical equipment, resulting in risk of failures in the system/integrity		Moderate	Moderate	Moderate	Moderate	Medium	Medium	Medium	Medium		Low	Low	Low	Low
					Staff access and health and safety	In the case of widespread flooding across the area, staff access to the site could be restricted. Potential shut down of operations if staff not able to access site		Moderate	Moderate	Moderate	Moderate	Medium	Medium	Medium	Medium	Emergency Response Plan will be prepared and implemented.	Low	Low	Low	Low

8.4.2 GHG Emissions

8.4.2.1 Construction

This section presents the assessment of construction-related GHG emissions carried out following the methodology outlined in Section 8.2.3. Total Project emissions by scope are presented in Table 8-18.

Table 8-18: Project emissions by scope

Scope	tCO_2e	% of total
Scope 1	830	2.62%
Scope 2	100	0.32%
Scope 3	30,770	97.07%
Total	31,700	100%

The construction phase of the Project will last 16 months according to the construction schedule. Therefore, total Scope 1 and Scope 2 emissions arising from the construction phase are 690 tCO2e per year, which is below the threshold value (25,000 tCO2e/year) as per the IFC guidance. Construction emissions are also below 5% of the lifetime emissions avoided through this renewable energy development, therefore the Project is compliant with the EBRD guideline.

Table 8-19: Project whole life carbon emissions

Whole-life stage	tCO_2e	% of total emissions
A1 – A3	24,580	77,54%
A4	3,840	12.11%
A5	3,280	10.35%
Total	31,700	100%

The most five emitting components / activities of the Project are shown in Table 8-20.

Table 8-20: Project emissions hotspots

Component / activity	tCO_2e	% of total emissions
Blades	8,218	25.92%
Towers	5,751	18.14%
Road construction materials	3,838	12.11%
Material transport to site	3,837	12.10%
Turbine hub	2,101	6.63%

Table 8-21: Project emissions by material / activity

Material / activity	tCO_2e	% of total emissions
Fiberglass	8,808	27.79%
Steel	8,589	27.09%
Fuel consumption (indirect emissions)	4,093	12.91%
Iron	2,101	6.63%
On-site waste	2,096	6.61%
Gravel	3,838	12.11%
Concrete	964	3.04%
Fuel consumption (direct emissions)	830	2.62%

Material / activity	tCO_2e	% of total emissions
Transmission cables	277	0.87%
On site power consumption	96	0.30%
Total	31,700	-

GHG emissions arising from the transportation of workers from and to the site is already included in the assessment. GHG emissions arising from the activities at the workers' camp site including fuel consumption by generators (if any) and for heating & cooking purposes, electricity consumption, and on-site waste are excluded as they are not expected to be significant carbon emissions.

Land-use change emissions

Emissions related to vegetation loss and the loss of sequestration potential are reported here. These are approximate emissions that are subject to uncertainty, as such these emissions have been reported separately from the construction emissions. Project specific land use change emissions by scope are presented in Table 8-22. As Table 8-22 shows, an estimated 90 tCO_2e loss in sequestration potential per year resulting from around 37 hectares of forestry area taken and used by the Project.

Table 8-22: Project specific land-use change emissions by scope

Scope	tCO_2e / year	tCO_2
Scope 1	90*	1,370**
Scope 2	0	0
Scope 3	0	0
*Annual estimated loss of forestry sequestration potential		
**Total estimated vegetation (tree) loss emissions		

Table 8-23: Project specific land-use change emissions by whole life carbon stage

Whole life carbon stage	tCO_2e / year	tCO_2
A5	90	0
B2	0	1,370

GHG emissions associated with the Project construction phase arise the supply and transport of raw materials, manufacture of project components,, transport to site, and construction installation processes (Figure 8-1).

Based on the assessment of construction-related GHG emissions provided above and considering mainly the components / activities emitting the most GHG emissions (Table 8-20), the following measures will be implemented to minimise these sources of GHG emissions as far as possible:

- Appropriate waste management will be implemented during construction works, adhering to the Waste Management Hierarchy to avoid and/or minimize on-site waste generation,
- Construction materials will be sourced locally where possible to minimise the amount of construction traffic movements,
- Construction related transport impact will be minimised through enhancement of transportation of construction materials and construction workers, for example by supplying materials from local sources to reduce transportation distance, improving vehicle efficiency by using efficient engines, using low-emissions vehicles, etc.,
- Where possible, materials with low carbon footprint will be considered in the design.

- Design will be optimized to minimise the quantities of new raw materials required, for example by limited haul road widths, optimising design of foundations for turbines, etc.
- Sustainable construction management practices will be established to optimise energy efficiency measures during construction site work activities. This will include:
  - Toolbox talks for workers about switching off plant and construction equipment and machinery when not in use,
  - The use of energy zoning in construction site cabins to control energy usage, and
  - Regular servicing of plant and diesel-powered construction equipment and machinery.

8.4.2.2 Operation

Operational GHG Emissions

Potential GHG emission sources during the operational phase of the Project and approach to their assessment are provided in this section. However, calculations have not been made due to lack of data on consumptions at this stage of the Project. GHG emission sources during the operation phase of the Project will include emissions due to:

- Fuel consumption associated with on-site generators,
- Fuel consumption associated with maintenance and repair activities,
- Electricity consumption for lightning and security purposes (e.g., operating security systems, CCTV, etc.) when climate conditions (i.e., the wind speed) are not suitable for operating activities.

Table 8-24 shows the approach to be used to calculate GHG emissions associated with the project operations.

Table 8-24: Operational GHG emissions assessment

No.	Sources	Unit	Type of GHG emissions	Emission factor (EF)			
				CO_2[91]	CH_4[80]	N_2O[80]	tCO_2e
1	**Fuel consumption associated with the use of on-site generators**						
1.1	Number of on-site generators	Quantity (qnt)	Scope 1	2.7 kg/L[92]	1.18559*10^{-5} kg/L[81]	1.11585*10^{-5} kg/L[81]	-
1.2	Operational time	hr/yr/qnt					
1.3	Total operation time	hr/yr					
1.4	Fuel consumption	L/hr					
1.5	Annual total fuel consumption	L/yr					
2	**Fuel consumption associated with maintenance and repair activities**						
2.1	Number of vehicles	qnt	Scope 1	2.7 kg/L[93]	4.27955*10^{-6} kg/L[95]	6.41933*10^{-6} kg/L[95]	-
2.2	Fuel consumption	L/km					

[91] 100-year Global Warming Potentials (GWPs) of CO_2, CH_4, and N_2O to be considered in the operational GHG emissions assessment are 1, 28, and 265, respectively. Last accessed in April 2024 here: https://ghgprotocol.org/sites/default/files/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_0.pdf.

[92] These emission factors are valid for heavy-duty trucks. Depending on the type of mobile sources (e.g., passenger cars, light-duty trucks, or heavy-duty trucks), emission factors will be changed. Emission factors are obtained from the GHG Protocol Calculation Tools and Guidance. Last accessed in February 2024 here: https://ghgprotocol.org/calculation-tools-and-guidance.

[93] These emission factors are valid for light-duty trucks. Depending on the type of mobile sources (e.g., passenger cars, light-duty trucks, or heavy-duty trucks), emission factors will be changed. Emission factors are obtained from the GHG Protocol Calculation Tools and Guidance. Last accessed in February 2024 here: https://ghgprotocol.org/calculation-tools-and-guidance.

No.	Sources	Unit	Type of GHG emissions	Emission factor (EF)			
				CO_2[91]	CH_4[80]	N_2O[80]	tCO_2e
2.3	Annual total distance travelled (considering the distance to and from the project site)	km/yr					
2.4	Annual total fuel consumption	L/year					
3	**Electricity consumption (e.g., for lightning and security purposes purposes)**						
3.1	Annual electricity consumption	MWh/yr	Scope 2	-	-	-	0.447[94]

Based on publicly available emissions factor data for operating activities provided in Table 8-24, GHG emissions during the operation phase can be calculated using the bottom-up approach described in Section 8.2.3.2 as follows:

- Fuel consumption both due to the use of on-site generators and maintenance and repair activities equals to total consumption per year (L/yr) x EF (kg tCO2e/yr),
- Electricity consumption equals to total consumption per year (L/yr) x EF (kg tCO2e/MWh).

Avoided GHG Emissions

This section presents GHG emissions avoided per year during the operational phase of the Project, based on the estimation approach previously described in Section 8.2. As mentioned earlier, avoided GHG emissions associated with the Project is calculated based on a grid factor for GHG emissions that would be released if typical fossil fuel-based technology were used to meet this energy capacity.

Avoided GHG emissions compared to typical grid generation emissions are calculated and presented in Table 8-25. This calculation is made based on the Turkish national electricity grid emission factors calculated according to IPCC Electricity Grid Emission Factor Calculation Methodology Tool07.V07 and published by the Ministry of Energy and Natural Resources[95].

Table 8-25: GHG Emissions Avoided in tonnes of CO_2 equivalent per year

Electricity Production (MWh/year)	Emission Factor (tCO_2/MWh)	Avoided Emissions (tCO_2e/year)
141,659	0.6488	91,908

The avoided emissions shown in Table 8-25 above equate to approximately 0.02% of the country's annual emissions in 2020 year.

Lastly, it is significantly important to note that there are not anticipated to be any specific transition risks of concern, given that the Project is a renewable energy operation investment.

8.4.3 Summary

This Assessment considers the effects, and their significance, of future climate change as it applies to the infrastructure that forms the Project during construction and operation phases and the potential GHG affects arising from construction and operation of the Project in line with applicable guidelines and standards provided in Section 8.2.1.

The future baseline climate is outlined, which is broadly projected to include warmer winters with decreased precipitation, and hotter and drier summers associated with increased drought and

[94] Turkish electricity generation and electricity consumption point emissions factors information form. Last accessed in February 2024 here: https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/EmisyonFaktorleri/TEUVETN_Emisyon_Fakt%C3%B6rleri_Bilgi_Formu.pdf.

[95] Received from https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/Bform2020.pdf. Last accessed in November 2023.

high temperature risks. The future baseline has been constructed for the mid-future (2040-2059) and far-future (2060-2079) taking into account the operational lifespan of the Project.

Construction and operation phase impacts include damage to physical project receptors, as well as environmental and social receptors due to high temperatures, wildfires, and extreme weather events (including storms, heavy winds and precipitation, and lightning).

Due to lack of information on construction activities at the time of writing this Assessment, embedded mitigations for the construction phase have not been identified. Those mitigations incorporated into the Project design for the operation phase mainly include continuous controlling and monitoring of the system containing the status of the wind energy converter and relevant ambient parameters such as rotor speed, temperature, wind speed, blade load, etc., extreme heat solutions such as cooling systems specifically for the components sensitive to high temperatures, and protection from extreme weather events including lightning and earthing protection systems.

Additional mitigation measures incorporated into the construction phase of the Project includes measures for protecting construction equipment and machinery, health and safety of construction workers, and environment against projected changes in climate. Also, monitoring and management plans required to reduce identified climate change-related risks to construction activities are presented. For the operation phase of the Project, those measures consist of recommendations for the Project design and those that will be incorporated into the operation phase of the Project including monitoring and management of impacts as they are observed during the lifetime of the Project and responses to this such as upgrades and replacements of equipment to reflect future projected temperatures at the time of their renewal.

Due to climate change, there is a possibility of an increased risk of wildfires, particularly associated with droughts and heatwaves. The Project components are surrounded by forest areas. Therefore, there is a potentially significant effect upon the Project associated with the increased risk of wildfires, even if both embedded mitigations (within the project design) and additional mitigation measures are included.

Based on the assessment of construction-related GHG emissions and mainly considering the components / activities emitting the most GHG emissions, several measures to minimise the carbon impact of the construction phase are recommended, including implementation of appropriate waste management during construction works, supplying construction materials locally as much as possible, minimising construction related transport impact through enhancement of construction material and worker transportation logistics, preferring materials with low carbon footprint in the design where possible, optimizing design to minimise the quantities of new raw materials needed and establishing sustainable construction management practices to optimise energy efficiency measures during construction site work activities.

Although there is no anticipated significant GHG emissions arising from the operation of the Project considering the nature of the Project (i.e., a renewable energy investment), potential Scope 1 and Scope 2 emission sources during the operation phase of the Project are provided in this Assessment for effective management of GHG emissions. However, due to lack of data on consumptions at the time of writing this Assessment, operational GHG emissions have not been calculated. Also, avoided GHG emissions associated with the Project during the operational phase are within the scope of this Assessment.

9 Noise and Vibration

9.1 Introduction

This chapter presents an assessment of the noise and vibration impacts that will be generated by the construction and operation of the Project.

In order to evaluate the potential impact of noise due to the construction and operation activities, a noise modelling study was undertaken covering the Project area and its surroundings.

This study addresses the noise and vibration impacts of the construction and operation phases of the Project. Noise and vibration related definitions, regulations and legal background, the methodology followed, results of noise modelling, potential impacts, and proposed mitigation measures are covered in this Chapter.

The goal of impact assessment is to evaluate the impact magnitude by analysing the ambient conditions and magnitude of potential impacts at receptor locations in order to identify appropriate mitigation measures.

Scope of the assessment covers the completion to the construction and operation periods. Impact assessments depending on the noise modelling are held by considering two-time intervals;

- Construction activities (earth works, truck routes, blasting)
- Operation activities (Turbine)

The anticipated activities at each receptor are modelled using the CadnaA acoustic modelling software. The predicted impacts are compared against criteria established for each critical location.

Noise impacts are assessed with the limits in accordance with the recommendations outlined in the IFC EHS Guidelines which is based on the Guidelines for Community Noise, World Health Organization (WHO), 1999 and National legislation, which is Turkish Regulation on Environmental Noise Control (RENC) (Official Gazette Date/Number: 30 November 2022/32029). RENC was prepared in accordance with European Noise Directive's (END) noise indicators and standard methods.

Vibration impacts are assessed in compliance with RENC and the vibration damage criteria, defined in BS 5228-2:2009+A1:2014 which is an internationally recognised standard.

9.1.1 Definitions

Before explaining the studies that were undertaken, it is helpful to provide definitions of basic acoustic terms and concepts, as given below.

Sound: Sound is vibrational disturbance, exciting hearing mechanisms, transmitted in a predictable manner determined by the medium through which it propagates. To be audible, the disturbance must fall within the frequency range 20 Hz to 20,000 Hz.

Noise: Noise is typically defined as "unwanted sound", sound being the human sensation of pressure fluctuations in the air. Sound levels are expressed in decibels (dB) on a logarithmic scale, where 0 dB is nominally the "threshold of hearing" and 120 dB is nominally the "threshold of pain".

Background noise: Prevailing noise in at a particular location measured in the absence of noise generated by the activities being studied.

Baseline noise: Atmospheric air pressure defined as decibels at the absence of any air pressure deteriorating effect which can be considered as noise.

Average noise measurement results: Raw levels gathered from field in logarithmic average according to time frames of the day. (background or source + background)

Processed average noise measurement results: Levels gathered via eliminating extraneous noise events and noise events of other noise sources from field in logarithmic average according to time frames of the day. (baseline noise in terms of index characteristics)

Decibels (dB): The unit describing the amplitude of the sound. The human hear responds to sound logarithmically. The bel is a logarithm of the ratio of the two sound power levels (i.e., instantaneous sound power and reference sound power) and decibel is 1/10 bel.

Frequency: The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or Hz.

Sound pressure level (L_p): A logarithmic measure of the effective sound pressure of a sound relative to a reference value. It is measured in decibels (dB) above a standard reference level. The commonly used "zero" reference sound pressure in air is 20 micro-pascal RMS (root mean square), which is usually considered the threshold of human hearing (at 1 kHz).

Sound power level (L_w): Ten times the logarithm of the ratio of the sound power under consideration of the standard reference power of 1 pW ($10^{-12}\ W$). The quantity obtained is expressed in decibels.

Equivalent Sound Level (L_{eq}): Quantifies the noise environment as a single value of sound level for any desired duration. L_{eq} correlates well with the effects of noise on people. L_{eq} is also sometimes known as Average Sound Level.

L_{10}: Sound pressure level that is exceeded 10% of the time of measurement.

L_{90}: Sound pressure level that is exceeded 90% of the time of measurement.

A-Weighting: A measure of sound pressure level designed to reflect the response of the human ear, which does not respond equally to all frequencies. To describe sound in a manner representative of the human ear's response, it is necessary to reduce the effects of the low and high frequencies with respect to medium frequencies. The resultant sound level is said to be A-weighted, and the units are in decibels (dBA).

Noise Barrier: A physical obstruction that is constructed between the noise source and the noise sensitive receptor(s) that lowers the noise level, examples include standalone noise walls, noise berms (earth or other material), and combination berm/wall systems.

Noise Berms: Noise barriers constructed from natural earthen materials such as soil, stone, rock, rubble, etc. in a natural, unsupported condition are termed, noise berms.

Noise Walls: Noise barrier systems that are manufactured according to a technical design and assembled on-site to obstruct the noise propagating from noise source to receptors.

C-Weighting: A measure of sound pressure level designed to reflect the response of the human ear, for higher levels above 100 dB when the human ear's response is flatter.

L_{Aeq}: A weighted equivalent sound pressure level.

L_{Amax}**:** The maximum a weighted sound pressure level detected in the measurement time domain.

L_{Ceq}**:** C weighted equivalent sound pressure level.

L_{day}**:** Equivalent continuous sound pressure level for reference time interval day.

L_{eve}**:** Equivalent continuous sound pressure level for reference time interval evening.

L_{night}**:** Equivalent continuous sound pressure level for reference time interval night.

L_{dn}**:** Day-night-weighted sound pressure level. Day time defined in between 07:00-23:00, and night time defined as 23:00-07:00.

L_{den}**:** Day, evening- night weighted sound pressure level. Day time defined in between 07:00-19:00, evening time between 19:00-23:00, night time between 23:00-07:00.

Point Source: A source of sound which is concentrated to a point.

Area Source: A source of sound which is distributed over an area.

Line Source: A source of sound emanating from a linear geometry.

The threshold of perception of the human ear is approximately 3 dB, and a 5 dB change is considered to be clearly noticeable to the ear. This is primarily due to the logarithmic measuring metric typically associated with decibels.

Table 9-1: Perception of Sound

Change in sound level	Perceived Change to the Human Ear
± 1 dB	Not perceptible
± 3 dB	Threshold of perception
± 5 dB	Clearly noticeable
± 10 dB	Twice as loud
± 20 dB	Four-fold change

9.1.2 Specific Objectives

The specific objectives of the impact assessment are to:

- Identify the main sources of potential impacts to ambient noise and vibration from Project activities during construction and operation phases,
- Assess noise and vibration impacts on sensitive receptors in the vicinity of Project area,
- Suggest mitigation measures and determine the residual impacts.

9.1.3 Potential Sources

Potential sources of noise and vibration can be outlined as:

- Noise generated by construction works.
- Noise generated from earth-moving truck activities on road route during the construction period.
- Noise generated turbine activities for operation phase.
- Vibration caused by construction activities.
- Blasting vibration.

9.2 Methodology

9.2.1 Applicable Guidelines and Standards

In this section, national and international legal requirements and applicable standards for the noise and vibration assessment for both construction and operation phase are described.

9.2.1.1 National Noise Requirements

Environmental noise and vibration levels are regulated by the RENC (Official Gazette Date/Number: 30 November 2022/32029). RENC was prepared in accordance with END noise indicators and standard methods.

Noise limits for construction activities are defined in terms of time limitations in RENC. Table 9-2 demonstrates the related time limitations for environmental noise generating activities around residential areas.

Table 9-2: The Allowed Time Frame for Outdoor Activities in Residential Areas (RENC)

Activity	Time
Construction site activities	10.00 – 20.00
Blasting activities in mines, quarries, and other areas	10.00 – 20.00

Related to the operation phase of the Project, limit value for noise emission sources of industrial facilities to the surrounding buildings in the RENC is presented in Table 9-3.This table presents maximum allowable environmental noise levels that shall be met at the nearest off-site receptor.

Table 9-3: Limit Values for Environmental Noise Level

Source Type	Measurement Parameters	Environmental Noise Level		
		Day (07.00-19.00)	Evening (19.00-23.00)	Night (23.00-07.00)
Industrial Facilities	LA_{eq}	65 dB(A)	60 dB(A)	55 dB(A)

9.2.1.2 International Noise Requirements

The international guidelines in the assessment of noise levels followed in this study is outlined in the World Bank Group's & IFC's EHS Guidelines (2007). The guideline refers to the WHO, Guidelines for Community Noise (WHO, 1999). Noise limits defined in this guideline will be obligatory to follow within the scope of the Project. Noise Limits are presented in Table 9-4..

The values presented can be applied to both the construction and operation phases of the Project. The noise levels should not exceed the levels presented in Table 9-4 or result in a maximum increase in current background levels of 3 dB at the nearest receptor location off-site.

Table 9-4: WBG - IFC Noise Level Guidelines

Receptor	Day time (07:00 - 22:00)	Night time (22:00 - 07:00)
Residential areas	55 dBA	45 dBA
Commercial/industrial areas	70 dBA	70 dBA

WHO states cumulative noise level limits, which depend on the background noise levels, meaning noise levels to be evaluated, will consist of the logarithmic sum of noise from source and baseline noise levels. To evaluate cumulative noise levels, the summation of background

noise and Project noise exposure is assessed. When the cumulative noise levels are less than the guidance values of L_{day}= 55 dBA and L_{night}= 45 dBA, the limits are set to these values. Alternatively, the cumulative noise levels should not exceed background noise by more than 3 dBA, for example in cases where the background noise levels already exceed the standards.

The impact assessment considers the arithmetic difference between the cumulative background and Project noise and the limit values. The impact magnitude considers the increase in noise.

9.2.1.3 National Vibration Requirements

Vibration levels are regulated by Turkish Regulation on RENC. Related vibration limits on the ground are defined for blasting activities, construction operations and machinery/equipment vibration in building. These are presented below.

The related limitations for impact of vibration due to blasting activities are presented in Table 9-5.

Table 9-5: The maximum permitted levels of ground vibrations in the nearest structure caused by vibrations due to blasting in mines, quarries and similar areas

Structure	Maximum Vibration Velocity at the Foundation of Buildings (mm/s) (according to frequency, f=Hz)			On the furnishing of the top floor for all frequencies
	f=1-10 Hz	f=10-50 Hz	f=50-100 Hz	
Houses, durable structures such as brick concrete.	5	15	20	15

The maximum allowable vibration impact levels due to the construction operations, at the nearest receiving structure are presented in Table 9-6.

Table 9-6: The maximum permissible values of ground vibrations caused by pile driving and similar vibration - generating operations in construction and construction machinery outside the nearest structure (in frequency bands between 1Hz - 80Hz)

Land Use Type	Maximum Permissible Vibration Velocity (Peak Value - mm/s)	
	Continuous Vibration	Discontinuous Vibration
Settlement Areas	5	10

The maximum permissible vibration levels for operation according to the RENC are presented in Table 9-7.

Table 9-7: The maximum permissible values of ground vibrations caused by railway and road transport vehicles, workplaces and industrial facilities in the nearest building and ground vibrations caused by machinery and equipment in the building

Location	Vibration Frequency (Hz)	Maximum Permissible
Residential	1	1,5

9.2.1.4 International Vibration Requirements

Vibration criteria are defined in “BS 5228-2:2009+A1:2014 - 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 9-8: 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 complaint but can be tolerated if prior warning and explanation has 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.

9.2.2 Study Area and Area of Influence (AoI)

The Project's AoI for noise impact is determined with the consideration of elevation and horizontal distance differences from the potential noise sources to receptors. 500 m distance was used for the AoI.

Accordingly, baseline noise measurements were conducted at the potentially impacted settlements and noise model was prepared to cover potential impact zones.

9.2.3 Impact Assessment Methodology

In order to evaluate the significance of impact from the Project, magnitude of impact and responsivity of the receptors need to be identified throughout the Project area.

Magnitude of impact is a parameter defined as characteristics of impact and the Project. On the other hand, responsivity defined as characteristics of receptors.

9.2.3.1 Significance of Impact

The category of significance is identified based on the combinations of magnitude and responsivity of receptors in accordance with Table 9-9.

Table 9-9: Determination of Impact Significance

Magnitude of Impact	Responsivity of Receptor		
	Low	Medium	High
No Impact	No Impact		
Negligible	Negligible		Minor
Small	Negligible	Minor	Moderate
Medium	Minor	Moderate	Major
Large	Moderate	Major	

Responsivity of Receptors

The second component in the evaluation of impact significance is the responsivity of a potentially affected receptor.

The term "responsivity" refers to a set of characteristics that include:

- Importance of the receptor and
- Sensitivity of the receptor to the impact.

The category of responsivity is identified based on the combinations of importance and *sensitivity* of receptors in accordance with the responsivity matrix (Table 9-10).

Table 9-10: Determination of Responsivity of Receptors

Importance	Sensitivity		
	Low	*Medium*	*High*
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium	High	High

Importance of Receptors

In general, evaluation of importance of the affected receptors is based on the following considerations:

- Protected status
- Policy of the regional government
- Stakeholder opinion
- Economic value
- Special features of ecosystems, such as resistance to change, rarity, adaptability, diversity, fragility and the ability to recover
- Importance of individual components as environmental components

If one of the above considerations is applicable, importance can be subjectively evaluated as medium or high. Otherwise, the importance is considered as low.

Sensitivity of Receptors

Sensitivity of a receptor depends upon the ability to recover for ecological receptors and the type of building use for human receptors are defined in Table 9-11.

Table 9-11: Designation of Sensitivity of Receptors

Sensitivity	Receptor
Low	High ability to recover the initial properties and functions, minor changes of spatial and dynamic indicators. Office Buildings, farm buildings, industrial or commercial facilities.
Medium	Limited / low ability to recover the initial properties and functions. Measures to minimize disturbance of ecosystems are required. Residential Buildings, hotels.
High	Lack of ability to recover the initial properties and functions. Irreversible disturbances may be caused by minor impacts. Recreational facilities, educational facilities, and health care centers.

9.2.3.2 Magnitude of Impact

The magnitude of impacts is determined from a combination of the extent and the scale of impact as shown in Table 9-12.

Table 9-12: Determination of Impact Magnitude

Extent	Scale				
	No Impact	Small	Medium	Large	Very Large
Single	No impact	Negligible		Small	
Site		Small	Medium		Large

Local		Medium	Large
Regional		Medium	Large

Extent of Impact

The impact extent which is detailed in Table 9-13 characterizes the spatial distribution of the impact. Impact assessment points are chosen to represent receptors in the area in which they are located. When it comes to broader regions, the influence becomes more extensive.

Table 9-13: Categories of Impact Extent

Noise impact extent category	Criteria
Single	Possible noise and/or vibration impact on a single building.
Site	Possible noise and/or vibration impact on 5 - 10 buildings.
Local	Possible noise and/or vibration impact on 10 - 100 buildings.
Regional	Possible noise and/or vibration impact on 100 - 1000 buildings

Scale of Impact

The scale of noise impact is the measure of how much noise is cumulated over limiting values at receptor locations. Noise receptors are residential, office, institutional, educational, health centres and commercial buildings.

Criteria for evaluation of the scale of noise impact are based on the RENC and WHO's Guideline's limiting values.

Scale of noise impact is evaluated according to exceedance level from the background. Time based noise metrics will be used for this kind of assessment procedure mainly L_{day} and L_{night}.

Any levels greater than the WBG - IFC's noise level limits will be noted down as exceedance. Criteria to classify the scale of a noise impact during construction and operation are detailed in Table 9-14.

Table 9-14: Scale of Noise Impact

Noise impact scale Category	Exceedance of noise limits WBG - IFC Criteria
No Impact	<1
Small	1-3
Medium	3-5
Large	5-8
Very Large	>8

*Criteria: Day time: 07:00 – 22:00, $L_{day} = 55\ dBA$; Night time: 22:00 – 07:00, $Lnight = 45\ dBA$

While determining the noise impact scale classification; Guidelines for Environmental Noise Impact Assessment[96] document is used.

Mentioned document defines sensitivity of receptors to noise level exposure's relative change using a similar approach.

Vibration impacts need to be evaluated for construction and operation.

[96] Guidelines for Environmental Noise Impact Assessment, Institute of Environmental Management & Assessment, IEMA Noise Guidelines Second Edition VERSION 1.2 (November 2014)

Construction and Operation Vibration

Vibration assessment criteria are presented in Table 9-15.

Table 9-15: Scale of Construction and Operation Vibration Impact

Category of vibration impact scale	PPV (mm/s)
No Impact	<0,14
Negligible	<0,3
Small	<1
Medium	<10
Large	>10

Scale of blasting vibration assessment criteria are presented in Table 9-16.

Table 9-16: Scale of Blasting Vibration Impact

Category of construction vibration impact scale	PPV (mm/s)
No Impact / Small	0-10
Medium / Large	10-15
Very Large	>15

9.2.4 Possible Mitigation Alternatives

Possible mitigation measures that should be considered for construction and operation are explained in this section.

Presented mitigations are generally used methods for similar projects. In case of an impact, source-specific measures specific to this Project are evaluated and presented in Section 9.5.

9.2.4.1 Construction Mitigation Alternatives

Construction Noise Mitigation Alternatives

The following possible mitigation measures may be considered during the construction phase of projects;

- Optimizing working routines and conditions for construction sites,
- Implementing periodic maintenance of construction machine/equipment,
- Minimizing truck movements and limiting speeds at locations where trucks work close to the receptors.

Construction Vibration Mitigation Alternatives

- Routing of heavy vehicles away from residential streets or to areas with the least number of houses,
- Spreading of activities which cause vibration over time so that multiple activities that generate vibration do not occur at the same time. When each vibration source acts independently, the total vibration level generated may be significantly lower,
- Avoiding night-time activities and times determined to be sensitive through stakeholder engagement (i.e. prayer times),
- Limiting activities that cause vibration to day-time hours in residential areas as sensitivity to vibration increases at night.

9.2.4.2 Operation Mitigation Alternatives

If Moderate or Major impacts are detected in terms of operational noise following possible strategies could be followed in order to mitigate operational noise;

- Re-arrangement of the turbine locations.
- Optimization of turbines with less noisy models.

9.2.5 Limitations and Assumptions

This section presents assumptions and limitations related to the calculations and modelling efforts during this Project.

9.2.5.1 Construction

- For construction noise modelling, given machine equipment assumed to be working on a reasonable construction polygon simultaneously and at full performance,
- Calculations and assessment procedures are accurate in line with the accuracy and detail level of the provided information and Project documents,
- It is confirmed by the Project Company that construction activities will be carried out in accordance with the time periods specified in the RENC and that no construction will take place during the night period or outside the allowed time frame for outdoor activities in residential areas (i.e. 10:00 – 20:00),
- The site access road is assumed to be used only during the daytime,
- It is assumed that there will be no blasting activities on the site access road,
- It is assumed that each truck given claimed to be used during construction works, performs 3 trips during the day period on the site access road,
- Site access road assumed to be rocky rural road and truck speeds are taken as 20 km/h.
- During construction works, access to the ETL will be provided via site access roads and any transportation needs regarding ETL is included in the total constructional machine/equipment.

9.2.5.2 Operation

- For operation noise modelling, given turbines assumed to be working simultaneously and at full performance,
- Modelling results can only consider to be accurate parallel to the accuracy and extent of the given information and documents,
- No impact or significant noise from ETL is expected for operation phase of the Project.

9.3 Baseline Conditions

In order to understand the current noise status, baseline noise measurements were conducted in October 2023.

9.3.1 Measurement Locations

Measurements were carried out at three locations which were selected as the closest residential areas to Project area. During the measurement period, ISO 1996-2 Standard was followed and IEC 61672 – 1 type 1 sound level meters were used. Measurements were conducted for 48 hours.

Baseline noise measurement locations are presented in Figure 9-1; whereas information of the measurement locations are presented in Table 9-17.

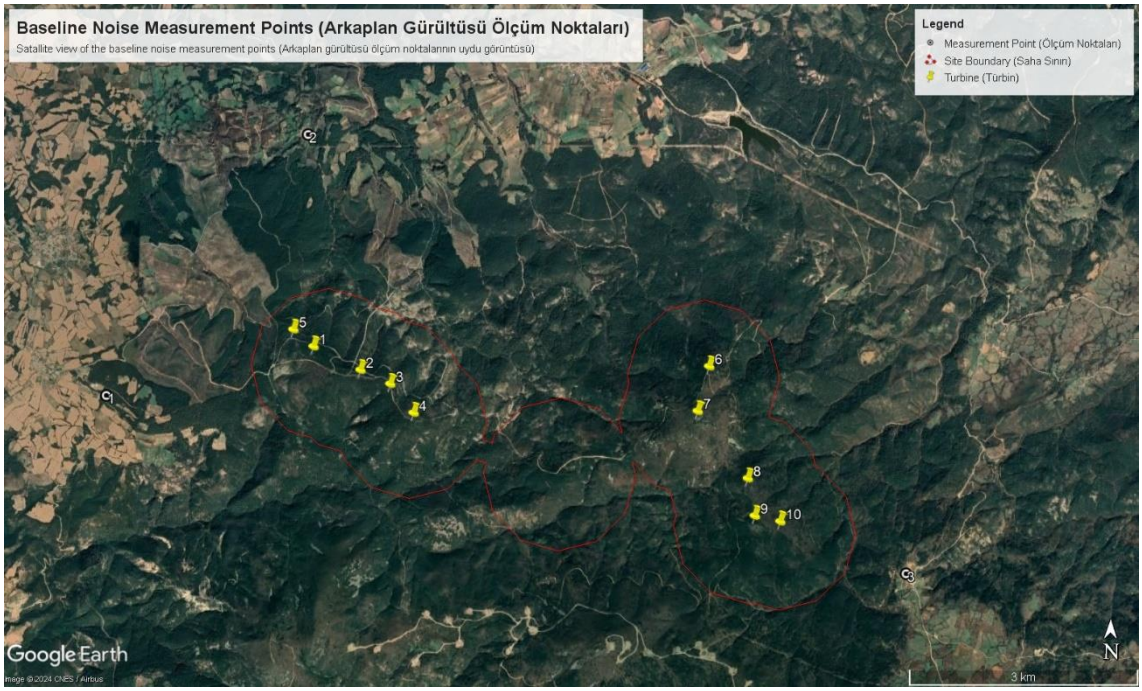


Figure 9-1: Baseline Measurement Locations

Table 9-17: Information of Measurement Locations

Points	Latitude	Longitude	Designated Land Use
Point 1	40.173130 °	26.590538 °	Residential
Point 2	40.204313 °	26.620771 °	Residential
Point 3	40.153993 °	26.714148 °	Residential

Fundamental information about measurement locations and the reasoning for selecting those points can be explained as follows;

Point 1 was located at a residential building setting. In order to determine baseline noise condition of the nearest rural settlement to closest turbines, sound level meter was located in this region as shown in Figure 9-2.

Figure 9-2: Measurement Point 1

Point 2 was located at a residential building setting. In order to determine baseline noise condition of the nearest rural settlement to closest turbines, sound level meter was located this region. Measurement photo is presented in Figure 9-3.

Figure 9-3: Measurement Point 2

Point 3 was located at a residential building setting. In order to determine baseline noise condition of the nearest rural settlement to closest turbines, sound level meter was located this region. Measurement photo is presented in Figure 9-4.

Figure 9-4: Measurement Point 3

Measurement results are presented in Table 9-18 for RENC and Table 9-19 for international standards.

Extraneous noise events were excluded from raw data. It means that detecting and eliminating noise events during measurement period which are completely irrelevant to the noise source tried to be measured. The detailed noise measurement results as per one-hour intervals equivalent noise levels are submitted in Appendix A.

Table 9-18: Baseline Noise Measurement Results for RENC (L_{den})

Measurement Location	Lday (dBA)	Levening (dBA)	Lnight (dBA)
Point 1	42.0	36.2	33.7
Point 2	41.0	36.2	35.5
Point 3	40.9	36.4	33.5

Table 9-19: Baseline Noise Measurement Results for International Standards (L_{dn})

Measurement Location	Lday (dBA)	Lnight (dBA)
Point 1	41.4	33.9
Point 2	40.5	35.3
Point 3	40.3	33.6

The surrounding settlements and the associated measurement locations which represent their baseline conditions are given in Table 9-20.

Table 9-20: Measurement Locations – Settlement Locations with Same Baseline Conditions

Measurement Location	Settlements

Point 1	Yukarıokçular, Kızılkeçili, Musaköy, Yapıldak
Point 2	İğdelik, Beybaş
Point 3	Hacıgelen, Üçpınar, Harmancık

9.3.2 Identified Receptors

In order to evaluate the noise and vibration impact of the Project, assessment points covered by the background monitoring were selected. These locations represent a set of receptors which have the same, or similar, background characteristics in terms of environmental noise levels and impact resulting from the Project. Moreover, evaluated receptors are representative locations which have the highest chance of being affected by noise and vibration during construction and operation activities of the Project. Most of the cases closest receptors to the nearest plant activity are the ones who have the highest chance of being affected.

While determination of assessment points, access road activities for construction phase is also considered. Some assessment points have impact of only truck traffics.

The details of identified receptors with the representative measurement points are presented in Table 9-21.

Table 9-21: Identified Receptors (Assessment Points)

Assessment Points	Representative Measurement Points	Comments	Extent	Sensitivity	Importance
AP 1	1	Residential	Site	Medium	Medium
AP 2	2	Residential	Site	Medium	Medium
AP 3	3	Residential	Site	Medium	Medium
AP 4	3	Residential	Site	Medium	Medium
AP 5	1	Residential	Local	Medium	Medium
AP 6	1	Residential	Local	Medium	Medium
AP 7	1	Residential	Local	Medium	Medium

Satellite view of the assessment points are presented in Figure 9-5.

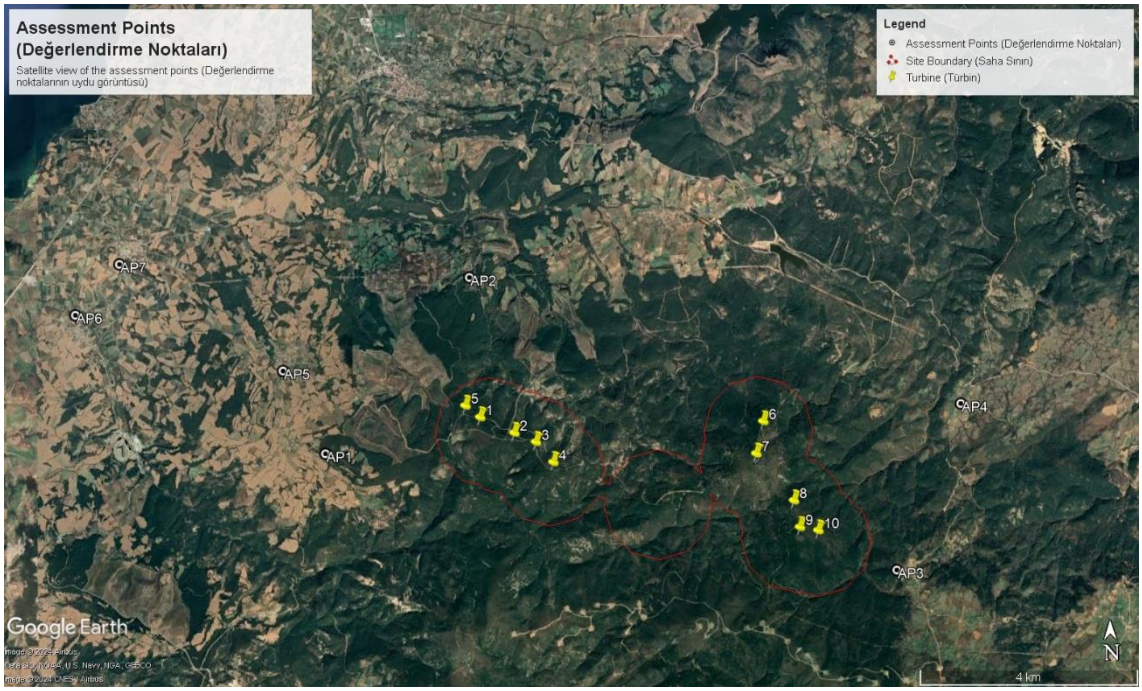


Figure 9-5: Satellite View of the Assessment Points

The source of impacts at the assessment points are identified in the following table. Accordingly, the significance of associated impacts at the identified assessment points are determined as a result of the modelling study. For any individual receptor to be identified during the implementation of the Project or for any grievance received from a nearby user (either during construction or operation phase), the Project Company will identify the impact (e.g. through monitoring, modelling etc.) and will take necessary mitigation measures as defined in Section 9.5.

Table 9-22: Turbine Impacts at Assessment Points

Assessment Point	Construction Noise Source	Operation Noise Source	Visual Impact
1	Site Access Road – T1-T5 Platform	T1-T5	T1-T2-T3-T4-T5
2	-	-	T1-T2-T5
3	T8-T9-T10 Platform	T8-T9-T10	T8-T9-T10
4	-	-	T6-T7-T8-T9-T10
5*	Site Access Road	-	-
6*	Site Access Road	-	-
7*	Site Access Road	-	-

*These assessment points have been assessed for site access road impact only.

9.4 Impact Assessment

9.4.1 Methodology

The methodology used for the noise and vibration calculations is presented in this section. For the construction and operation phase, environmental noise and vibration levels were calculated by using appropriate methods taking into account related noise sources.

9.4.1.1 Noise Modelling

A noise model was developed using commercial noise modeling software CadnaA from Datakustik. The calculation parameters and sound source levels for the modeling and the methods are described in this section.

The input data to the noise model has an essential importance on the significance of the noise model. In this section the noise model input data for operation and construction phases is explained.

Since sound propagation is hugely affected by terrain which can act as an obstacle to noise, information on ground topography was considered in the noise model. Ground topography data around the Project area was used to develop the model.

Ground sound absorption (G) varies between 0 for hard - reflective surfaces and 1 for soft - absorptive surfaces. When calculating noise propagation, G values were considered as 0,9; because region is rural and far away from reinforced concrete structures.

Meteorological data (average relative humidity, average temperature, wind frequencies) were included in the noise mapping software to calculate the most suitable sound propagation conditions. Meteorological attenuation parameters – Cmet - are considered as 1.5, 0.7 and 0 for day, evening and night periods respectively. Given the nature of noise propagation, this means night and evening noise levels would be slightly higher than the daytime levels with same model input.

Buildings are introduced to prepare 3D noise propagation model where relevant data exists.

9.4.1.2 Construction Noise

In most cases, the logical way to express construction noise is to create area noise sources within the noise modelling software. Since significant quantity of construction equipment are used during the construction period, it may be problematic to represent the real noise case into modelling software.

Information about construction phases in the documents provided by the Project Company were analyzed and construction areas were determined. It was assumed that all equipment and machinery would be operating simultaneously; leading the noise model to present a worst-case.

Regarding ETL facilities which are incorporated with the plant considered to be negligible in terms of environmental noise for following reasons. Following Figure 9.6 shows the ETL line for the specific project.

- The PID reports of the similar facilities from work package of 9 facilities suggest only one unit of each type of construction equipment will be used. This means there will not be any simultaneous construction works.
- The same reports suggest that all construction processes for ETL lines (sub structure, super structure and string application) will last for 6 moths in total.
- It is also suggested in the PID reports that following equipment will be used for construction of ETL; loader, excavator, sweeper, truck, crane and string machine. Total sound power level is calculated as 119 LwA for these equipment according to BS5228.
- Safe distance to for 119 LwA to drop to 55 dBA level (day time noise limit) modelled as 400m. Thus ETL construction noise is considered negligible.
- Only for ETL units (if there exist any) which has settlements lies within the safe distance corridor, noise monitoring studies and following mobile noise barrier application during construction period is suggested if necessary until the end of construction period.

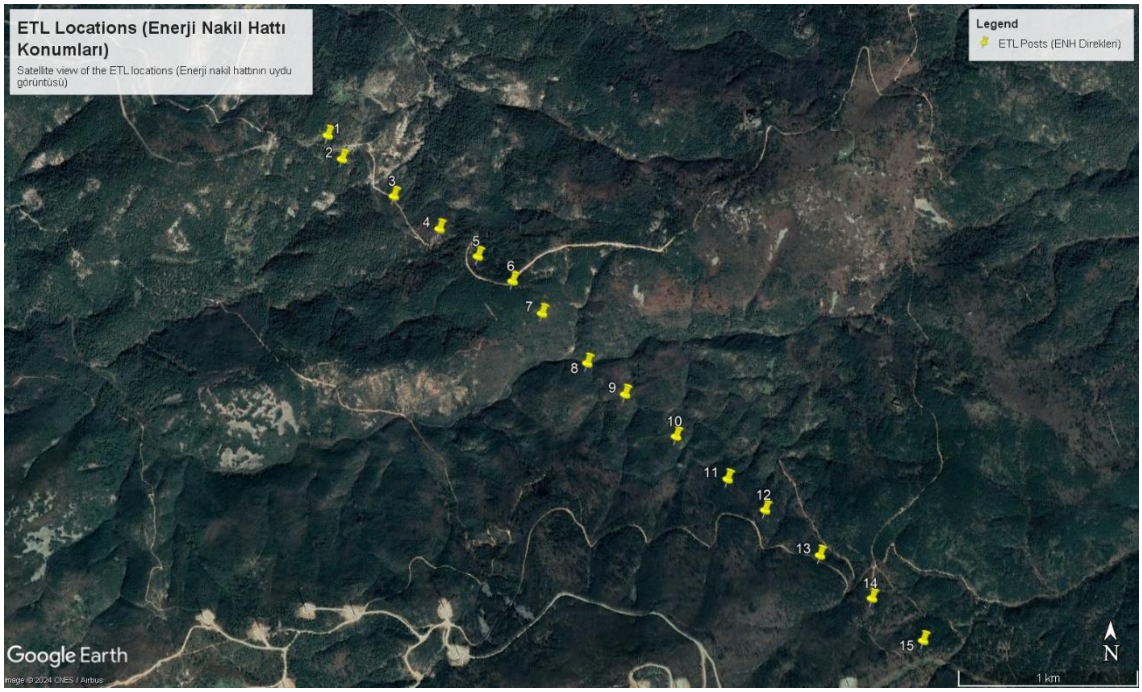


Figure 9-6: ETL Units Specific to The Project

In the noise model, the construction zones are defined using area noise sources. The total sound power level of all equipment was homogeneously assigned to the construction areas.

The given construction machine/equipment list is presented in Table 9-23.

Table 9-23: Construction Machinery/Equipment List

Plant	Quantity	Unweighted Octave Band Sound Power Level [dB]									Sound Power	Total Corrected Sound Power Level (dB)	Reference
		% on-time	63	125	250	500	1k	2k	4k	8k	Level (dBA)		
			Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz			
Concrete Mixer	18	30	111	102	94	97	98	106	88	83	108	115	BS 5228: Tab C.4 #20
Loader	2	40	96	95	91	90	90	89	82	75	95	94	BS 5228: Tab C.4 #14
Crawler Dozer	2	30	108	112	104	105	107	109	97	87	113	111	BS 5228: Tab C.6 #28
Excavator	12	30	104	101	90	94	90	87	82	77	96	102	BS 5228: Tab C.3 #20
Truck	6	30	113	114	114	110	109	107	105	96	114	117	BS 5228: Tab C.6 #25
Crane	4	100	108	107	101	102	101	101	92	83	106	112	BS 5228: Tab C.4 #73
Generator	1	20	98	90	90	85	81	80	76	69	88	81	BS 5228: Tab C.4 #77
Welding Machine	1	20	92	91	92	89	91	92	97	97	102	95	BS 5228: Tab C.4 #69
Water Tanker	2	30	108	109	103	107	101	102	98	93	109	107	BS 5228: Tab C.6 #37
Grader	1	20	116	115	111	107	112	106	102	93	114	107	BS 5228: Tab C.6 #31
Rock Drill	1	30	114	120	113	116	112	111	106	105	118	113	BS 5228: Tab C.9 #1
Mobile Crushing and Screening Plant	1	20	119	119	116	115	113	111	106	96	118	111	BS 5228: Tab C.9 #14
Iron Cutting	1	20	95	96	97	96	97	94	89	84	101	94	BS 5228: Tab C.3 #31
Iron Bending	1	20	102	104	94	86	84	84	83	83	93	86	BS 5228: Tab C.3 #35
Total Sound Power Level (dBA)			122	96	105	110	114	116	118	111	122		
Sound Power Level per area Lw" (dBA/m2)			75	49	58	63	67	69	71	64	75		
Construtrion Area(m2)			**50000**										

In addition to the machinery and equipment list, truck traffic activities were also modelled for construction phase. Truck routes provided by the Project Company, were implemented into the model for only daytime period.

9.4.1.3 Operation Noise

The noise source of the Project for operation phase is wind turbines. Planned turbines' specifications are listed in Table 9-24.

Table 9-24: Planned Turbine Specifications

Turbine	Nominal Power (kW)	Hub Height (m)	Sound Power Level (dBA)
T1-T10	4200	111	106,0

9.4.1.4 Construction Vibration

Vibration analyses were conducted for construction phase. There is no vibration impact expected for operation phase of the Project.

Vibration during the construction stage is mostly caused by earthworks and blasting activities. It was assumed that machinery that have maximum vibration impact, will work at the closest construction polygon to receiving location. Thus, the worst-case scenario was studied.

Calculations were conducted according to the information and reference vibration levels gathered from Federal Transit Administration (FTA) document. The reference vibration value is accepted as loaded trucks activities according to the FTA. The reference values are presented in Table 9-25.

Table 9-25: Reference Vibration Levels of Construction Equipment

Equipment		PPV at 25 ft (in/sec)	Approximate Lv at 25 ft
Pile Driver (impact)	upper range	1.518	112
	typical	0.644	104
Pile Driver (sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop (slurry wall)	-	0.202	94
Hydromil (slurryl wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drillin		0.089	87
***Loaded trucks**		**0.076**	**86**
Jackhammer		0.035	79
Small bulldozer		0.003	58

RMS velocity in decibels (VdB RE 1 micro-inch/second)

*Loaded truck activities are accepted as a reference vibration.

Reference vibration levels for several generic construction equipment is listed in Table 9.23. The one which has the highest vibration reference value and will be operative during

construction works is the “loaded trucks”. To be on the safe side and represent a worst case scenario vibration calculations are conducted with “loaded truck” reference value. The peak particle velocities at the identified receptors are calculated with reference vibration velocities and distances in between the working area and receptors as shown in the equation below.

Equation 1 Peak Particle Velocity at Receptor - Formula

$$PPVreceiver = PPVreferance \times (dref/drec)^{1.5}$$

PPV: peak particle velocity (mm/s),

dref: reference distance (m),

drec: receptor distance (m)

Blasting vibration impact was assessed for the construction phase. Blasting activities will be carried out with 39.85 kg explosive material (37.85 kg anfo and 2 kg dynamite) per hole, as reported by the Project Company.

The calculation of blasting vibration impact was defined as peak particle velocity (PPV) according to the “International Society of Blasting Engineers – Blasters’ Handbook” document. PPV is calculated with Equation 2 and Equation 3.

Equation 2 Peak Particle Velocity for Blasting - Formula

$$PPV = \mathrm{k} \times (\mathrm{SD})^{-\beta}$$

PPV: peak particle velocity (mm/s),

k: propagation coefficient

SD: scaled distance (m)

β: extinction coefficient

Equation 3 SD Formula

$$\mathrm{SD} = \mathrm{D}/\sqrt{w}$$

D: distance from blasting point to assessment point (m)

W: amount of explosive material (kg)

9.4.2 Results and Assessment

This section presents the noise modelling findings together with grid noise maps as well as the computed vibration levels. The procedures described in Section 9.2.3 are used to obtain the impact scales, magnitudes, and final significances.

9.4.2.1 Noise

Construction Noise

The potential noise impacts caused by construction activity are evaluated with the model and noise maps were prepared.

The construction noise maps are presented in Figure 9-7; whereas construction phase noise assessments are presented in Table 9-26 for IFC Limits.

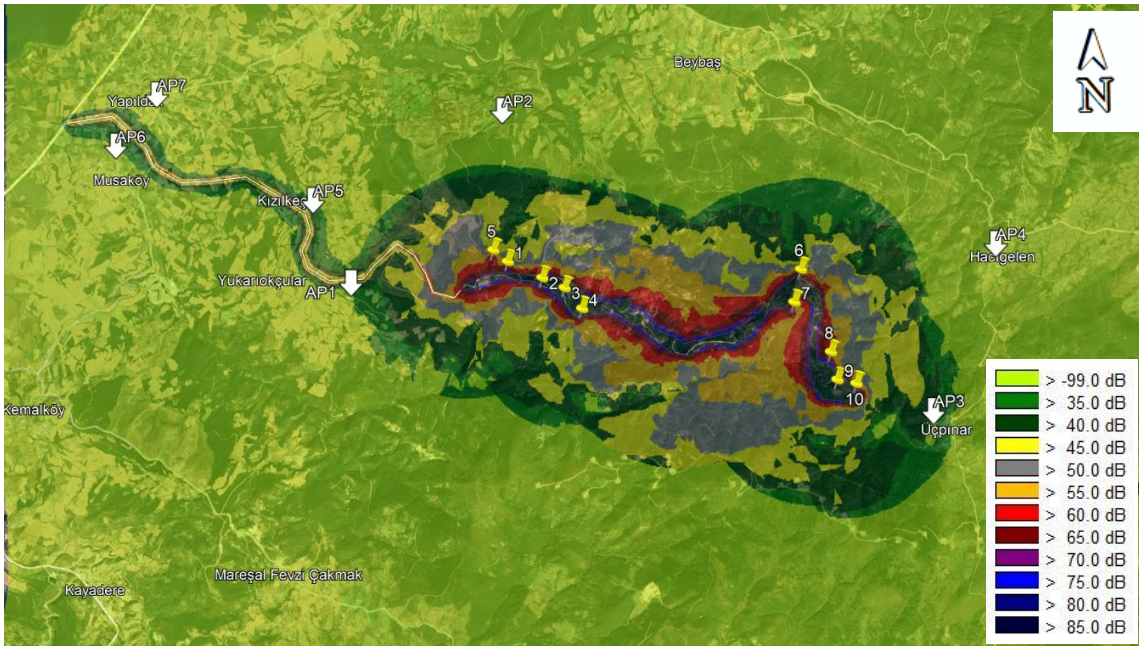


Figure 9-7 Construction Noise Map – Day

Table 9-26 Construction Phase Noise Assessment Results, IFC-WBG Limits

Assessment Point	Model Result L_{eq} (dBA)	Baseline L_{eq} (dBA)	Cumulative (dBA)	Limit Value (dBA)	Limits Exceedance (dBA)	Scale of Impact	Impact Magnitude	Impact Significance
	L_d	L_d	L_d	L_d				
1	25.2	41.4	41.5	55.0	0.0	No Impact	No Impact	No Impact
2	Undetected	40.5	40.5	55.0	0.0	No Impact	No Impact	No Impact
3	33.8	40.3	41.2	55.0	0.0	No Impact	No Impact	No Impact
4	Undetected	40.3	40.3	55.0	0.0	No Impact	No Impact	No Impact
5	40.0	41.4	43.8	55.0	0.0	No Impact	No Impact	No Impact
6	33.1	41.4	42.0	55.0	0.0	No Impact	No Impact	No Impact
7	23.6	41.4	41.5	55.0	0.0	No Impact	No Impact	No Impact

*Undetected: No impact was detected at the assessment point.

No Impact	**7**
Negligible	**0**
Minor	**0**
Moderate	**0**
Major	**0**

As can be seen from assessment tables related with the construction phase of the Project; all final impact significances are found to result in “No Impact” in accordance with IFC limits for seven receptor locations.

Operation Noise

The potential noise impacts caused by operation activity were evaluated with the model and noise maps were prepared.

The operation noise maps are presented in Figure 9-8 and Figure 9-9. Operation phase noise assessments are presented in Table 9-27 for RENC Limits and Table 9-28 for IFC Limits.

Figure 9-8: Operation Noise Map – Day

Figure 9-9: Operation Noise Map – Night

Table 9-27: Operation Phase Noise Assessment Results, RENC Limits

Assessment Point	Model Result L_{eq} (dBA)			Limit Value L_{eq} (dBA)			Limit Exceedance Max (dBA)	Scale of Impact	Impact Magnitude	Impact Significance
	L_{day}	L_{eve}	L_{night}	L_{day}	L_{eve}	L_{night}				
1	Undetected	Undetected	Undetected	65.0	60.0	55.0	0.0	No Impact	No Impact	No Impact
2	Undetected	Undetected	Undetected	65.0	60.0	55.0	0.0	No Impact	No Impact	No Impact
3	24.4	24.2	24.9	65.0	60.0	55.0	0.0	No Impact	No Impact	No Impact
4	Undetected	Undetected	Undetected	65.0	60.0	55.0	0.0	No Impact	No Impact	No Impact
5	Undetected	Undetected	Undetected	65.0	60.0	55.0	0.0	No Impact	No Impact	No Impact
6	Undetected	Undetected	Undetected	65.0	60.0	55.0	0.0	No Impact	No Impact	No Impact
7	Undetected	Undetected	Undetected	65.0	60.0	55.0	0.0	No Impact	No Impact	No Impact

*Undetected: No impact was detected at the assessment point.

No Impact	**7**
Negligible	**0**
Minor	**0**
Moderate	**0**
Major	**0**

Table 9-28: Operation Phase Noise Assessment Results, IFC-WBG Limits

Assessment Point	Model Result L_{eq} (dBA)		Baseline L_{eq} (dBA)		Cumulative (dBA)		Limit Value (dBA)		Limits Exceedance Max	Scale of Impact	Impact Magnitude	Impact Significance
	L_d	L_n	L_d	L_n	L_d	L_n	L_d	L_n				
1	Undetected	Undetected	41.4	33.9	41.4	33.9	55.0	45.0	0.0	No Impact	No Impact	No Impact
2	Undetected	Undetected	40.5	35.3	40.5	35.3	55.0	45.0	0.0	No Impact	No Impact	No Impact
3	24.4	24.9	40.3	33.6	40.4	34.1	55.0	45.0	0.0	No Impact	No Impact	No Impact
4	Undetected	Undetected	40.3	33.6	40.3	33.6	55.0	45.0	0.0	No Impact	No Impact	No Impact
5	Undetected	Undetected	41.4	33.9	41.4	33.9	55.0	45.0	0.0	No Impact	No Impact	No Impact
6	Undetected	Undetected	41.4	33.9	41.4	33.9	55.0	45.0	0.0	No Impact	No Impact	No Impact
7	Undetected	Undetected	41.4	33.9	41.4	33.9	55.0	45.0	0.0	No Impact	No Impact	No Impact

*Undetected: No impact was detected at the assessment point.

No Impact	**7**
Negligible	**0**
Minor	**0**
Moderate	**0**
Major	**0**

As can be seen from assessment tables related with the operation phase of the Project; all final impact significances are found to result in “No Impact” in accordance with both national and IFC limits for seven receptor locations.

9.4.2.2 Vibration

Construction Vibration

The major vibrational activity is loaded truck and blasting activities for the construction phase.

The reference vibration value is accepted as loaded truck according to the Federal Transit Administration (FTA). The construction vibration levels related to distance were calculated according to the Equation 1.

Construction vibration levels and limit values are presented in Figure 9-10.

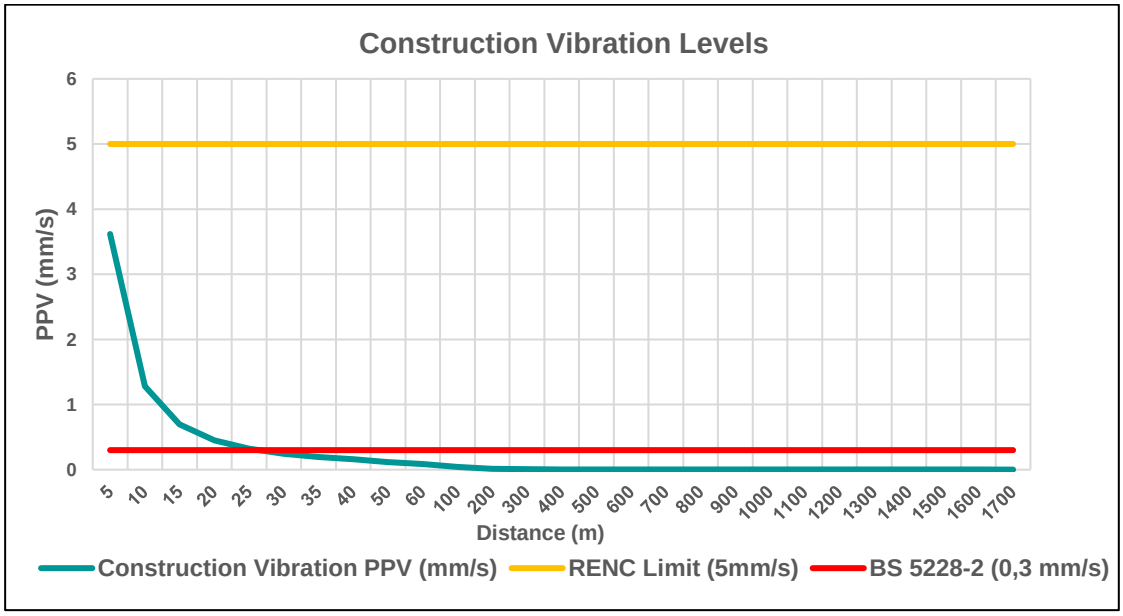


Figure 9-10: Construction Vibration Levels and Limit Values

Critical distances from the construction zone are calculated as 30 meters according to the BS 5225-2:2009 document. As seen in Figure 9-10, construction activity closer than the critical distances to the receptors, may cause vibrational impact.

Calculated construction vibration levels at the assessment points are presented in Table 9-29 and none of the assessment points is in the critical distance according to RENC.

Table 9-29: Construction Vibration Results

Assessment Points	Construction Vibration Level (mm/s)	Distance (m)	Critical Distance (m)	
			RENC	BS5228-2
1	0.007	325	<5	30
2	0.000	2490	<5	30
3	0.001	1440	<5	30
4	0.000	3400	<5	30
5	0.0067	60	<5	30
6	0.002	800	<5	30
7	7.814	3	<5	30

The construction vibration impact assessment results are presented in Table 9-30.

Table 9-30: Construction Vibration Impact Assessment Results

Assessment Point	Distance (m)	Vibration ppv (mm/s)	Limit Values (mm/s)		Limits Exceedance (max)	Scale of Impact	Impact Magnitude	Impact Significance
			RENC	BS 5228-2:2009				
1	325	0.007	5,000	0.300	0.0	No Impact	No Impact	No Impact
2	2490	0.000	5,000	0.300	0.0	No Impact	No Impact	No Impact
3	1440	0.001	5,000	0.300	0.0	No Impact	No Impact	No Impact
4	3400	0.000	5,000	0.300	0.0	No Impact	No Impact	No Impact
5	110	0.035	5,000	0.300	0.0	No Impact	No Impact	No Impact
6	800	0.002	5,000	0.300	0.0	No Impact	No Impact	No Impact
7	3	7.814	5,000	0.300	7.5	Medium	Medium	Moderate

No Impact	**6**
Negligible	**-**
Minor	**-**
Moderate	**1**
Major	**-**

As can be seen from Table 9-30, there is one “moderate” and six “no impact” final impact significance measurement results in accordance with RENC regarding the vibration due to construction phase.

Blasting activities are also assessed and results are presented below.

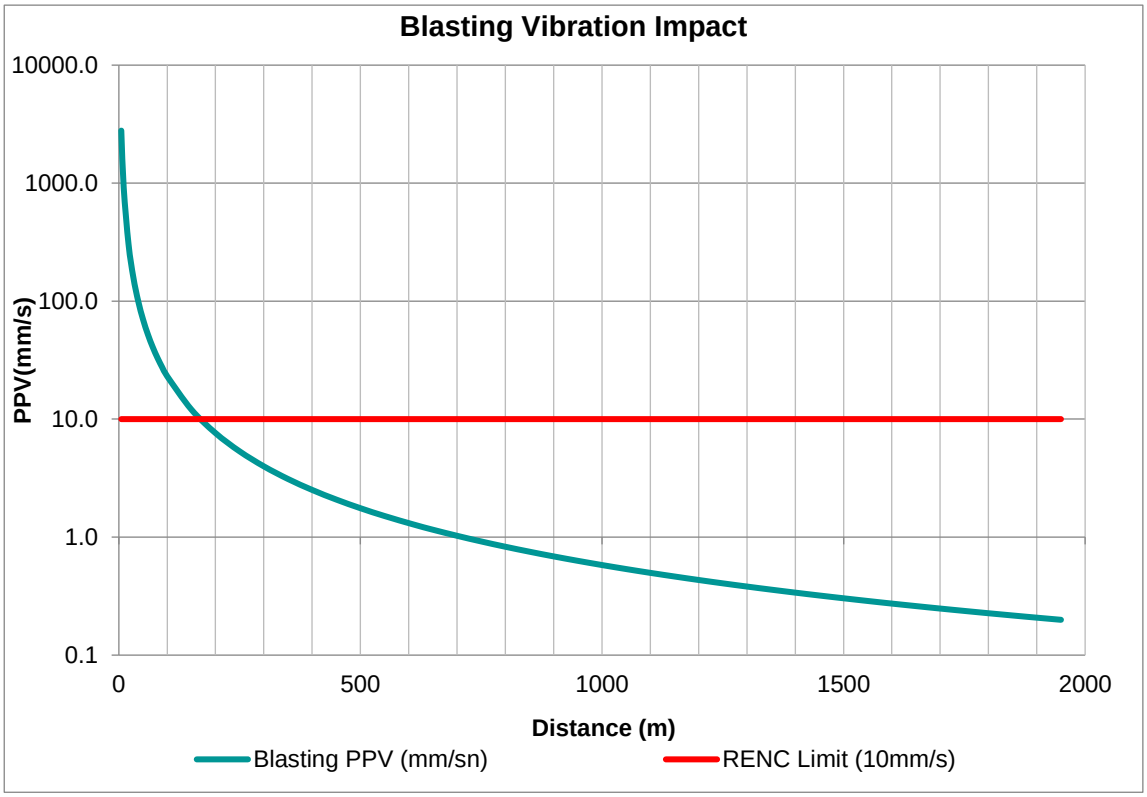


Figure 9-11: Blasting Vibration Level and Limits

Critical distances from the blasting zone are calculated as 165 meters according to the RENC limits. As can be seen from Figure 9-11, blasting activity closer than the critical distances to the receiving bodies, may cause the vibrational impact. According to Table 9-31, none of the receptors is within the critical distance in accordance with RENC.

Table 9-31: Construction Vibration Results

Assessment Points	Distance (m)	Critical Distance (m)
		RENC
1	2550	165
2	2470	165
3	1440	165
4	3640	165
5	3320	165
6	7300	165
7	6800	165

The blasting vibration impact assessment results are presented in Table 9-32**.**

Table 9-32: Blasting Vibration Impact Assessment Results

Assessment Point	Distance (m)	Vibration ppv (mm/s)	Limit Values (mm/s)	Limits Exceedance	Scale of Impact	Impact Magnitude	Impact Significance
1	2550	0.121	10,000	0.0	No Impact	No Impact	No Impact
2	2470	0.127	10,000	0.0	No Impact	No Impact	No Impact
3	1440	0.302	10,000	0.0	No Impact	No Impact	No Impact
4	3640	0.068	10,000	0.0	No Impact	No Impact	No Impact
5	3320	0.079	10,000	0.0	No Impact	No Impact	No Impact
6	7300	0.022	10,000	0.0	No Impact	No Impact	No Impact
7	6800	0.026	10,000	0,0	No Impact	No Impact	No Impact

No Impact	**7**
Negligible	**-**
Minor	**-**
Moderate	**-**
Major	**-**

As can be seen from Table 9-32, related with the operation phase of the Project; all final impact significances were found to result in “No Impact” for blasting activities to be performed during construction phase

Operation Vibration

There is no vibration impact is expected for operation phase of the Project.

9.5 Impact Mitigation & Residual Impact

9.5.1 Construction

Assessment Point 7 was found to have moderate final impact significances in terms of construction vibration. However, detected impacts include a great extent of uncertainty.

Detected vibration impact is sourced from truck passages through site access roads.

The Project will seek compliance with international guidelines and national legislation regarding prevention and control of noise and vibrations during construction. Following measures will be taken where necessary to mitigate any impact.

- Earth-moving and noisy equipment will be kept as far away from sensitive areas as feasible on the construction site.
- Activities that cause noise and vibration will be spread over time so that multiple activities that generate noise and vibration do not occur at the same time and their cumulative impacts are mitigated.
- Low baseline noise level will be taken into account when construction activities are planned. At low baseline noise regions, hours and at the weekends, truck activities will be limited and low noise generating activities will be scheduled.
- Construction impacts detected are directly related with truck routes. Truck access routes can be altered at impacted zones.
- Site-specific measures could be implemented. (i.e. extra speed limits at impacted zones).
- Construction workers will be trained on relevant management plans and be aware of the sensitive nature of workplaces they are operating in and advised to limit verbal noise or other forms of noise.
- Noise and vibration will be minimized at the Project area and surrounding areas through instructing construction truck drivers to switch off vehicle engines while offloading materials and to shut down or throttled down to a minimum when not in operation.
- Proper machinery, equipment and vehicles with lower sound power levels and reduced-sound models will be preferred.
- Use of old or damaged machinery with high level of noise emissions that would have a negative impact in the environment will be avoided and it will be ensured that equipment is properly serviced and efficient.
- Maintenance of construction vehicles will be conducted regularly by means of a regular vehicle maintenance and repair program as per the recommendations of the manufacturer to minimize extraneous noises caused by poor performance.
- All generators and heavy-duty equipment will be insulated or placed in enclosures to minimize disrupting ambient noise levels.
- Health and safety of construction workers will be protected from any possible noise impact generated at the construction site. Adequate personal protective equipment (PPE) will be provided to workers.
- Local communities will be engaged to minimize any disturbance and effect on the safety, health of people in the nearby buildings;
- Construction activities will be planned in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance.

- Complaints on noise and vibration disturbances will be recorded, assessed and necessary preventive measures will be taken.
- According to complaints and disturbances, mobile noise barriers will be employed for affected receptors from site access roads. Noise barriers will be used until completion of the truck traffic for construction activities.

Noisy activities taking place within construction sites will be located away from the residential areas to the extent possible.

Perceptible, vibration levels are detected solely from truck passages at the settlement located very close to the site access roads.

Any possible structural damages or deviations need to be monitored and any possible complaint need to be collected regularly.

Considering detected impact is sourced from truck passages, no residual impacts are expected. Following the end of construction works source will be removed. (Trucks)

9.5.2 Operation

In terms of both operational noise and vibration there is no significant impact detected at any of the assessment points. Thus, there is no need for mitigation measures and no residual impacts are expected in terms of the operation phase.

10 Landscape and Visual

10.1 Introduction

This report contains the visual impacts that would be caused during the operation phase of the Project. An analysis of landscape and visual baseline conditions were undertaken to inform the assessment of change and resulting significant effect. Modelling studies were undertaken to analyse shadow flicker impact and zones of turbine visibility. All wind turbines within the scope of Project have been considered.

The anticipated activities at each receiver are modelled using the WindPRO 4.0 software.

Shadow impacts were assessed in line with “IFC Environmental, EHS Guidelines for Wind Energy” document.

The proposed WPP will consist of 10 wind turbines with a hub height of 111m and turbine tip height of up to 180m. Proposed ancillary assets include access roads and a 154 kV single-circuit ETL of approximately 4.5 km for connection to Üçpınar TS, which is currently operated by the TEİAŞ. Further information regarding the scheme description is presented in *Chapter 2: Project Description.*

10.2 Methodology

10.2.1 Applicable Guidelines and Standards

The European Landscape Convention (ELC) is a convention of the Council of Europe (rather than the European Union) of which Türkiye has been a signatory since October 2000. The ELC highlights the importance of all landscapes in Europe and defines landscape character as ‘...an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors’. The ELC encourages relevant authorities to adopt policies for the protection, management and planning of landscapes throughout Europe.

Further information regarding relevant environmental legislation and policy is presented in *Chapter 3: Policy, Legal and Institutional Framework.*

In the absence of applicable country specific guidance and standards in respect to undertaking Landscape and Visual Impact Assessment in Türkiye, the methodology for this assessment has been broadly informed by the principles of the Guidelines for the Landscape and Visual Impact assessment (GLVIA) Third Edition as published by the Landscape and Institute and Institute of Environmental Management and Assessment. These guidelines have been applied in the context of Türkiye rather than the UK.

Additionally, environmental, health, and safety guidelines for Wind Energy document published by IFC denotes the following;

39. If it is not possible to locate the wind energy facility/turbines such that neighbouring receptors experience no shadow flicker effects, it is recommended that the predicted duration of shadow flicker effects experienced at a sensitive receptor not exceed 30 hours per year and 30 minutes per day on the worst affected day, based on a worst-case scenario.

Even though many of the countries around the world do not have any regulation or limitations regarding Shadow Flicker concept, the ones that worked on it have limitations and regulations likewise. Accordingly, Table 10-1 summarizes applicable Project limits.

Table 10-1: IFC Wind Energy Guideline Shadow Flicker Limits

Receptor	Yearly Flicker Occurrence (hr/year)	Daily Flicker Occurrence (min/day)
Turbine neighbouring sensitive areas	30	30

10.2.2 Study Area and Area of Influence

The Project's AoI for the shadow flicker impact was determined as the area where shadow generated by the Project reaches out the receptors. As such, the AoI for the shadow impact was determined as sensitive residential areas located at nearest settlements.

The Project's AoI for the assessment of landscape and visual effects was determined by the outputs of the zone of visual influence (ZVI) modelled for the project, along with field studies undertaken by local consultants in country. The ZVI and site visits determined an initial study area of 20 km for the assessment of landscape and visual effects.

A digital ZVI has helped to inform the identification of visual receptors (those who would have a view of the proposed development) and a selection of corresponding representative viewpoints. A ZVI is a computer-generated model which illustrates the areas from which the project could theoretically be visible from a viewer height of 2m. A ZVI based on the operational project has been produced for this assessment. The ZVI has been modelled in ESRI's ArcGIS Pro Geographical Information System (GIS) using 25m resolution topographical data from Airbus. The ZVI is based on bare ground data, with any ridgelines, plateaux and valleys reflected in the extent of predicted visibility. Existing vegetation including forestry is therefore not accounted for in the ZVI and presents a worst-case scenario. The ZVI assumes a maximum 150m tip height above ground level.

According to studies conducted by United States Department of the Interior Bureau of Land Management about wind turbine visibility, max theoretical visibility of wind turbines varies between 16-58 kilometres. However same document states that; dominant landscape impact is limited to 4-8 kilometres according to hub heights. Since visual impact assessment is based on landscape alteration area of influence for visual impact is 8 km radius from turbines.

10.2.3 Impact Assessment Methodology

In terms of shadow flicker and visual impacts, methods to classify impact is defined in this section.

10.2.3.1 Shadow Flicker

To assess possible impacts of a shadow flicker, an AoI has been identified according to the rotor diamater (which is 138.6 m). The AoI has been determined as ***10 X Rotor Diameter*** distance from turbines, curtailed to 130 degrees either side of North (so 260 degrees in total, leaving 130 degrees south of turbines where shadow effects are not expected).Seven assessment points have been identified in and around the identified AoIs (Figure 10-1).

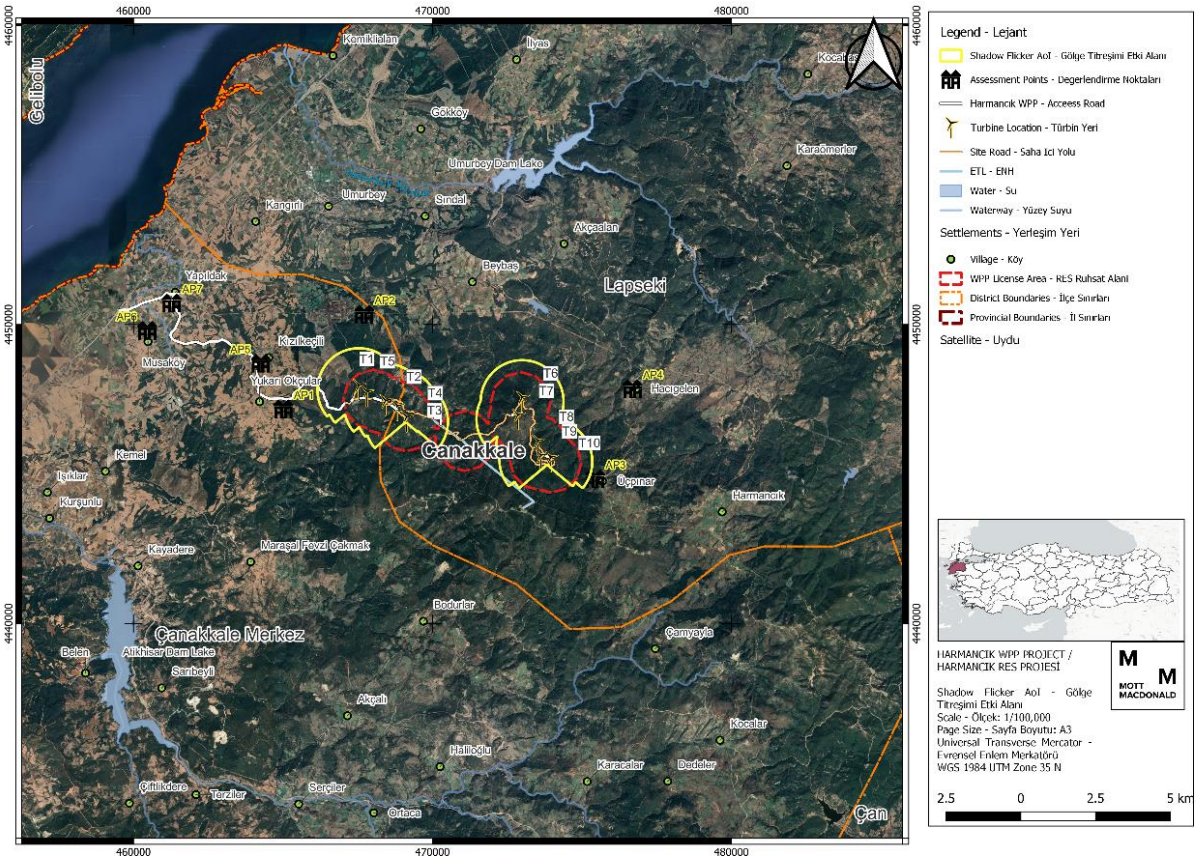


Figure 10-1: Shadow Flicker AoI (θ=260°C)

For shadow flicker given limits in Table 10-1 will be determinant to classify the impact. If the limits defined;

- Is exceeded than it could be said that “Moderate to Major” impact can be expected.
- Is not exceeded however some shadow flicker occurrence present than it could be said that “Negligible to Minor” impact can be expected.
- Is not exceeded moreover no shadow flicker occurrence present than it could be said that “No Impact” is expected.

10.2.3.2 Visual Impact

Baseline conditions are defined by landscape character and respective sensitivity, together with visual amenity (as represented by views) and the sensitivity of visual receptors (or potential viewers), in accordance with the criteria set out below.

Table 10-2: Definitions of Sensitivity

Level of Sensitivity	**Definition of Sensitivity** (Sensitivity considers the value of receptors and their susceptibility to change)
High	**Landscape** Value: Typically, of high importance and rarity, recognised at an international or national scale, with limited potential for substitution (e.g. National Parks). Outstanding or High overall evaluation. *Susceptibility to change: Landscape unlikely to accommodate the change proposed.
	Visual Amenity Value: Typically, internationally or nationally recognised/important. *Susceptibility to change: Appreciation of affected views may be one of the main activities
Medium	**Landscape** Value: Typically, of moderate importance and rarity, recognised at a regional/local scale, with limited potential for substitution. *Susceptibility to change: Landscape has the potential to accommodate the change proposed.
	Visual Amenity Value: Typically, regionally/locally recognised/important and/or expected to be appreciated at least locally. *Susceptibility to change: There may be appreciation of affected views.
Low	**Landscape** Value: Typically, of low importance and rarity, undesignated and may be degraded. *Susceptibility to change: Landscape likely to accommodate the change proposed.
	Visual Amenity Value: Affected views not recognised as having attached value and not expected to be appreciated at a local level or otherwise. *Susceptibility to change: Attention is unlikely to be focussed on affected views.

*The judgement concerning susceptibility to the type of change proposed is made by considering the nature/characteristics of the change and receiving landscape, following evaluation of receptor value and prior to the assessment of effects.

A combined assessment of value and susceptibility to change is undertaken to determine sensitivity, as set out in Table 10-3 below.

Table 10-3: Sensitivity Matrix

		Susceptibility to Change		
		Low	**Medium**	**High**
Value	**Low**	Low	Low/Medium	Medium
	Medium	Low/Medium	Medium	Medium/High

		Susceptibility to Change		
		Low	**Medium**	**High**
	High	Medium	Medium/High	High

Sensitivity is determined by applying professional judgement and is derived as a product of value and susceptibility to change, as set out above. Where more than one sensitivity outcome is possible for a given combination of value and susceptibility to change, professional judgement is applied to determine that which is most appropriate, on a case-by-case basis.

Relevant desk-based information was obtained from open street map and aerial photography. The identification of landscape character baseline was informed by a review of available mapping data and through site visits undertaken by local consultants in September 2023.

Viewpoints were identified initially through desk study and verified via field surveys (undertaken by the local consultant).

In addition, Table 10-4 informs the assigning of magnitude of impact, which may be either beneficial or adverse.

Table 10-4: Assigning Magnitude of Impact

Level of Magnitude	Definition of Magnitude Impacts may be beneficial or adverse
High	**Landscape** Major beneficial or adverse alteration to key landscape characteristics such that landscape character would be fundamentally changed.
	Visual Amenity Major beneficial or adverse change in existing view.
Medium	**Landscape** Beneficial or adverse alteration to key landscape characteristics such that landscape character would be noticeably changed.
	Visual Amenity Noticeable beneficial or adverse change in existing view.
Low	**Landscape** Minor beneficial or adverse alteration to key landscape characteristics such that landscape character would be similar to the baseline conditions.
	Visual Amenity Minor beneficial or adverse change in existing view such that view largely unchanged.
Negligible	**Landscape** Very minor beneficial or adverse alteration to key landscape characteristics such that change in landscape character would be barely distinguishable from the baseline conditions.
	Visual Amenity Barely noticeable beneficial or adverse change in existing view.

A combined assessment of sensitivity and magnitude is undertaken to determine how significant an effect is, as set out in Table 10-5, below.

Table 10-5: Significance Matrix

		Sensitivity		
		Low	**Medium**	**High**
Magnitude	**Negligible**	Negligible	Negligible	Negligible
	Low	Minor	Minor/Moderate	Moderate
	Medium	Minor/Moderate	Moderate	Moderate/Major
	High	Moderate	Moderate/Major	Major

Significance is determined by applying professional judgement and is derived as a product of magnitude and sensitivity, as set out above. Where more than one significance outcome is possible for a given combination of magnitude and sensitivity level, professional judgement is applied to determine that which is most appropriate, on a case-by-case basis. Effects may be beneficial or adverse. Typical descriptors of each effect category are provided in Table 10-6.

Table 10-6: Levels of Significance and Typical Descriptors

Level of Significance	Definition of Descriptos Impacts may be beneficial or adverse
Major	**Landscape** Beneficial - Character and integrity of landscape greatly enhanced. Adverse - At complete variance with the character and integrity of the landscape.
	Visual Amenity Beneficial – Substantial enhancement of views, typically from highly sensitive receptors. Adverse - Substantial deterioration of views, typically from highly sensitive receptors.
Moderate	**Landscape** Beneficial – Character and integrity of landscape noticeably enhanced. Adverse – Noticeable variance with character and integrity of the landscape.
	Visual Amenity Beneficial – Obvious improvement of views from low to medium sensitivity receptors or perceptible
Minor	**Landscape** Beneficial – Complementary change or limited enhancement to character and integrity of landscape. Adverse – Limited variance with character and integrity of the landscape.
	Visual Amenity Beneficial – Limited enhancement of views from receptors, with greater enhancement of views from receptors of low sensitivity. Adverse – Limited deterioration of views from receptors, with greater deterioration of views from receptors of low sensitivity.
Negligible	**Landscape** Character and integrity of landscape maintained.
	Visual Amenity No readily perceptible deterioration or improvement in views from receptors.

10.2.4 Limitations and Assumptions

This assessment has been based on the following assumptions and limitations:

- The assessment has been based on the project description presented in *Chapter 2: Project Description.*
- The assessment of landscape and visual effects is based on baseline information gathered on site by a local consultant, in country. This includes the provision of country and area specific environmental planning policy and regulations. The assessment of impact and effects has subsequently been undertaken by a Chartered Landscape Architect in the UK, with long standing experience undertaking LVIA for major infrastructure.
- Viewpoint descriptions are based on the wirelines produced for this assessment. The wireline analysis has been undertaken without the benefit of corresponding photography, using bare earth data only, and as such does not account for intervening forestry or built form that may reduce visibility of some of the wind farms presented in the viewpoint wirelines, or those described in the baseline analysis and cumulative considerations presented in this report.
- Wirelines have been produced using Resoft WindFarm software and 25m resolution terrain data from Airbus. All wireline images show a field of view of 90 degrees, which is broadly consistent with that of human eyes. The coordinates provided for the wirelines are in in Projected Coordinate System WGS 1984 UTM Zone 35N.

10.2.5 Modelling Methodology and Related Definitions

Modelling and calculation details about calculations are shared at this section of the report.

10.2.5.1 Shadow Flicker

Shadow flicker occurs on a dwelling when the wind turbine rotor is directly between the line of sight of the sun rays and the windows of the dwelling. More precisely, this phenomenon appears once the blades are rotating, which creates an intermittent light reduction.

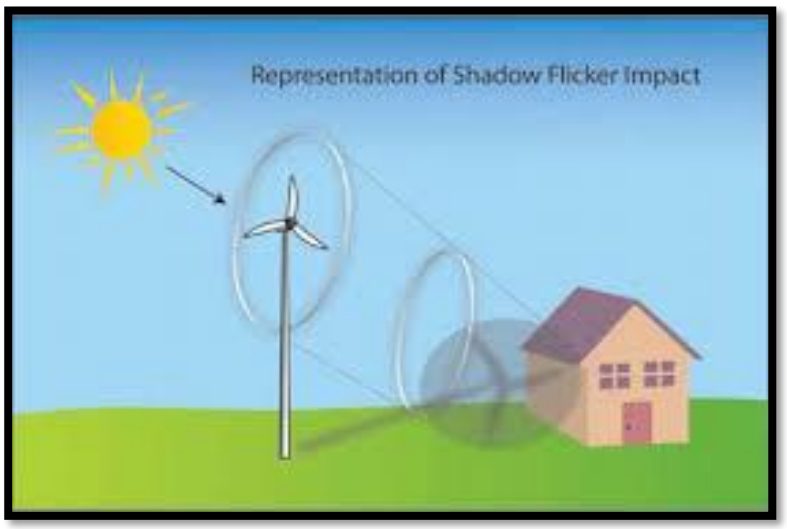


Figure 10-2: Shadow Flicker Representation

The impact of shadow flicker can differ through same day since the sun height is low during sunrise and sunset and higher the rest of the day. That's why shadow flicker is observed only during specific and short periods. For similar reasons, the impact from shadow flicker differs throughout the year.

Although an unlikely case, it's standard practice to evaluate the shadow flicker in a "worst-case" scenario. The worst-case scenario considers that:

- The sun is shining all day with no disturbance from clouds or fog;
- The sun rays, the turbine rotor and the windows are in the same line-of-sight all day long;
- The wind is blowing all day, which means that wind turbines are always operating;
- The dwelling is composed only of windows (like a greenhouse);
- There is no light obstruction from obstacles (existing turbines, trees, other buildings, etc.);
- There is no light obstruction from topography;

Moreover, the shadow flicker intensity is not considered. Thus, even if the shadow is too weak to be observable, the period of flicker will be recorded.

The results of the “worst-case” scenario is presented in this analysis, but needs to be considered as information only since, as discussed previously, it represents a situation which is not possible in reality.

In order to gather more realistic results, real case scenario is also considered and simulated for the Project. Following sub-topics explains important aspects needed in order to create a real case scenario.

10.2.5.2 Flicker Occurrence

The occurrence of the shadow flicker can be altered by the following factors:

- The sunshine/cloudiness data of the project region
- The wind data of the project region, allowing to consider the real direction of the turbine rotor and the period when the turbine doesn’t rotate
- The presence of obstacles like existing wind turbines, trees or buildings
- The topography of the site which could create a natural shadow
- The external configuration of the dwellings (direction of building faces, number and size of the windows)
- The internal configuration of the dwellings (size and location of the rooms)
- The physical obstacles inside the dwellings (curtains, blinds…)

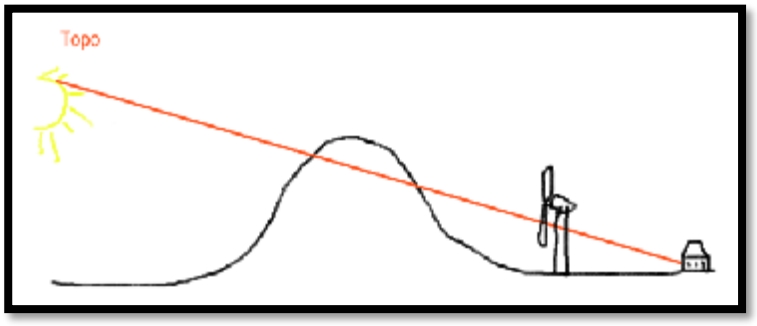


Figure 10-3: Topographic Shadow

10.2.5.3 Visual Impacts, Zones of Visibility (ZVI)

Visual impact study can be defined as modelling future appearance of the turbines from determined receivers. Below Figure 10-4 represents the visual impact created by turbines at different distances to the receiver locations.

Visibility of the turbines are calculated mainly via terrain geometry and radius of curvature of the earth.

Figure 10-4: Visual Impacts of Turbines of Different Distances

In order to make a complete visibility assessment for the Project, the visibility of each turbine is calculated and mapped for identified receivers.

10.2.5.4 Turbine Information

Information related to the turbines to be used in the Project are presented in the below Table 10-7.

Table 10-7: Planned Turbine Specifications

Turbine	Brand / Model	Nominal Power (kW)	Hub Height (m)	Sound Power Level (dBA)
T1 – T10	Enercon E-138	4200	111	106,0

10.2.5.5 Modelled Factors

There are a number of attenuation factors that can potentially be used in the assessment of shadow flicker, however only several of these factors have been included in this study. Accordingly, topographic obstacles are modelled. Moreover, total annual working time of the turbines is another modelling criterion. Since cut-in speed of the turbines is low, it is assumed that turbines will work all year long.

The factors which cannot be modelled in this study such as internal obstacles of the dwellings all in favour of lowering the shadow flicker exposure.

Since limit values guided by IFC is worst-case scenario limits, modelling studies conducted according to a worst-case scenario.

The attenuation factors used in this study are:

- The sunshine/cloudiness[97] data of the project region;
- The topography of the Project area.

[97] Cloudiness and sunshine statistics data are gathered from the database of the WindPro 4.0. The representative station for these data is located in İzmir Türkiye.

10.3 Baseline Conditions

During field trips and spatial surveys landscape identification has been conducted for current situation around planned Project site. In terms of current landscape followings are noted regarding the landscape character and visual amenity.

10.3.1 Landscape Character

- The field mostly consists of rural and forest villages.
- The terrain is mostly forests and mountainous areas.
- As a consequence of the hilly terrain, very close distances can be shadowed by terrain fluctuations.
- When accounting for the lack of designations within the study area, and accounting for the low level of development in this vast mountainous landscape, the sensitivity is considered to be medium. During field trips none of the followings; recognised viewpoint locations, UNESCO sites, landscape fabric/ character/ designations are observed.

10.3.2 Visual Amenity

The initial baseline analysis undertaken in country identified aN AoI of up to 20km. Figure 10-5 below illustrates the 20km AoI and the ZVI therein for the Project. Ten receptor groups have been identified, refined accounting for intervening topography, forestry and built form. These receptor groups are predominantly to the more populated and less vegetated landscape to the south of the project site. Those identified were all representative of residential properties.

Table 10-8 below presents the representative receptors identified, a baseline description of existing view and the assigned sensitivity to change. Figure 10-6 presents the locations of the representative visual receptor locations included within this assessment.

Table 10-8: Representative Visual Receptors (Assessment Points)

Assessment Points	Representative Measurement Points	Description	Comments	Extent	Sensitivity	Importance
AP 1	1	View looking east across intervening vegetation, over rising ground towards mountain peaks and ridgelines. The majority of the project site is out of view, hidden by intervening topography.	Residential	Site	Medium	Medium
AP 2	2	View looking south across intervening vegetation, over rising ground towards mountain peaks and ridgelines. The majority of the project site is out of view, hidden by intervening topography.	Residential	Site	Medium	Medium
AP 3	3	View looking northwest across intervening vegetation, over rising ground towards mountain peaks and ridgelines. The majority of the project site is out of view, hidden by intervening topography.	Residential	Site	Medium	Medium
AP 4	3	View from within valley looking southwest across agricultural land and tree and shrub cover in the fore and middle ground. The majority of the project site is out	Residential	Site	Medium	Medium

Assessment Points	Representative Measurement Points	Description	Comments	Extent	Sensitivity	Importance
		of view, hidden by intervening topography.				
AP 5	1	Similarly to AP-1, view looking east across intervening vegetation, over rising ground towards mountain peaks and ridgelines. The majority of the project site is out of view, hidden by intervening topography.	Residential	Local	Medium	Medium
AP 6	1	View looking southeast through intervening vegetation over initially gently rising topography, prior to the becoming steeper close to the ridgeline. The majority of the project site is out of view, hidden by intervening topography.	Residential	Local	Medium	Medium
AP 7	1	Similarly to AP-6, view looking southeast through intervening vegetation over initially gently rising topography, prior to the becoming steeper close to the ridgeline. The majority of the project site is out of view, hidden by intervening topography.	Residential	Local	Medium	Medium

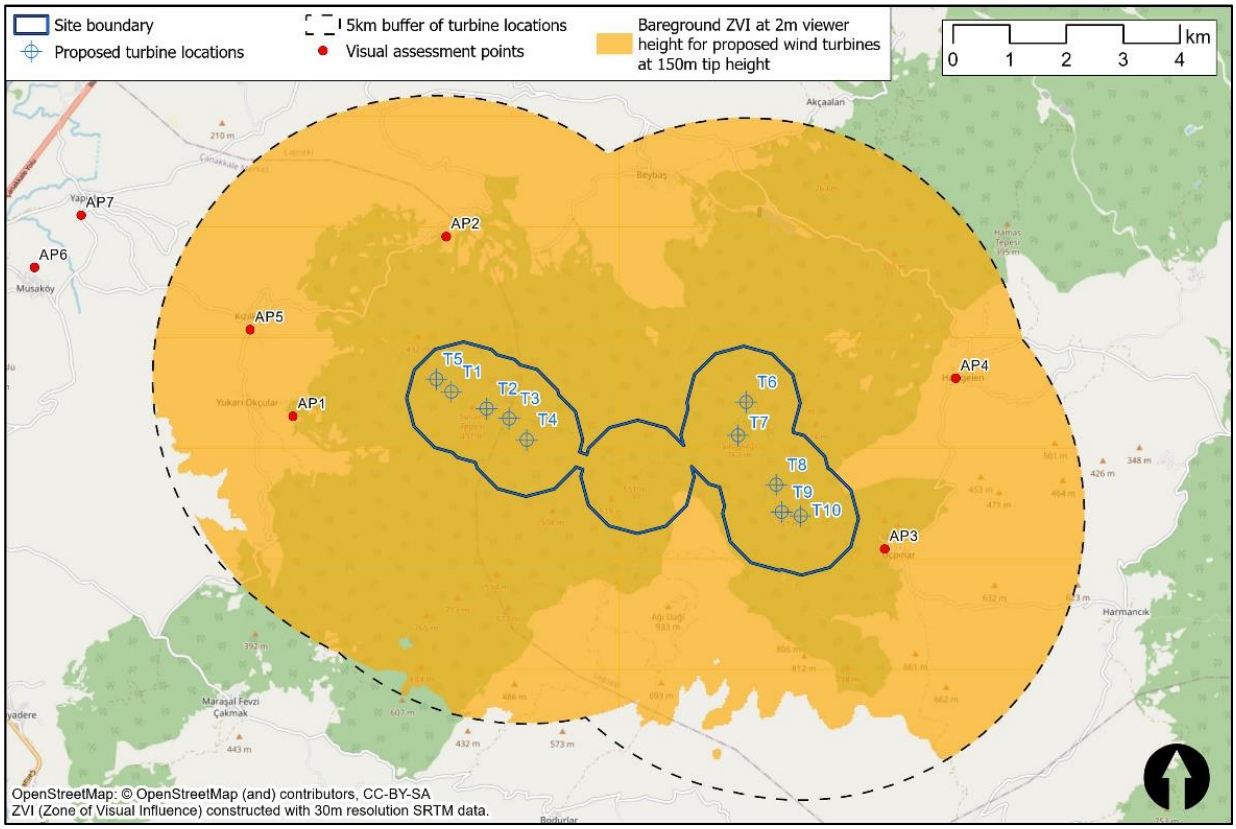


Figure 10-5: Operational ZVI

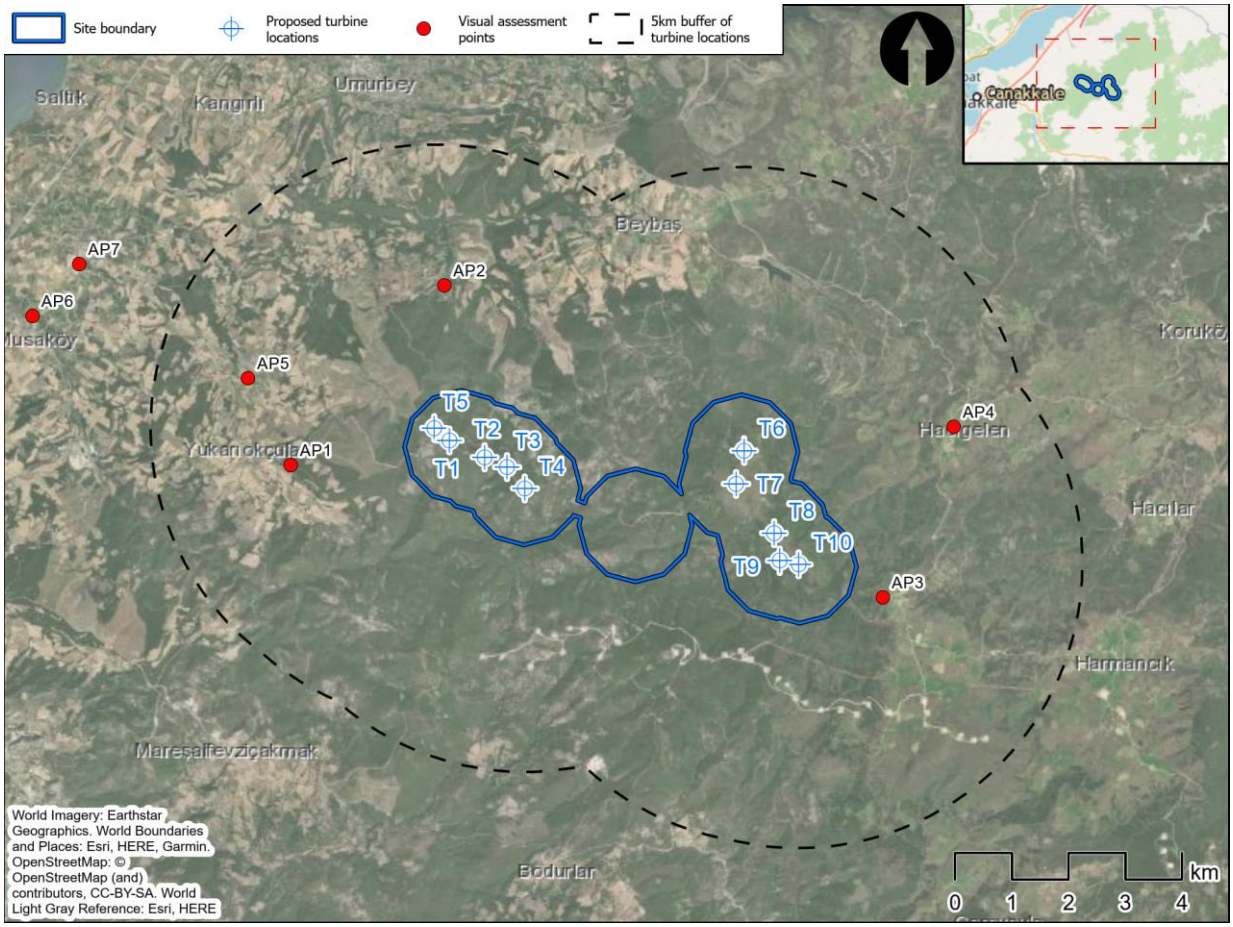


Figure 10-6: Representative Visual Receptor Viewpoint Locations

10.4 Impact Assessment

Limiting values guided by WBG IFC in terms of shadow flicker are defined according to a worst-case scenario. However; as stated in the methodology part of this section, assumptions of worst case scenario is very unlikely to occur. Accordingly, following studies are conducted;

- Shadow flicker point calculations, worst-case.
- Shadow flicker maps, real case.
- Zones of visibility maps and results

10.4.1 Shadow Flicker

Below figure shows the shadow flicker occurrence periods according to a real case scenario.

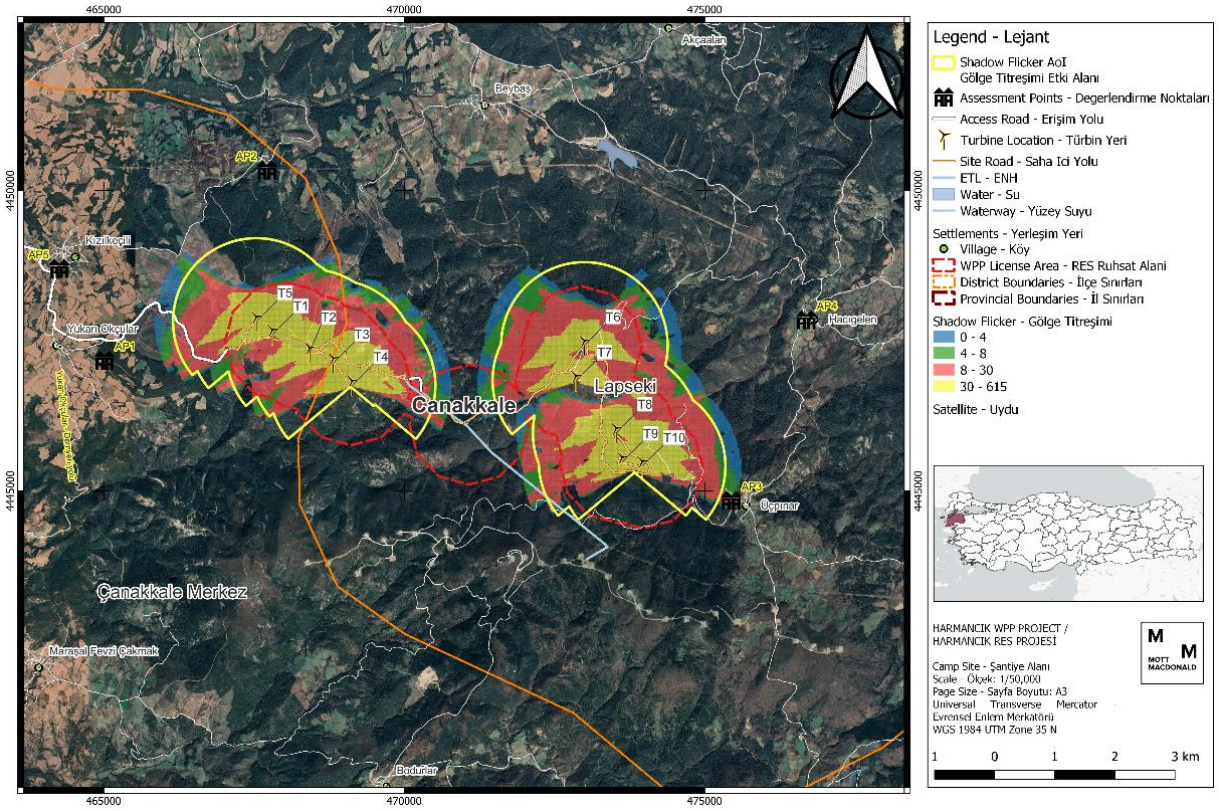


Figure 10-7: Shadow Flicker Occurrence Map, Real Case, Hours per Year

Below Table 10-9 shows point calculation results and assessment for shadow flicker. Accordingly, at none of the assessment points shadow flicker impact is foreseen.

Table 10-9: Shadow Flicker Results and Assessment

Assessment Point	Worst-case hours per year	Limit, Hours	Worst affected day hours per day	Limit, Minutes	Impact
1	00:00	30:00	00:00	00:30	No Impact
2	00:00	30:00	00:00	00:30	No Impact
3	00:00	30:00	00:00	00:30	No Impact
4	00:00	30:00	00:00	00:30	No Impact
5	00:00	30:00	00:00	00:30	No Impact
6	00:00	30:00	00:00	00:30	No Impact
7	00:00	30:00	00:00	00:30	No Impact

10.4.2 Zones of Visibility (ZVI)

Below Figure 10-8 shows turbine visibility assessment.

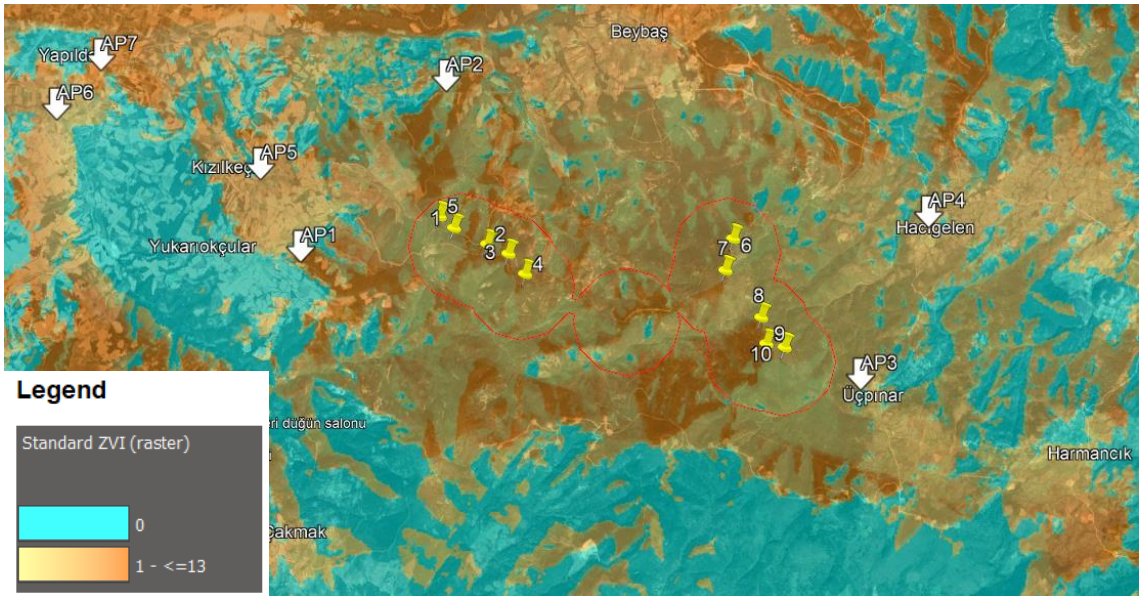


Figure 10-8: Turbine Visibility Map, (0=No visible turbine, 1-10=n turbines visible)

Below Table 10-10 shows the visible turbine quantities for each receptor.

Table 10-10: Turbine Visibility and Impact Assessment

Assessment Point	Number of Visible Turbines	Final İmpact
1	1-10	Negligible/Minor
2	1-10	Negligible/Minor
3	0	Negligible/Minor
4	1-10	Negligible/Minor
5	1-10	Negligible/Minor
6	1-10	Negligible/Minor
7	1-10	Negligible/Minor

Theoretical relative visibility of the turbines from identified receivers are rendered on satellite images and presented in Figure 10-16 toFigure 10-19.

As a matter of fact, that turbines located at a very close distance to the rural households (considering average height of the rural houses and average height of the turbines), surely can have at least psychological adverse effects on habitants. Nonetheless, considering turbine distances to the households (being very distant), visual impact is expected to be only slightly changing the view of the residents.

10.4.3 Assessment of landscape effects

Temporary landscape and visual effects, during construction, would be minimised through measures within the Environmental and Social Management Plan. Landscape and visual mitigation during operation is embedded in the design of the project including siting and layout, as discussed below.

Construction activities associated with the project, including those associated with the wind turbines and ETL, such as creation of construction compounds and the movement of plant and vehicles, would introduce temporary elements within the landscape. With the exception of

temporary crane use, these activities would primarily affect local landscape characteristics and would not be readily perceived within the wider landscape. Overall, considering the nature of construction activities, particularly their transient characteristics, the magnitude of landscape impact is considered to be low to moderate adverse, and, taking into account the medium landscape sensitivity that has been identified, the overall significance of landscape effect during construction is considered to be moderate adverse.

In terms of operation, the WPP design is responsive to the simple, mountainous landscape in which it would be located, by avoiding considerable variations in the height and spacing of turbines, avoiding multiple occurrences of overlapping turbines on ridgelines and through careful alignment of the access road. ETL infrastructure would be similarly responsive, with tower design and spacing generally consistent along the ETL route, through the mountainous landscape. Notwithstanding these considerations, the project would result in subtle change to the landscape such that the magnitude of landscape impact is considered to be low adverse, and, taking into account the low landscape sensitivity that has been identified, the overall significance of landscape effect during operation is considered to be negligible/minor adverse.

10.4.4 Assessment of visual effects

Construction activities associated with the project, including those associated with the wind turbines and ETL, such as creation of construction compounds and the movement of plant and vehicles, would introduce temporary elements within views from representative visual receptor locations. Due to the separation between visual receptors and the project, these activities would generally result in minor changes in views, with limited deterioration. Overall, considering the nature of construction activities, particularly their transient characteristics, the magnitude of visual impact is considered to be low to moderate adverse, and, taking into account the medium sensitivity of visual receptors identified, the overall significance of visual effect during construction is considered to be moderate adverse.

In terms of operation, the project is separated from representative visual receptor locations by intervening remote, mountainous land, such that the project would generally be perceived in the middle-distance rather than very close. In addition, WPP design is responsive to existing views from the representative visual receptor locations identified by avoiding considerable variations in the height and spacing of turbines, avoiding multiple occurrences of overlapping turbines on ridgelines, and through careful alignment of the access road. ETL infrastructure would be similarly responsive, with tower design and spacing generally consistent along the ETL route. Notwithstanding these considerations, the project would result in subtle change to views such that the magnitude of visual impact is considered to be low adverse, and, taking into account the medium sensitivity of visual receptors identified, the overall significance of visual effect during construction is considered to be minor/moderate adverse.

Figure 10.9 to Figure 10.15 depict the wirelines of the proposed wind turbines produced for each of the viewpoints identified within the assessment.

10.4.5 Cumulative effects

The project would be separated from the other WPPs identified in this ESIA by intervening mountainous areas, such that landscape character is not expected to become overwhelmed by wind turbines. Visual receptor groups in relation to the project are located east, west, and north of the project such that views to the project are west, east, and south facing. Given the other WPPs identified are north and southeast of the Project area and associated visual receptor groups, the project and other WPPs identified would not occur simultaneously in the representative views identified for the project. Taking the above considerations into account, there are not expected to be significant cumulative landscape and visual effects.

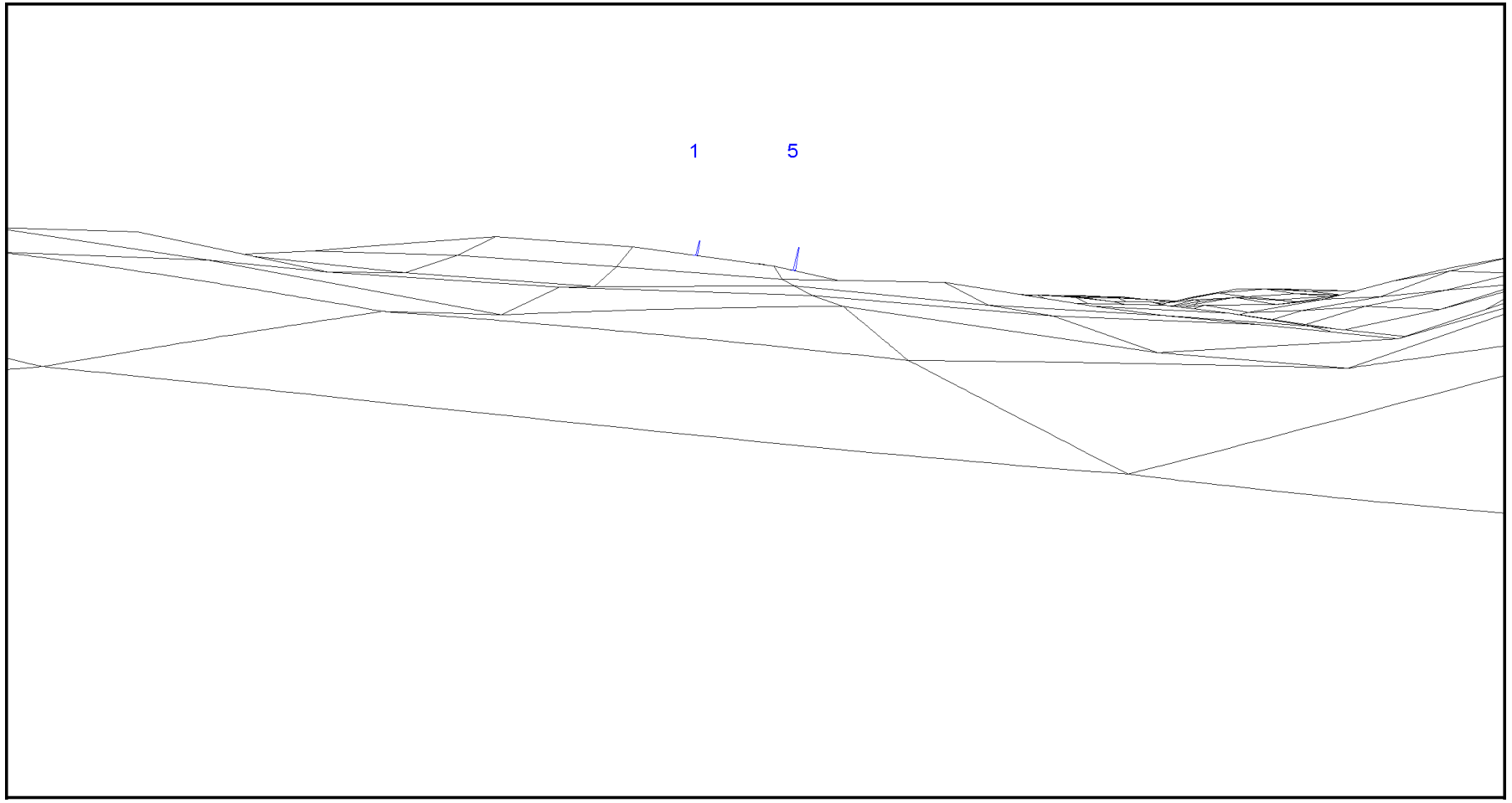


Figure 10.9: AP1 Proposed Wireline during Operation. View direction to Site Centre: 93.9°; Coordinates X: 465,015; Y: 4,447,171; Pitch: 0°.

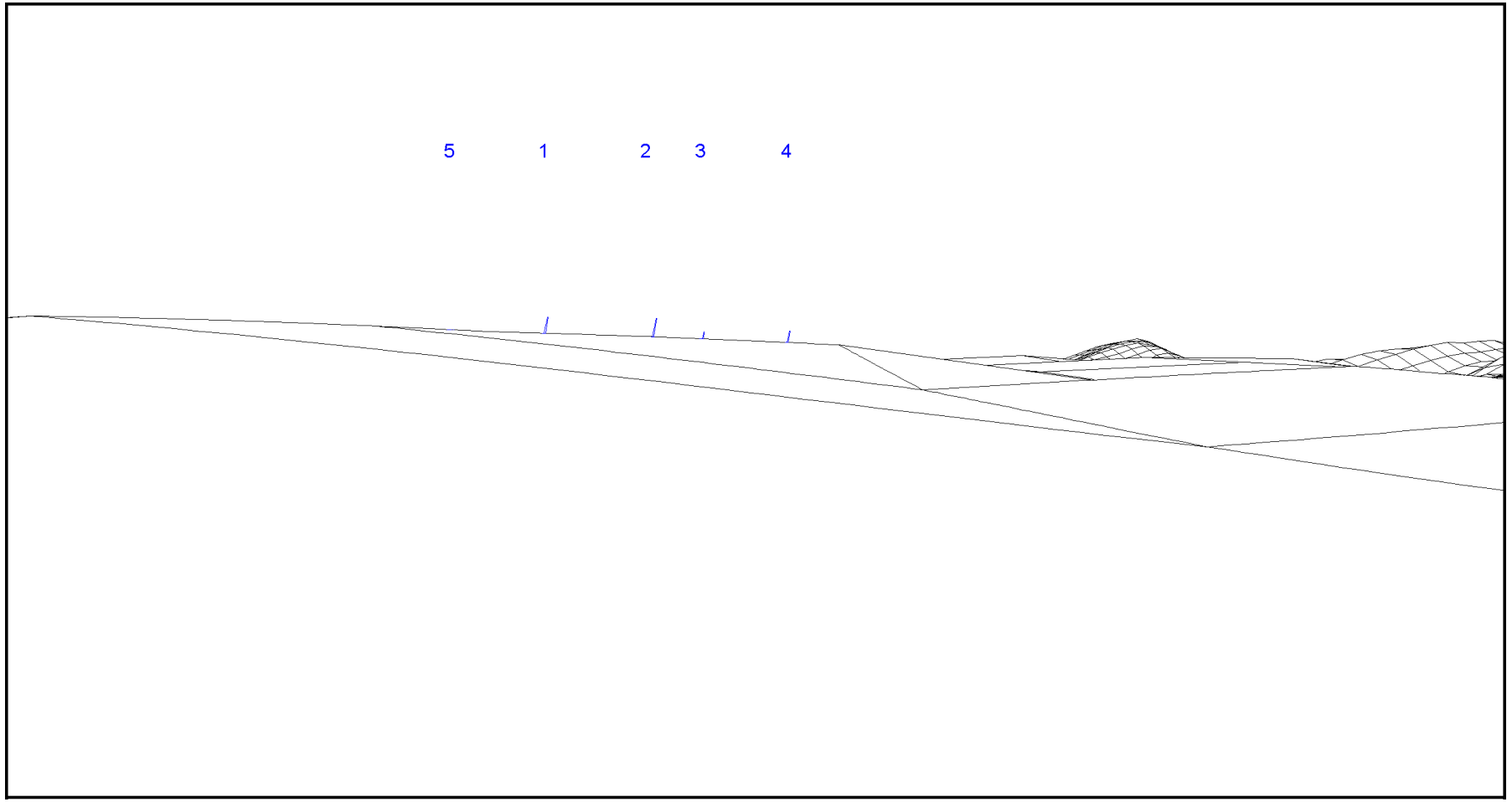


Figure 10.10: AP2 Proposed Wireline during Operation. View direction to Site Centre: 181.8°; Coordinates X: 467,717; Y: 4,450,338; Pitch: 0°.

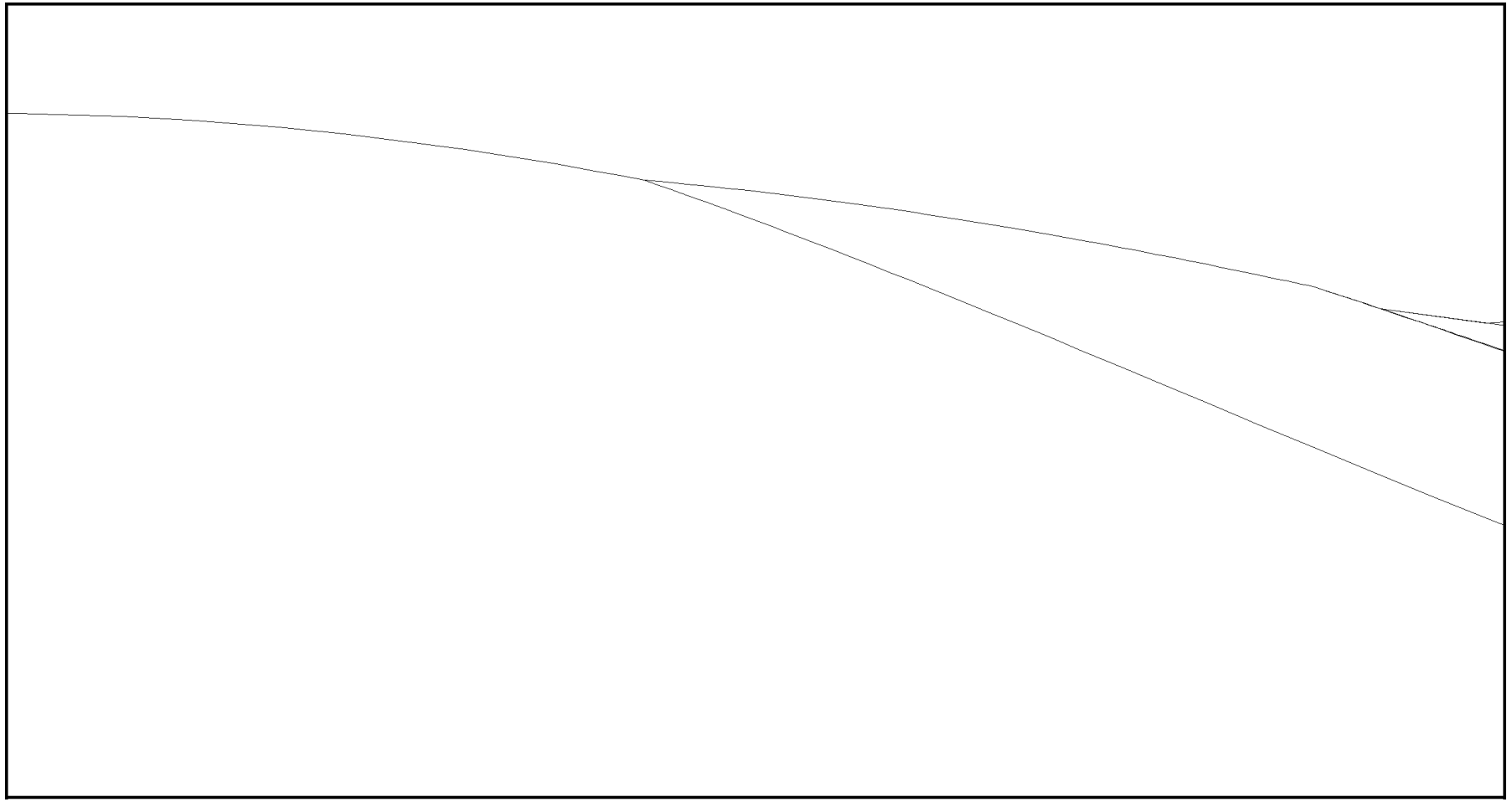


Figure 10.11: AP3 Proposed Wireline during Operation. View direction to Site Centre: 293.0°; Coordinates X: 475,441; Y: 4,444,838; Pitch: 0°.

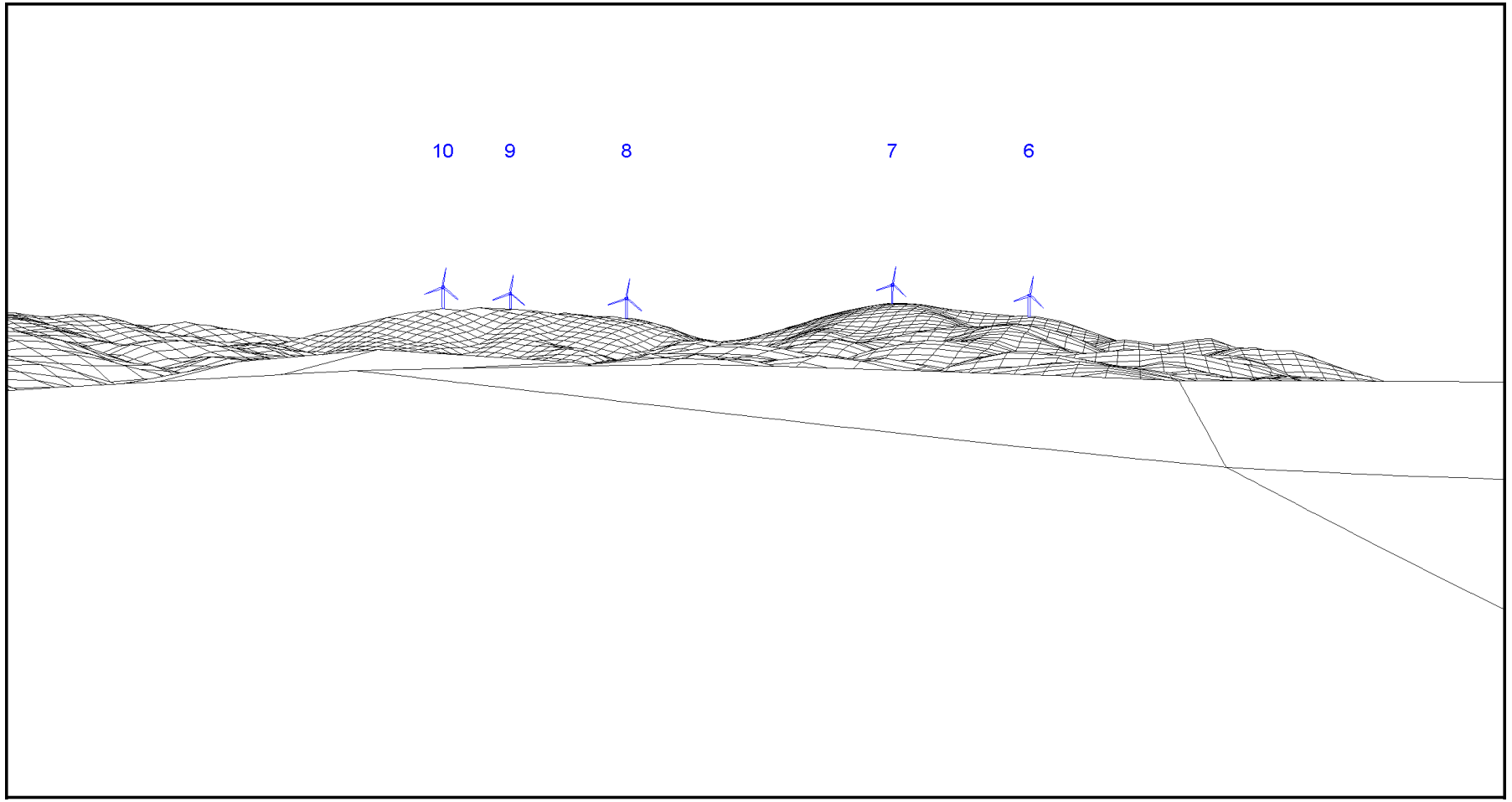


Figure 10.12: AP4 Proposed Wireline during Operation. View direction to Site Centre: 247.1°; Coordinates X: 476,693; Y: 4,447,846; Pitch: 0°

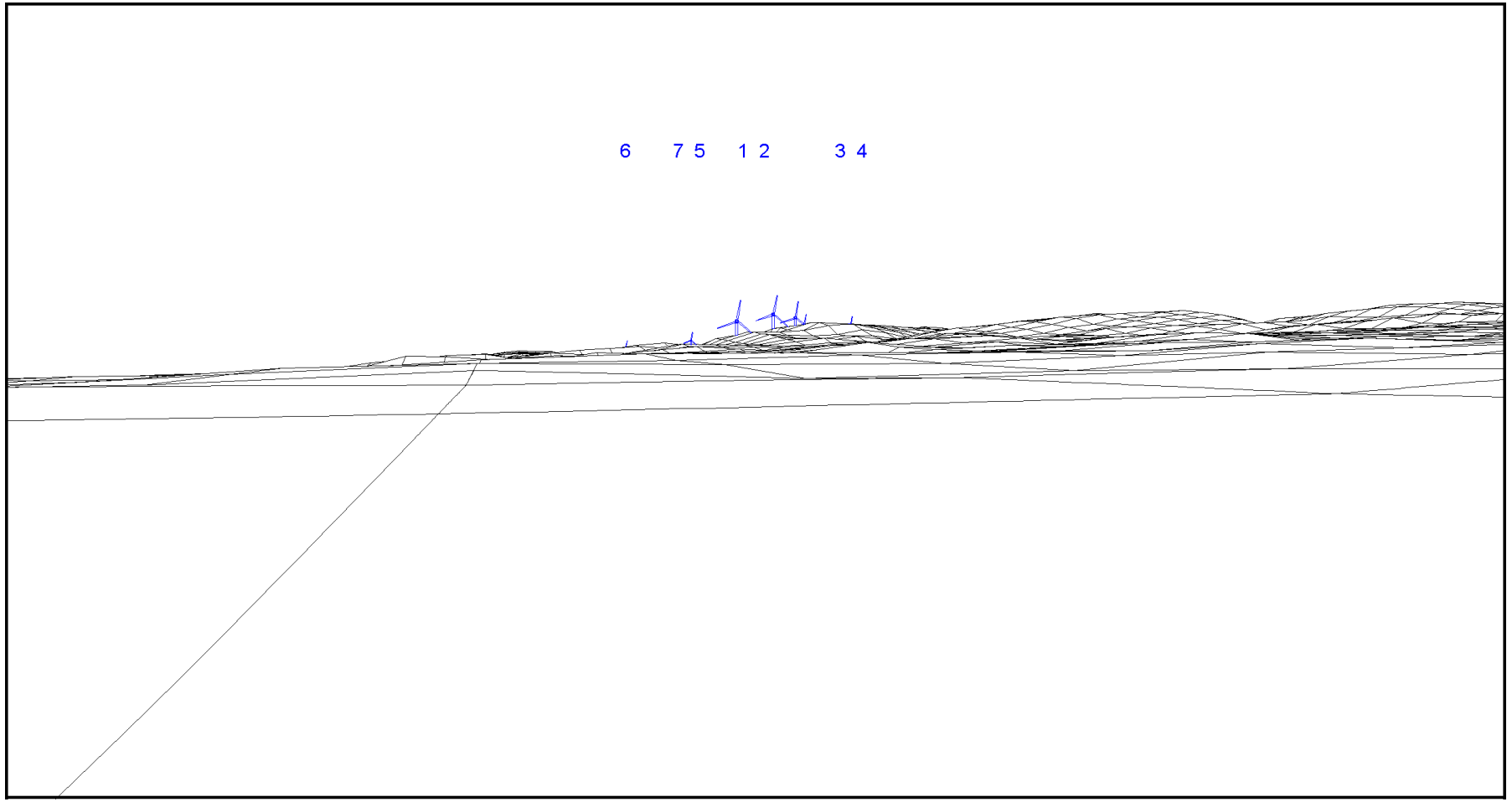


Figure 10.13: AP5 Proposed Wireline during Operation. View direction to Site Centre: 106.2°; Coordinates X: 464,261; Y: 4,448,698; Pitch: 0°.

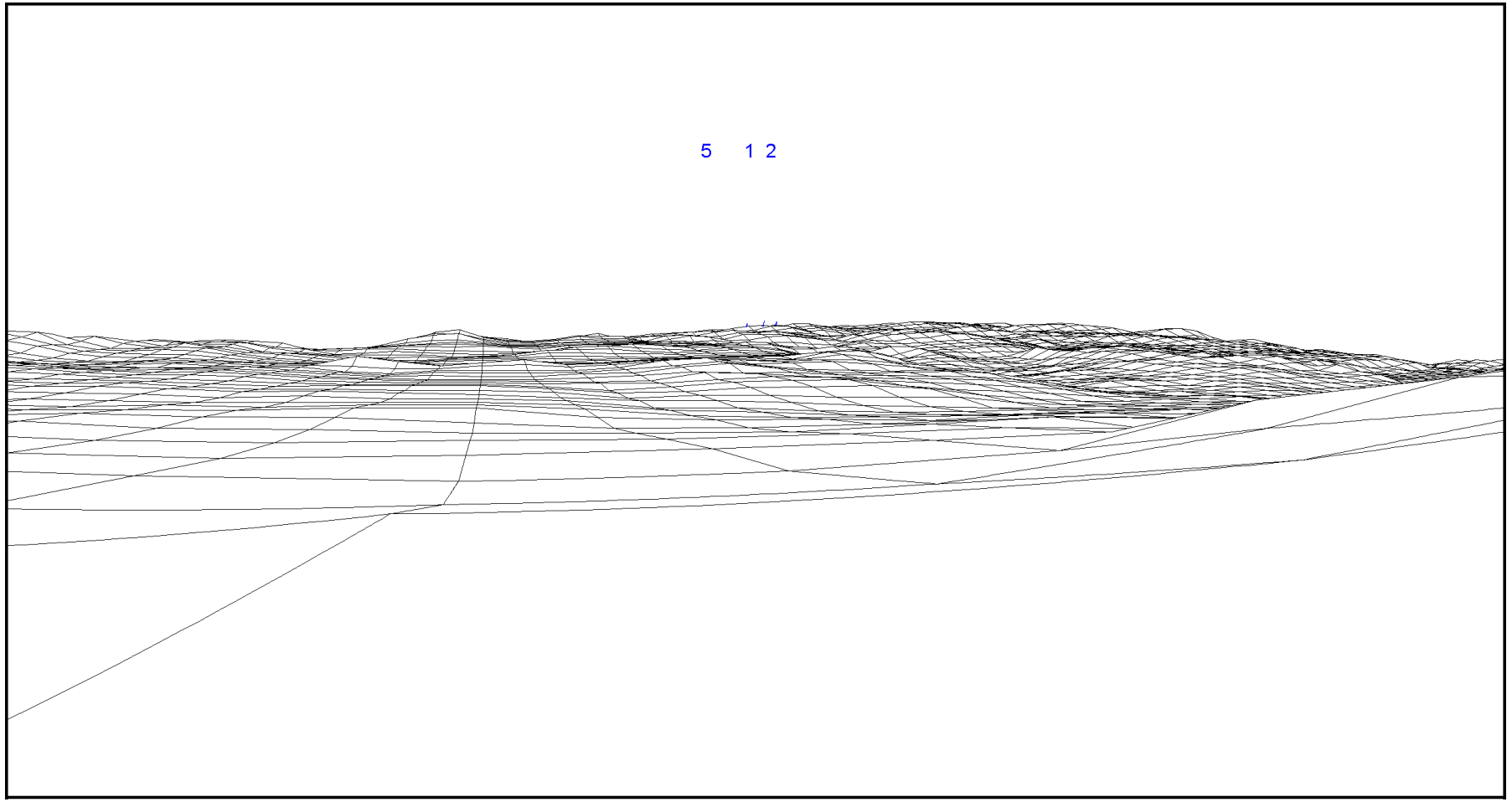


Figure 10.14: AP6 Proposed Wireline during Operation. View direction to Site Centre: 106.2°; Coordinates X: 460,460; Y: 4,449,796; Pitch: 0°.

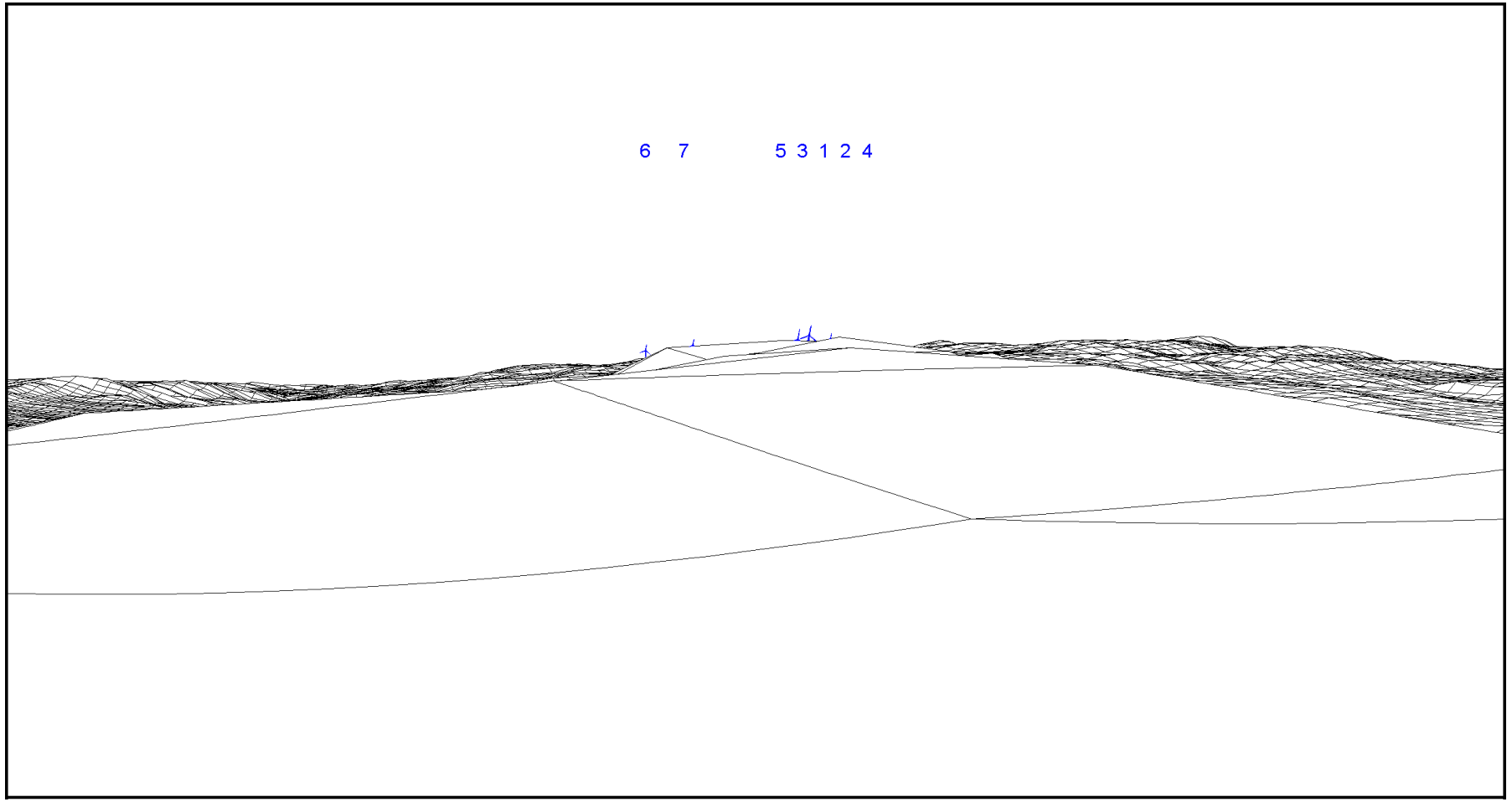


Figure 10.15: AP7 Proposed Wireline during Operation. View direction to Site Centre: 112.3°; Coordinates X: 461,283; Y: 4,450,712; Pitch: 0°.

The satellite view of turbines at the assessment points are presented in Figure 10-16 to Figure 10-19.

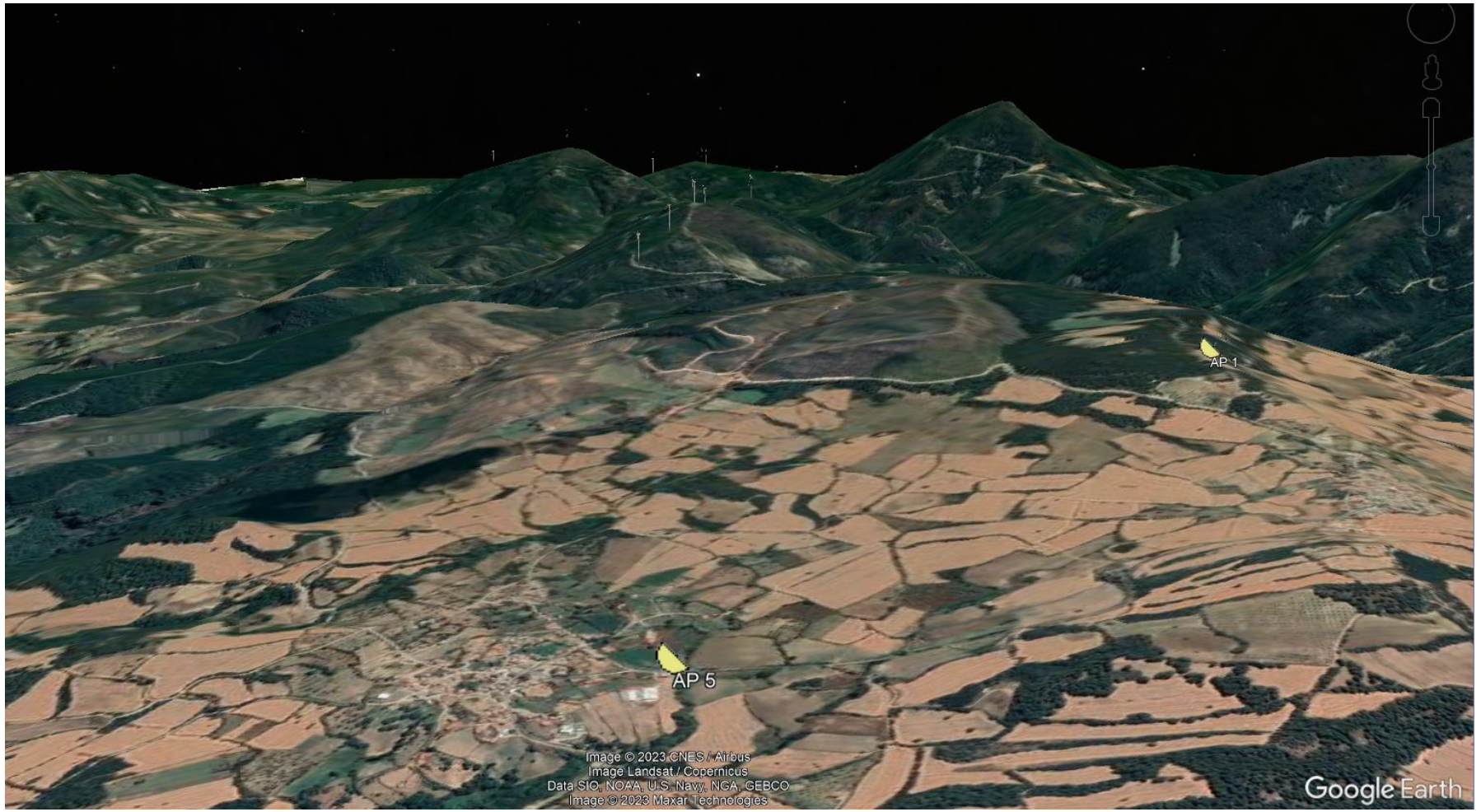


Figure 10-16: Turbine Visibility at Assessment Point 1-5

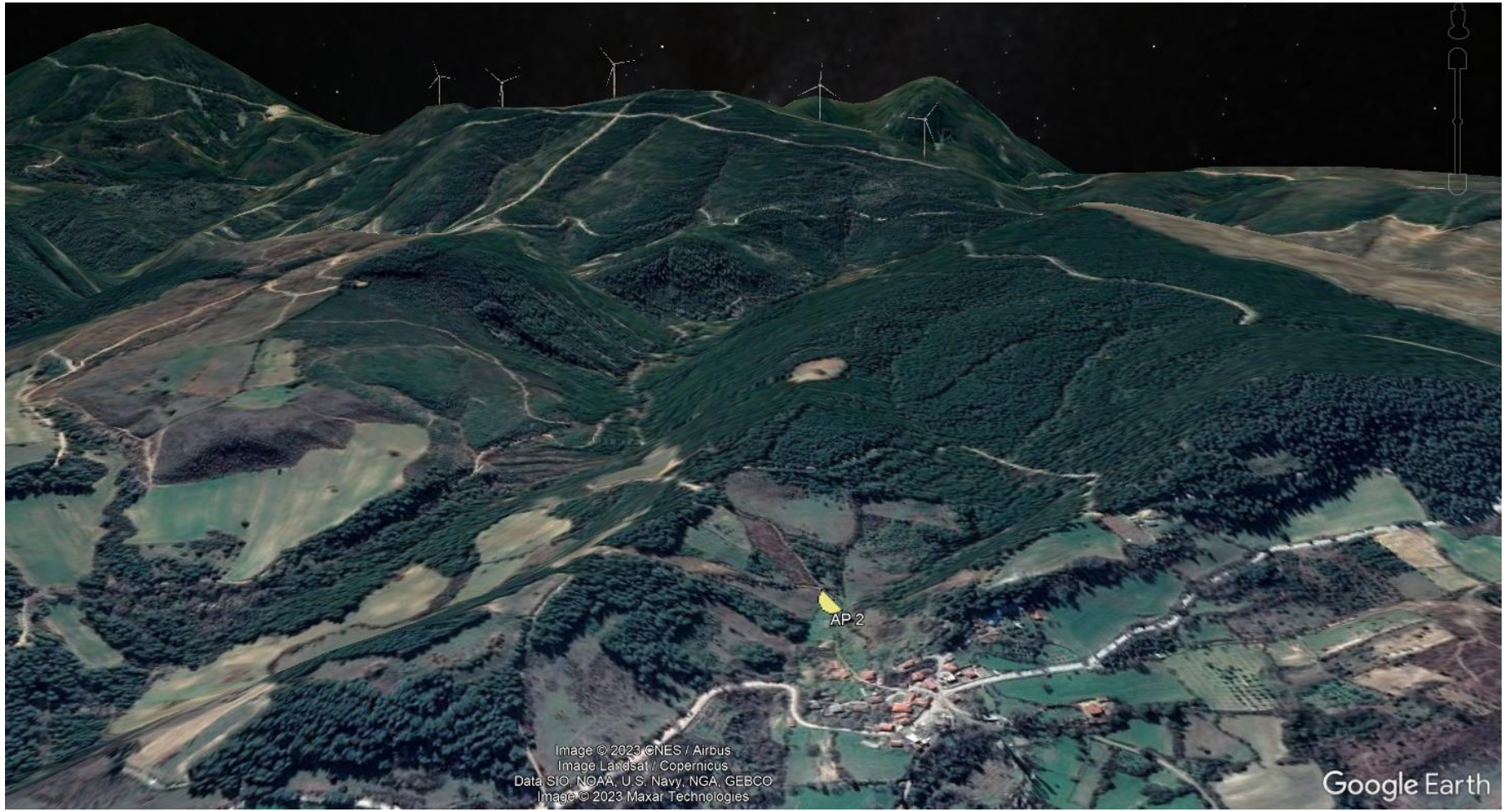


Figure 10-17: Turbine Visibility at Assessment Point 2

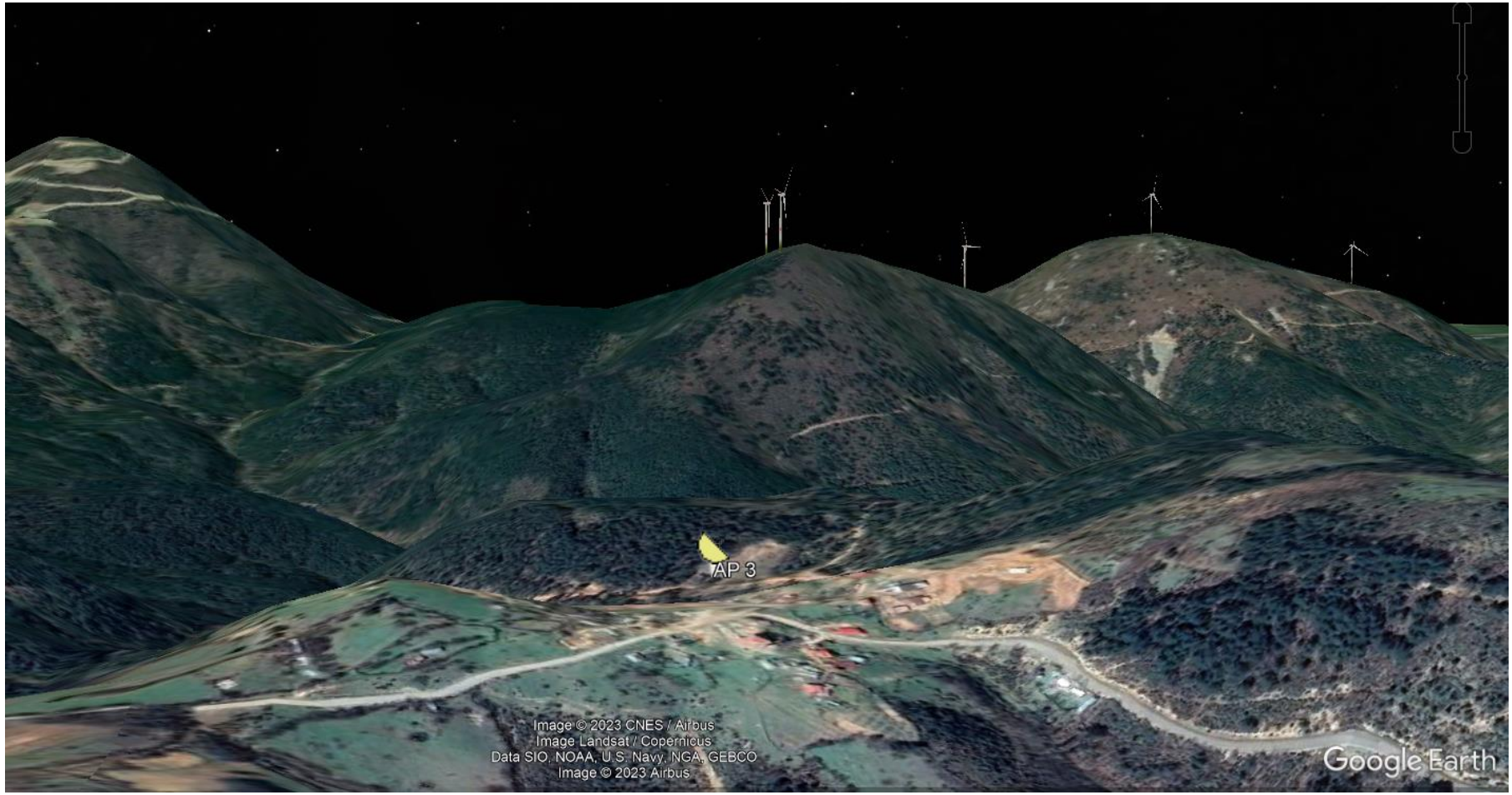


Figure 10-18: Turbine Visibility at Assessment Point 3

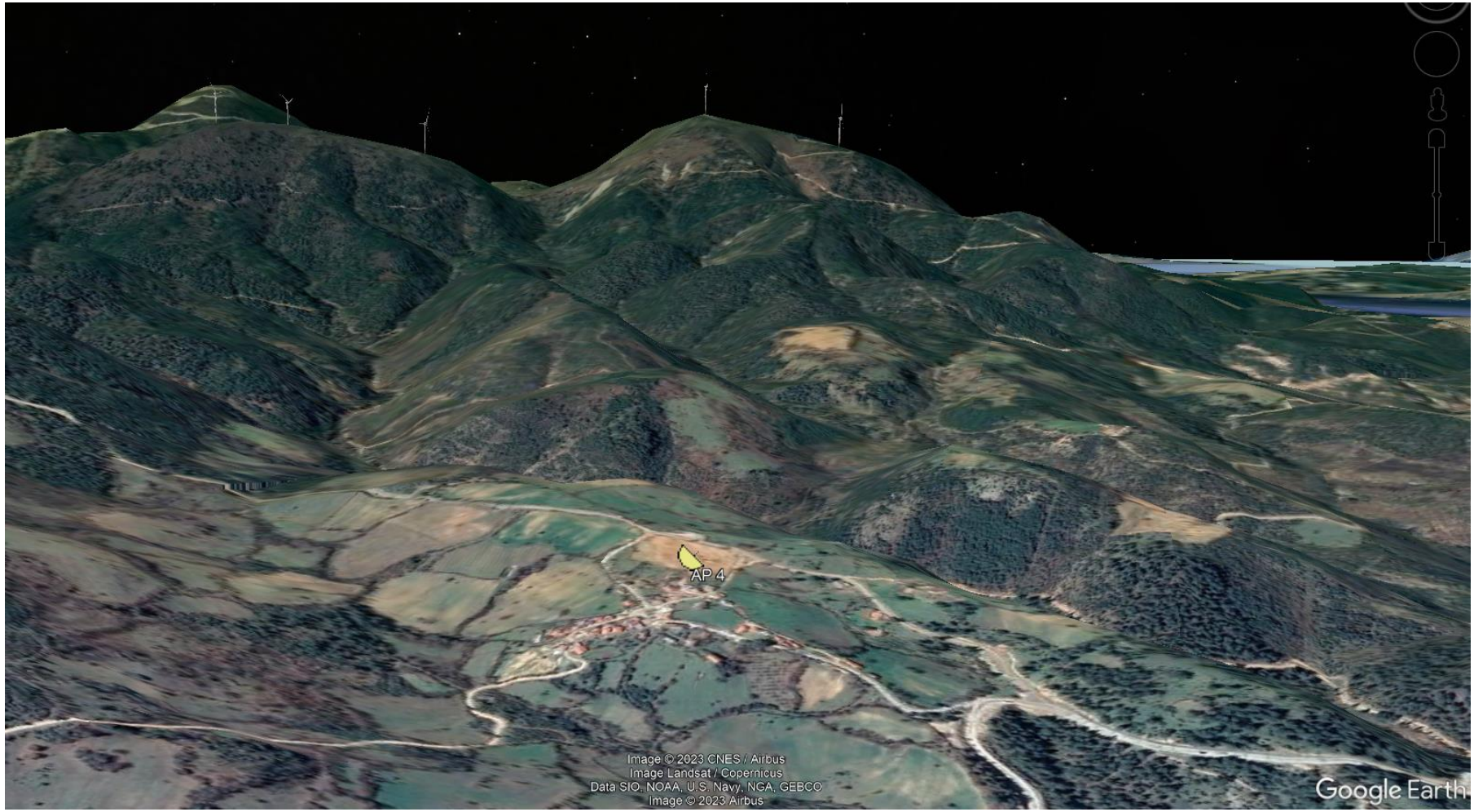


Figure 10-19: Turbine Visibility at Assessment Point 4

10.5 Mitigation Measures and Residual Impacts

In terms of shadow flicker, no impacts have been detected at identified receptors. Thus, no mitigation measures are considered.

11 Waste and Resources

11.1 Introduction

The potential impacts from the use of material resources and waste generation during construction and operation phases of the Project in line with national, international and the Lenders' guidelines, policy and standards are discussed in this Chapter. A description of the material resources that will be required for the construction and operation of the Project and the baseline conditions for the waste and wastewater management have been identified. In addition, management of waste which are anticipated to be generated during construction and operation phases are shared. In terms of waste management, potential impacts include environmental impacts, health and safety impacts to the workers and employees and impacts to the community resulting from the improper waste management during construction and operation phases.

11.2 Methodology

11.2.1 Applicable Guidelines and Standards

Beside detailed regulation, guideline and standards framework shared in *Chapter 3: Legal and Policy Framework*, each chapter presents topic-based policy and legislations. In this chapter, waste and resource related policy and legislations are shared.

11.2.1.1 National Requirements

Environmental Law is the major law required to be followed during the lifetime of the Project and there are pertinent regulations applicable for waste management. During the development stage of the Project, the issues related with waste management are reviewed in detail as per Environmental Impact Assessment Regulation. The waste generated during both construction and operation phase of the Project is managed in accordance with Regulation on Waste Management which sets the general criteria. There are also other regulations required for the management of different waste types including medical waste, hazardous waste, non-hazardous waste and packaging waste.

The wastewater to be generated during the construction and operation phases of the Project is managed in accordance with Regulation on Wastewater Collection and Disposal Systems.

11.2.1.2 International Requirements

International requirements including standards, principles, guidelines, directives and principles and the Lenders' standards and guidelines related to waste and resources management applicable to the Project is shared in Table 11-1.

Table 11-1: International Requirements Relating to Waste and Resource

Requirement	Publish Date/Last Amendment Date
EU Council Directive 2008/98/EC (Waste Framework Directive) on waste and repealing certain Directives	22.11.2008
EU Council Directive 91/271/EEC concerning urban wastewater treatment (1991)	26.10.2022
Regulation (EU) 2020/741 OF European Parliament and of the Council on minimum requirements for water reuse	25.05.2020
EU Commission Directive 98/15/EC amending Council Directive 91/271/EEC with respect to certain requirements established in Annex I	1998
European Commission Environmental Impact Assessment (EIA) Guidelines	2017

Requirement	Publish Date/Last Amendment Date
EBRD Environmental and Social Policy and Performance Requirements (PR)	2019
EBRD Environmental and Social Policy	2019
IFC Performance Standards (PSs) on Environmental and Social Sustainability	2012
IFC Sustainability Framework	2012
IFC Environmental, Health and Safety Guidelines, Wastewater and Ambient Water Quality	2007
IFC Environmental, Health and Safety Guidelines, Water and Sanitation	2007
IFC Environmental, Health and Safety Guidelines, Water Conservation	2007
IFC Environmental, Health and Safety Guidelines, Waste Management	2007
IFC Environmental, Health and Safety Guidelines, Hazardous Materials Management	2007
IFC Environmental, Health and Safety Guidelines, Contaminated Land	2007
IFC Good Practice Note: Managing Contractor's Environmental and Social Performance	2017
World Bank Group, Environmental, Health, and Safety Guidelines Wind Energy	2015
World Bank Group General EHS Guidelines: Construction and Decommissioning	2007

Source: Accessed from the relevant international institutions' websites, the information has been last updated as of 15 November 2023.

11.2.1.3 Project Standards

The Project Company commitments to comply with the national policy and legislations and Lenders' standards and guidelines applicable for waste and resources for the implementation of the Project.

11.2.2 Area of Influence (AoI)

The area of influence encompasses the Project licence area, and its scope may extend to surrounding areas where potential impacts associated with resource utilization and waste generation are assessed. Associated impacts along with their estimated magnitudes are identified within the scope of this Report. The resources or receptors to be directly impacted from the identified resource use and waste generation are also specified. Considering the extent of the AoI, the resource or receptors are including:

- Existing local infrastructure including municipality landfill and excavation disposal facilities, waste transfer stations, relevant waste recycling facilities mentioned in following sections, and wastewater treatment plants,
- Environmental aspects (e.g., soil, groundwater, air),
- The personnel employed during the construction and operation phases of the Project.
- Local residents living in close proximity to the agreed waste disposal facilities and wastewater treatment plants,
- Local residents living along he routes which are used by contractors' vehicles during transferring the material and waste from the site.

11.2.3 Study Methodology

The outcomes of the studies shared in this section is prepared based on the statements of the Project Company, the observations from the site visit and formulated projections with the baseline information.

A site visit was carried out by a team of the Consultant on 28 September 2023 during the pre-construction phase of the Project. During the site visit, the site storage and disposal conditions were investigated together with the representatives from the Project Company. No material storage and significant waste generation were observed during the site visit.

Information regarding the baseline waste and resources was obtained by examining the listed documentation:

- National Waste Management and Action Plan (2016-2023), published in 2017, Ministry of Environment, Urbanization and Climate Change
- Çanakkale Environmental Status Report, 2022, Provincial Directorates of Environment, Urbanization and Climate Change
- Harmancık WPP National EIA Report, 2023, Savra
- Teleconference interviews were conducted by the ESIA Team members with the authority of Provincial Directorate of Environment, Urbanization and Climate Change and Metropolitan Municipality of Çanakkale in the beginning of November 2023.

The assessment within the area of the influence is carried out to identify the potential impacts on ecosystems, communities, and resources due to waste and resource management practices associated with the Project, the necessary mitigation measures are identified accordingly and shared in Section 11.4 and 11.5 and sensitivity/value and magnitude of these impacts on resource/receptors are identified in Section 11.4.3.

11.2.4 Limitations and Assumptions

The limitations and assumptions associated with the study on the waste and resources of the Project are shared below.

- The complexities of the uneven terrain make it challenging to conduct a thorough examination of the site, and the limited time available for site visit restricts the extent of baseline assessment of the entire site. Therefore, the baseline observations related to the site and the findings related to the impact of the Project on the area of influence are constrained.
- Limited availability or accuracy of baseline data related with the resource use such as amount of water consumed and wastewater generated are projected on the reference data and may affect the reliability of impact assessments and the necessity of identified measures.

It is essential to acknowledge these limitations and uncertainties to provide a realistic and transparent assessment. Whilst these limitations and uncertainties should be acknowledged, the assessments were undertaken is valid with a conservative approach taken to consider a worst-case scenario. Despite the limitations due to terrain conditions of the Project site and baseline information regarding waste and wastewater management, the Consultant relied on extrapolation of stakeholder interview results to gain a broader understanding of the overall situation since the neighbourhoods in the scope of the Project have similar baseline characteristics. The extrapolation of results of the teleconference interview with the authorities of the Provincial Directorates of Environment, Urbanization and Climate Change of Çanakkale were extensively utilized to supplement the baseline information in the region of the Project area. The Consultant also established a robust monitoring plan to verify effectiveness of mitigation measures during the construction and operation phases and ensure any deviations from the predicted impacts are promptly identified and addressed, reducing uncertainties associated with the long-term effects of the Project.

11.3 Baseline Conditions

This section provides an overview of the existing waste and resources management infrastructure and procedures in Çanakkale province and in particular for the Project area or the Power Plant.

11.3.1 Resource Management

The construction phase activities include the supply of materials and equipment, preparing waste and wastewater infrastructure, the assembly of the Project's components, and the ultimate disposal of construction waste. The operation phase activities include enabling electricity production and disposal of operation and maintenance waste during the operation period. All identified activities for the construction and operation phases of the Project demand energy and water consumption.

During the National EIA process, the official correspondences were conducted to prepare the Project area in terms of providing necessary resources needed in the construction and operation phases of the Project; accordingly, necessary resources to be provided for the Project are shared below.

- The electricity will be supplied from the national grid or diesel-fired generators to be used in the Project construction area,
- The drinking water will be supplied from dispenser size bottled water, for which the emptied bottles will be collected as recycling materials and sent to licensed companies,
- The utility water will be used during both the construction and operation phase to meet the personnel needs as well as to supress dust generated during construction activities. The utility water, which will be supplied from the licensed water supply contractor, will be delivered by a water truck. The Project Company will ensure that the volumes required are well within the available capacity of the sources permitted to be used by the contractor.
- The water used for dust control will remain within the soil structure, hence generation of wastewater is not anticipated for the dust suppression,
- The sanitary wastewater to be generated for the Project, will be collected in septic tank during the construction and operation phases of the Project and will be emptied by vacuum trucks to be transferred to licensed WWTPs for treatment and subsequent discharge,
- The excavation waste to be generated during the earthworks of the Project will be handled according to the Mitigation Hierarchy. With this regard, to avoid the generation of waste, the excavated material will be used as structural filling material on the access road as well as on turbine pads. The filling process will be carried out according to the suitability of the excavated material and limits of the final zoning planning permission (i.e. maximum permitted road width).

  The materials that cannot be used as structural filling material, which will be classified as excavated waste, will be managed in a way that does not harm the environment and human health in accordance with the Regulation on the Control of Excavation Soil, Construction and Demolition Wastes published in the Official Gazette dated 18/3/2004 and numbered 25406
- The ready-mixed concrete and aggregate will be supplied from the concrete batching plants to be readily used during the construction. The ready-mixed concrete will be delivered by a concrete mixer/transit mixer to the Project area. There are several ready-mixed concrete batching plants in the close vicinity of the Project area.

  It is to be noted that no concrete batching plant will be established in either the Project area and/or in its close vicinity.
- The Project Company shared that necessary overflow and drip containment measures including providing secondary containment will be taken in the hazardous material storage areas and designated hazardous waste storage area. The secondary containment structure will include walls capable of containing the larger of 110 percentage of the largest tank in area with above-ground tanks with a thousand liter or above storage volume totally and will be impervious, chemically resistant material. The preventing the contact between incompatible materials will be also considered in case of releasing of the chemicals. For the flammable hazardous material strorage and hazardous waste storage, flame arresting

devices on vents will be used. In addition to these, transfer of hazardous materials and hazardous waste from vehicle tanks to storage areas and during the oil transfers for maintenance of equipment will be conducted with surfaces sufficiently impervious or spill containment to avoid soil contamination. In hazardous material management, it will be ensured that containment structure will not connect to municipal wastewater collection system. The Project Company will classify the waste as hazardous based on nature and volatility of the waste in accordance with the Waste Management Regulation (OG Date/Number: 02.04.2015/29314) and hazardous wastes will be managed in accordance with the same regulation.

- The Project Company stated that all waste streams to be generated by the Project Company will be disposed of, reused, and treated within Republic of Türkiye, no transboundary trade in waste will be conducted during the implementation of the Project which is line with the current waste management practices onsite as of 2 May 2024.

The baseline conditions including resource consumption and waste and wastewater disposal for the Project was observed by the Consultant during the site visit conducted on 28 September 2023. Construction for the installation of portable containers, a septic tank and a fuel tank has been ongoing. No waste generation and material storage were observed.

11.3.2 Solid Waste Management

According to TurkStat data (2022), a total of 256,932 tonnes of municipal waste is collected in Çanakkale, and majority of the collected municipal waste is being disposed of in sanitary landfills.

Currently, there are two municipal sanitary landfills namely Çanakkale Waste Management Corporation (ÇAKAB) and Gelibolu Peninsula Waste Management Corporation, as described below.

Gelibolu Peninsula Waste Management Corporation;

- The distance from the Project area is 50km to the facility located in Gelibolu district of Çanakkale province,
- The daily capacity is 45 tonne,
- Technically there is currently no capacity for incineration, composting and energy production.

ÇAKAB sanitary landfill;

- The distance from the Project area is 11.5km to the facility located in Central of Çanakkale province,
- The daily capacity is 250 tonne,
- The disposed municipal waste amount has been recorded as 85,435 tonne in 2022[98],
- Technically there is capacity to generate energy from the landfill gas.

It is anticipated that municipal waste to be generated for the Project will be disposed of in ÇAKAB sanitary landfill which could have sufficient technical capability and capacity to have projected waste volumes and convenient accessibility for waste transport. The transportation route from the Project area to ÇAKAB is shared in the Figure 11-1.

[98] *Çanakkale- Lapseki- Umurbey- Kepez-Çardak- İl Özel İdare Kati Atik Yönetim Birliği (ÇAKAB) 2022 Activity Report.* http://cakab.org/wp-content/uploads/2023/05/2022-Faaliyet-Raporu.pdf

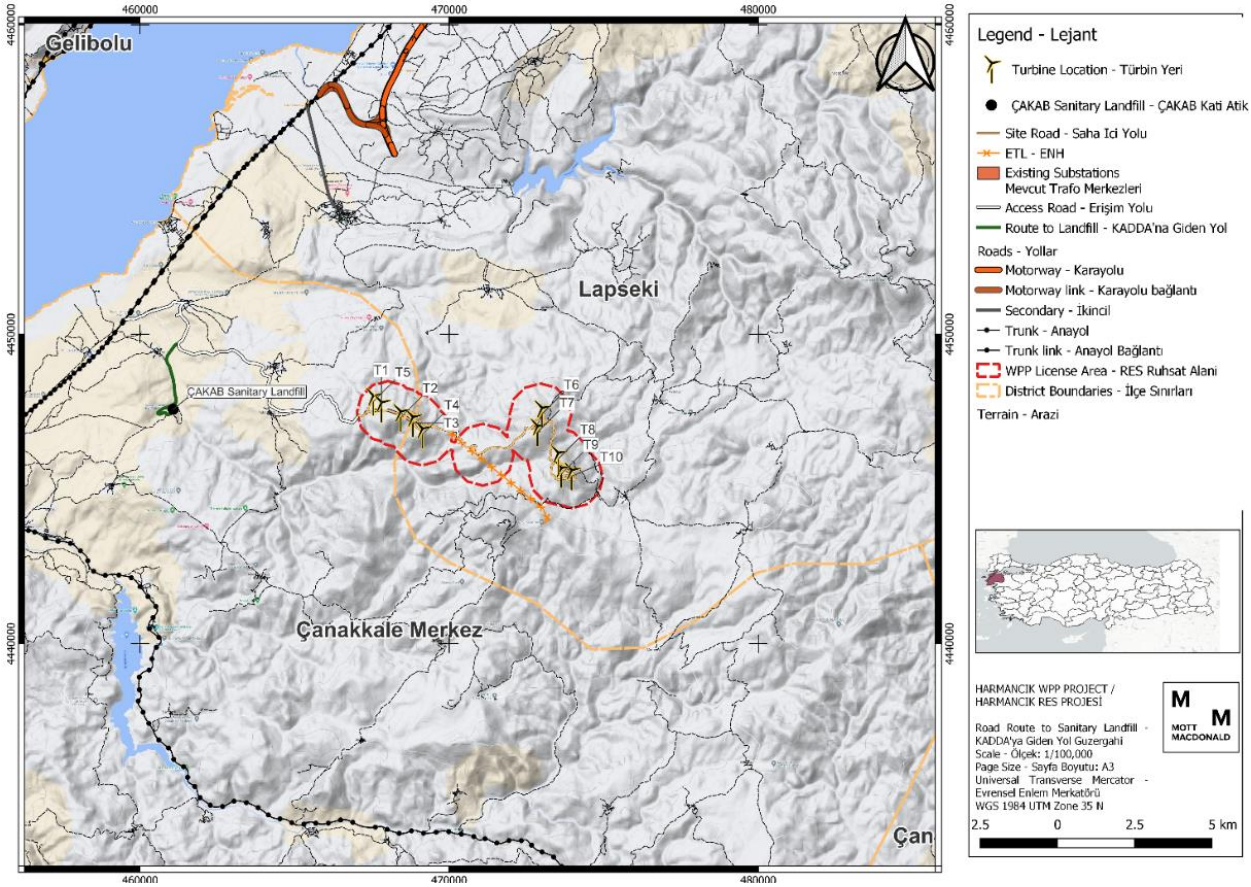


Figure 11-1: The transportation route from Project area to the sanitary landfill (ÇAKAB)

The number and types of waste management facilities for the Çanakkale province are shared below based on information obtained from Environmental Status Report (2022) of Çanakkale:

- There are 22 mobile household waste disposal stations in Çanakkale. Out of all, one located in Central district is used for recycling of the packaging waste, waste electrical electronic equipment (WEEE), vegetative oil waste, waste batteries, and end-of-life tires (ELT), two located in Lapseki district in close vicinity of the Project area.
- There is one licensed hazardous waste recycling facility in Biga district and one temporarily operational facility for hazardous waste management in Kepez district.
- There are four licensed packaging waste collection and separation facilities, and two packaging waste recycling facilities.
- There is one licensed medical waste sterilization facility in the Central district of Çanakkale province.

According to the information shared in Environmental Status Report which is prepared in 2022 for Çanakkale province, no disposal areas have been designated for excavated soil and recycling facility for construction wastes. The Consultant had an interview with the authority of the Ministry of Environment, Urbanization and Climate Change Provincial Directorate of Çanakkale on 24 November 2023 regarding the current excavated soil management in the province. It was stated that the excavated soil is disposed of the disposal areas of the neighbouring provinces, which are in Bursa, Balıkesir and Tekirdağ. Total number of excavated soil disposal areas are 21, 4 and 19 in Bursa, Balıkesir and Tekirdağ, respectively. There is lack of information regarding the locations and capacities of excavated soil disposal areas, except from those in Bursa, in the provincial environmental status reports and on the official

websites of metropolitan and district municipalities. Therefore, an evaluation of the suitability of these excavated soil disposal areas in terms of distance and capacity could not be conducted.

The material that cannot be used as structural filling material, which will be classified as excavated waste, will be managed in a way that does not harm the environment and human health in accordance with the Regulation on the Control of Excavation Soil, Construction and Demolition Wastes published in the Official Gazette dated 18/3/2004 and numbered 25406. For this purpose, theavailable lands within the Proje area will be identified with engagement of the relevant forestry directorate. The lands where no tree is located and can be considered as hollow areas will be filled with mutual agreement with the relevant forestry directorate. Mitigation measures regarding air quality, noise, erosion, water source protection, habitat and livelihood impacts will be assessed separately if any of these lands are considered to be used.

According to the National Waste Management and Action Plan prepared for the period between 2016 and 2023, the capacity expansions in the municipal waste management facilities have been planned for the treatment of the municipal wastes generated in Balıkesir, Bilecik, Bursa, Yalova and Çanakkale provinces in the Marmara Region for the year 2023. These planned capacity increases are given below:

- A total capacity increase to 340 tonne per day for biological processes for separately collected municipal waste,
- The establishment of a mechanical biological process facility, including a composting process, with a daily capacity of 1,000 tonne for mixed municipal waste,

It has been also projected in the National Waste Management and Action Plan for 2016-2023 that 2% of the waste generated in the Marmara Region will undergo biological processing, 11% will undergo Mechanical Biological Treatment (MBT), and 16% will be subjected to thermal processes, and 71% of it is planned to be recycled and disposed of in the sanitary landfills.
Wastewater Management

According to Çanakkale Environmental Status Report 2022, there are 19 licensed wastewater treatment plants (WWTPs). Out of all WWTPs in Çanakkale province, the closest three facilities to the Project area are shared below.

- Çanakkale Advanced WWTP, which is located at 21km to the Project area in Central district with a capacity of 21,750 m^3/day and discharging treated water to Sarı Creek,
- Kepez Biological WWTP, which is located in 31km to the Project area at Kepez district with a capacity of 7,525 m^3/day and discharging treated water to Marmara Sea,
- A wastewater treatment plant is cooperated by Lapseki and Çardak municipalities, which is located at 33km to the Project area, in Lapseki district with a capacity of 5,236 m^3/day and discharging treated water to Ulubay Creek.

The treated wastewater is discharged in accordance with the limit discharge values specified in the national regulation.

It is anticipated that wastewater to be generated for the Project, will be collected in septic tank during the construction and operation phases of the Project; it will then be transferred by the municipality to be discharged to Çanakkale Advanced WWTP, which is the closest WWTP to the Project area and has sufficient technical capability and capacity to have projected wastewater volume.

Total daily capacity of all WWTPs and the total daily wastewater discharged amount by the Municipalities in Çanakkale province are shared in the below table. The local existing WWTPs have sufficient capacity to manage wastewater generated by the Municipalities of Çanakkale province.

Table 11-2: The Capacity of the Local Existing Wastewater Treatment Plants in Çanakkale

Benchmark[99]	Data
The municipal population served by the local existing treatment plants	354,943
The amount of wastewater discharged daily per person (m^3/person-day) by the Municipalities	0.172
The total daily amount of wastewater generated by the Municipalities and received by the WWTPs (m^3/day)	61,051
The total daily capacity of WWTPs (m^3/day)	95,773

11.4 Impact Assessment

11.4.1 Resource Management

The potential impacts associated with the resources to be used, waste and wastewater to be generated during the construction and operation phases of the Project are assessed. The identified impacts, together with mitigation measures to address them, are shared herewith.

- When products are selected during the procurement stage, environmental aspects will be considered, as such;
  - It may initially be cheaper to buy a particular product, but savings could be lost further down the line simply because more waste is generated, or because the waste is harder to recycle or to dispose. It is to be noted that the procurement stage has already been completed as per the Project timeline. However, the Project Company has assured waste minimization by providing examples and measures such that implementing sustainable procurement policy that considers environmental factors when selecting suppliers and procuring materials. This includes preferring suppliers who can prioritize waste reduction, recycling and sustainable practices. This also includes establishing a clear return and exchange policy for materials or equipment that are no longer needed or are surplus to requirements which helped to avoid unnecessary waste.
- The transportation of the purchased materials and equipment could increase the traffic in the Project area.
  - The increase in traffic during the transportation of the purchased materials (e.g., concrete, oils) and equipment more likely to cause a risk of soil, groundwater and surface water contamination in the event of accidental spills of hydrocarbon-based oils and lubricants as well as heavy metals.
- In the extreme weather conditions (e.g., rainfall), the contaminated runoffs are likely to form.
  - The presence of exposed soil stockpiles (e.g., excavation, topsoil) and concrete could pose a risk for high suspended solid loading within surface runoffs during the high intensity precipitation events.
- The construction waste, hazardous waste, non-hazardous waste, and wastewater will be generated associated with the resource use of the personnel during the construction and operation phases of the Project.
  - In case construction and operation waste to be generated by the Project could not be managed in accordance with the applicable standards and national legislation, they could be more likely to cause soil and groundwater contamination.
  - The waste and wastewater to be generated by the Project could increase the load on the capacity of existing local waste recycling/landfilling facilities, excavated soil disposal areas, and wastewater treatment plants (WWTPs).
- There are no excavated soil disposal areas in the Çanakkale province.

[99] TurkStat data, 2020 Municipal Wastewater Statistics

– Excavation waste management is more likely to cause a challenge in terms of finding alternative excavated soil disposal areas and transporting excavation waste to distant disposal areas.

Without a proper local disposal area, there is a risk of improper waste storage in the Project area which can result in soil, groundwater and sediment contamination.

11.4.2 Land Preparation, Excavation and Construction Activities

During the earthworks in the construction phase of the Project, topsoil is collected separately and be stored in turbine platform areas, which will be used for reinstatement purposes post-construction to re-establish green areas. If platform areas are insufficient for storage purposes, temporary storage areas onsite have been determined to be used based on worst-case scenario. It is anticipated that all top soil retained and reused onsite and no topsoil will be exported.

During excavation process in the construction phase of the Project, the soil other than topsoil, which is excavation soil, resulting from the soil loosening activities sized to be reused. The excavation soil will be temporarily stored at turbine platforms to be used for structural filling the Project area.

If reuse of the excavation soil is not feasible due to either, it is not suitable for reuse on-site (excavation waste) or more material is excavated from the Project area than is needed for structural filling (excessive excavation soil), these materials will be stored temporarily in designated non-forest storage areas in the Project licensed area and the additionally bought agricultural land parcels subject to land acquisition onsite. According to the information shared by the Project Company, these lands will be bought on willing seller and willing buyer basis and any physical or economic displacement was not required. Negotiated settlement and expropriation processes are followed within the land acquisitions made within the scope of the Project. However, the economic displacement process has been also evaluated in the LRP prepared in the RAP and PAPs whose livelihoods has been damaged will be compensated with appropriate corrective actions. Also, land acquisitions continue in the remaining parcels. The RAP prepared in this process will be followed and landowners will be approached within the scope of this plan.

If there are no proper number of the agricultural lands to be bought for temporary excavation waste storage, available lands will be identified with engagement of the relevant forestry directorate. The lands, where no trees are present and can be considered as hollow areas, will be filled with mutual agreement with the relevant forestry directorate. For these areas permits from DSI and Provincial Directorate of Forestry and Agriculture will be granted. Unless granting necessary permits including non-agricultural use permit for the temporary use of the bought land areas, the excavation waste will not be stored in these lands.

In addition to the bought/to be bought agricultural lands in the Project licensed area, there may be need to acquire additional agricultural lands off the Project licensed area. For the agricultural lands to be bought offsite, the same actions identified for the agricultural lands bought/to be bought onsite are required to be followed during the acquisition and use of these lands.

It is to be noted that the Project Company shared that the remedy of the non-agricultural use of the lands is planned in order to protect the soil and sustain the natural function of the lands. In the rehabilitation of the lands, the following measures will be taken in accordance with the Regulation on the Control of Excavation Soil, Construction and Demolition Wastes (Official Gazette Date/Number: 18.03.2004/25406). When the excavation waste soil stored there has been disposed of the licensed excavation waste disposal facilities, the modified soil will then to be tested for contamination and the features of the unmodified soil will be provided to the land. The rehabilitation will include restoring the land's natural appearance. Safety of environment will

be ensured in the modified land due to temporary excavation waste storage. Without retaining walls, all slope surfaces will be stabilised in their natural form. If there is a sloping surface in the outer perimeter of the land, strict precautions will be taken against stone and fragment rolls and slides. During rehabilitation, if the slope angles of the tailings are to be changed, the new slope to be given will be at values that will allow the laying of cover soil, the development of vegetation, and prevent erosion and waste from coming to the surface. For the area around the land, water traffic safety will be ensured. In the most intense rainfall conditions of the region, water collection and run-off channels and the surrounding natural drainage system will be planned to be adequate, and adequate measures will be taken against the possibility of flooding of hollow areas. Depending on how the land will be utilised in the future, it will either be afforested or filled with vegatative top cover soil.

The Project Company shared that the duration for the temporary storage for the transferring the excavation waste to the final licensed excavation waste disposal facilities will be completed after Commercial Operation Date. The excavation waste will be transported to the licensed excavation waste disposal facilities located in the neighbouring provinces including Bursa and Balıkesir. The necessary communications and official correspondences will be conducted with the authorities of the Environment, Urbanization and Climate Change Provincial Directorates of Çanakkale. After obtaining relevant directions by the authorities, the tendering procedure for transferring and disposing the excavation waste and storing the excavation waste storage will be followed.

The potential community health and safety risks on the air quality, noise, erosion, water source protection, habitat and livelihood impacts associated with the transfer of the excavation waste, temporary storage of the excavation waste into agricultural areas to be bought, final disposal of the excavation waste to the licensed excavation waste disposal facilities and corresponding mitigation measures will be assessed separately in the Community Health and Safety plan.

In every action taken regarding the excavation waste management, the Regulation on the Control of Excavation Soil, Construction and Demolition Wastes (Official Gazette Date/Number: 18.03.2004/25406) will be adhered ensuring the environment and human health and safety.

Earthworks for 10 wind turbines together with a switchyard, and access and site roads are planned to be completed in 13 months. It is planned to be working 26 days a month, with each working day consisting of 10 hours.

The Project Company estimated cut and fill volumes in earthworks which will be carried out for the construction of the switchyard, roads, and turbines as part of the Project. According to the cut and fill volumes which are estimated and provided by the Project Company, the total cut and fill volumes are 573,215 m^3 and 280,346 m^3, respectively.

The excess excavation soil refers to difference between cut volume (excavation) and the fill volume, and total excess soil volume is calculated on hourly, daily and monthly basis accordingly.

Table 11-3: Excess Excavation Soil Generation

Phase	The expected workdays	Total volume of excess excavation soil	Excess Excavation Soil Generation Rate	
			Period	Quantity
Construction	13 months	292,870 m^3	Monthly	22,528 m^3/month
	26 days/month		Daily	866 m^3/day
	10 hours/day		Hourly	87 m^3/hour

In the worst-case scenario with an assumption that all excess excavation soil could not be reused in the Project area and to be managed as excavation waste, excavation waste

generation rate will be 87 m^3/hour. The frequency of excavation waste to be transferred to the excavated soil disposal areas depends on the distance and capacity of agreed local excavated soil disposal areas and capacity of the turbine platforms in which excavation waste will be stored temporarily. However, the Consultant made a rough estimation on the truck movements to transfer the excavation waste amount in the worst-case scenario. Approximately nine truck movements with a truck capacity of 10 m^3 could be required hourly.

It is to be noted that there are no excavated soil disposal areas in the Çanakkale province. The Project Company will initiate excavation activities only after assessing the capacity and suitability of excavation soil recycling and storage facilities authorized by relevant municipalities and local authorities in accordance with the "Regulation on the Control of Excavation Soil, Construction, and Demolition Wastes (OG Date/Number: 18.03.2004/25406)". This evaluation will inform the proper disposal of excavation wastes in accordance with regulatory guidelines. The load to the existing local excavated soil disposal areas could not be estimated herewith.

In addition to the excavation waste, the construction waste generation is also anticipated. It is specified that preventing the mixing of excavated soil with construction and demolition wastes is essential according to the Regulation on the Control of Excavation Soil, Construction, and Demolition Wastes (OG Date/Number: 18.03.2004/25406). It is also specified that the recyclable construction wastes during the construction phase of the Project need to be managed in the recycling facilities of the municipalities. Non-recyclable construction/demolition wastes, after necessary sorting and size reduction by the facilities of the municipalities, can be used as daily cover material in sanitary landfills, following the principles outlined in the Waste Management Regulation (OG Date/Number: 02.04.2015/29314).

11.4.3 Waste Generation

It is anticipated that a total of 100 and five personnel will work throughout the construction and operation phases of the Project, respectively.

It is to be noted that the total anticipated personnel numbers including the personnel of the subcontractors will work temporarily for the Project. Therefore, waste generation amounts are considering a worst-case scenario by considering total number of personnel

It is planned to be worked 26 days monthly and 312 days annually with each working day consisting of 10 hours for the construction phase of the Project. It is planned to be worked 24 hours daily and 365 days annually for the operation phase of the Project.

- Municipal waste

According to TurkStat data[100], the average amount of municipal waste generated in Çanakkale province per person is recorded as 1.74 kg/person-day. Thus, with the assumption that the general trend is similar, amount of municipal waste to be generated in the construction and operation periods are shared in table below. It is anticipated that 100 workers will work during construction period.

It is to be noted that the total anticipated personnel numbers including the personnel of the subcontractors will work temporarily for the Project. Therefore, waste generation amounts are considering a worst-case scenario by considering total number of personnel as a peak value.

Table 11-4: Municipal Waste Generation

[100] TurkStat 2022 Municipal Waste Statistics. Retrieved from https://biruni.tuik.gov.tr/medas/?kn=119&locale=tr

Phase	Number of Personnel Expected to Work	Average Amount of Municipal Waste Generated in Çanakkale	Amount of Municipal Waste to be Generated[101]
Construction	100	1.74 kg/person-day	174 kg/day
Operation	5		8.7 kg/day

- Packaging waste

Packaging waste is defined as all packaging waste introduced into the domestic market, irrespective of material (plastic, metal, glass, paperboard, composite, etc.) and source (household, industrial, commercial, workplace), as specified on the Packaging Waste Control Regulation (OG Date/Number: 26.06.2021/31523).

According to TurkStat data[102], total collected municipal waste amount is 32,324,472 tonne for 2020 year in Türkiye. For the same year, total amount of packaging waste is 9,448,743 tonne[103]. Thus, with the assumption that the general trend is similar, packaging waste will constitute 29.2% of the total municipal waste in terms of weight also for the Project.

Table 11-5: Packaging Waste Generation

Phase	Amount of Municipal Waste to be Generated	Scale factor	Amount of Packaging Waste to be Generated[104]
Construction	174 kg/day	29.2%	50.8 kg/day
Operation	8.7 kg/day		2.5 kg/day

The packaging waste will be separately managed from other waste streams at the source. It will be collected, stored at separate place in the waste storage area, and periodically delivered to a licensed waste collection company in accordance with the provisions of the Packaging Waste Control Regulation (OG Date/Number: 26.06.2021/31523).

- Hazardous waste

The maintenance and repair processes of machinery and equipment to be used during the construction and operation phases of the Project may potentially generate hazardous waste such as oily rags, empty lubricating oil containers, used filters from machinery, etc.

Hazardous waste generated per person (excluding major mineral wastes) is 36.7 for 2018. Thus, with the assumption that the general trend is similar, hazardous waste to be generated is projected below.

[101] Amount of municipal waste to be generated per day is calculated by multiplying average amount of municipal waste generated in Çanakkale with the number of personnel expected to work for the Project

[102] TurkStat 2020 Municipal Waste Statistics. Retrieved from https://biruni.tuik.gov.tr/medas/?kn=119&locale=tr

[103] The data is sourced from the “2020 Packaging Waste Bulletin” published by Ministry of Environment, Urbanization, and Climate Change, General Directorate of Environmental Management. Retrieved from https://cygm.csb.gov.tr/dongusel-ekonomi-ve-atik-yonetimi-dairesi-baskanligi-i-85475

[104] Amount of packaging waste to be generated per day is calculated by multiplying amount of municipal waste to be generated with the scale factor.

Table 11-6: Hazardous Waste Generation

Phase	Number of Personnel Expected to Work	The expected workdays in a year	Hazardous waste generated per person annually in Türkiye[105]	Amount of Hazardous Waste to be Generated[106]
Construction	100	312 days	36.7 kg/person-year	11.8 kg/day
Operation	5	365 days		0.5 kg/day

Within the framework of the Project, hazardous wastes to be generated such as oil, fuel, empty oil containers, materials contaminated with chemicals including brushes, rags, paint containers, fluorescent lamps, electrical cables, etc. will be segregated and stored in containers marked as "Hazardous Waste". Wastes possessing hazardous characteristics will be stored separately in a designated waste storage area designed to be leak-proof.

For temporary waste storage area, each container will be classified based on its characteristics, with clear indications of whether it is hazardous or non-hazardous, the waste code, the quantity of stored waste, and the storage date.

- Medical waste

The amount of medical waste constitutes of 6.8% of the total hazardous waste amount[107]. Thus, with the assumption that the general trend is similar, medical waste to be generated is projected below.

Table 11-7: Medical Waste Generation

Phase	Amount of Hazardous Waste to be Generated	Scale factor	Amount of Medical Waste to be Generated[108]
Construction	11.8 kg/day	6.8%	0.8 kg/day
Operation	0.5 kg/day		0.03 kg/day

During the construction phase of the Project, 100 personnel expected to be employed. According to the Regulation on Occupational Health and Safety Services (OG Date/Number: 29.12.2012/28512), the employer is required to establish infirmary unit including two rooms to provide occupational health and safety services, appoint occupational health and safety personnel, and ensure basic first aid interventions for emergencies in adequately equipped infirmary unit for 50 personnel and above.

During the operation phase, personnel expected to be employed is below 50; there is no obligation to establish a comprehensive medical treatment unit according to the "Regulation on the Occupational Health and Safety Services" (OG Date/Number: 29.12.2012/28512). However, the employer is required to provide a suitable place for occupational health and safety services to be effectively delivered by the occupational health and safety staff throughout working hours, as per the regulation. A suitable place, capable of providing basic first aid interventions will be

[105] The source of this information is based on the 2018 data from the TurkStat Sustainable Development Indicators (2010+) Report, published in February 2021. It represents the ratio of total hazardous waste per capita, excluding large-volume mineral waste, screening sludge, and contaminated soil. The data is compiled from municipalities, healthcare institutions, manufacturing industrial facilities, thermal power plants, completed infrastructure organized industrial zones, as well as mining and quarrying operations. Retrieved from https://data.tuik.gov.tr/Bulten/Index?p=Surdurulebilir-Kalkinma-Gostergeleri-2010-2019-37194&dil=1

[106] Amount of hazardous waste to be generated per day is calculated by multiplying hazardous waste generated per person with the number of personnel expected to work and diverting it by expected workdays in a year.

[107] According to the information shared in the website of the MoEUCC, the National Waste Declaration System namely "TABS" reported most recent data that 16,388 facilities submitted declarations for a total of 125,566 tons of medical waste in 2020. This figure constitutes 6.8% of the total hazardous waste quantity, excluding mining wastes. Retrieved from https://cevreselgostergeler.csb.gov.tr/tibbi-atiklar-i-85754

[108] Amount of medical waste to be generated per day is calculated by multiplying amount of hazardous waste to be generated with the scale factor.

established for emergencies, although it will not be equipped as a comprehensive medical treatment unit. Therefore, the generated medical waste will be significantly lower than the projected medical waste amount for the operation phase of the Project.

In the event of significant injuries within the Project area, the nearest healthcare facilities will be utilized. In case of minor accidents, medical wastes will be segregated from other wastes, collected in leak-proof medical bags, and transferred with vehicles which have a medical waste collection license to be disposed of local existing medical waste disposal/sterilization facilities that have obtained environmental permits and licenses.

- Vegetable oil waste

During the construction and operation phases, personnel's meals will be provided by contracted catering companies at the campsite, thus generation of vegetable oil waste is not anticipated. Other social activities conducted on-site are also not expected to generate vegetable oil waste.

However, in a worst-case scenario, if vegetable oil waste is generated within the Project area, it is estimated based on Hazardous Waste Declaration System (TABS) data that vegetable oil waste constitutes 0.7% of the total hazardous waste amount[109]. Thus, with the assumption that the general trend is similar, vegetable oil waste to be generated is estimated below.

Table 11-8: Vegetable Oil Waste Generation

Phase	Amount of Hazardous Waste to be Generated	Scale factor	Amount of Vegetable Waste to be Generated[110]
Construction	11.8 kg/day	0.7%	0.08 kg/day
Operation	0.5 kg/day		0.004 kg/day

In the worst-case scenario of vegetable oil waste generation within the Project area, it will be collected in a clean and lidded container, separately from other wastes. Used cooking oils will not be disposed of into sewage systems, soil, water bodies, or similar receiving environments to protect the environment. The disposal of vegetable oil waste will be carried out pursuant to the "Regulation on the Control of Vegetable Oil Waste" (OG Date/Number: 06.06.2015/29378).

- Waste oils

During the construction and operation phase of the Project, the anticipated waste oil types can be identified as hydraulic oil wastes (under the waste code of 13 01), engine, transformers and switchyard lubricating oil wastes (under the waste code of 13 02), insulation and heat conduction oil waste (under the waste code of 13 03), and liquid fuel waste (under the waste code of 13 07) in accordance with Waste Management Regulation (OG Date/Number: 02.04.2015/29314).

According to the TABS, the quantity of waste oil constitutes 3.6% of the total hazardous waste amount[111]. Thus, with the assumption that the general trend is similar, waste oil to be generated is projected below.

[109] According to the information shared in the website of the MoEUCC, the National Waste Declaration System namely "TABS" reported most recent data that a total of 13,008 tons of vegetable oil waste was generated in 2020. This figure constitutes 0.7% of the total hazardous waste quantity. Retrieved from https://cevreselgostergeler.csb.gov.tr/atik-madeni-yaglar-bitkisel-atik-yaglar-atik-piller-atik-akumulator-atik-elektrikli-ve-elektronik-esyalar-omrunu-tamamlamis-lastik-ve-araclar-i-85755

[110] Amount of vegetable oil waste to be generated per day is calculated by multiplying amount of hazardous waste to be generated with the scale factor.

[111] According to the information shared in the website of the MoEUCC, the National Waste Declaration System namely "TABS" reported most recent data that a total of 67,379 tons of waste oil was generated in 2020. This figure constitutes 3.6% of the total hazardous waste quantity. Retrieved from https://cevreselgostergeler.csb.gov.tr/atik-

Table 11-9: Waste Oil Generation

Phase	Amount of Hazardous Waste to be Generated	Scale factor	Amount of Waste Oil to be Generated[112]
Construction	11.8 kg/day	3.6%	0.4 kg/day
Operation	0.5 kg/day		0.02 kg/day

In addition to waste oils to be generated during the activities of the Project, regular waste oil generation is anticipated for the oil changes for machinery in the construction phase of the Project. The Project Company informed that total number of machineries will be 53 including concrete mixer, loader, crane, excavator, truck, generators etc. with an average oil capacity of 5 litre. It is anticipated that oil changes will be conducted four times a year during the construction phase. Thus, amount of waste oil generated during the oil changes of machinery is projected below.

Table 11-10: Waste Generation for the Oil Changes of Machinery

Phase	Number of machineries	Amount of lubricant oil to be used for each machinery per maintenance	Maintenance period	Amount of Waste Oil to be Generated[113]
Construction	53	5 litre	4 times/year	1,060 litre/year

During the operation phase of the Project, periodic inspection for lubrification of wind turbines will be conducted annually, of which any lubricants that have been used up are refilled. For each turbine, 150 litre lubricant is anticipated to be used on the average. For 10 turbines, average waste oil generation due to operation and maintenance works are calculated below.

Table 11-11: Waste Generation for Lubrication of Wind Turbines

Phase	Amount of lubricant to be used	Number of turbines	Amount of Waste Oil to be Generated[114]
Operation	150 litre/year	10	1,500 litre/year

The waste oils to be generated will be managed in accordance with the regulations specified in the Waste Oil Management Regulation (OG Date/Number: 21.12.2019/30985).

- Waste batteries and accumulators

The vehicle accumulator replacement during the construction and operation phases is anticipated to be carried out by authorized external services, accumulation of waste accumulators in the Project area is not anticipated.

During the construction and operation phases, waste batteries to be generated will be collected and sent to licensed firms for proper disposal. In Türkiye, the approximately 4-5 batteries per person is generated annually[115]. Thus, with the assumption that the general trend is similar, waste batteries to be generated is estimated below.

madeni-yaglar-bitkisel-atik-yaglar-atik-piller-atik-akumulator-atik-elektrikli-ve-elektronik-esyalar-omrunu-tamamlamis-lastik-ve-araclar-i-85755

[112] Amount of waste oil to be generated per day is calculated by multiplying amount of hazardous waste to be generated with the scale factor.

[113] Amount of waste oil to be generated per year is calculated by multiplying amount of lubricant to be disposed of annually with the number of machinery and maintenance period.

[114] Amount of waste oil to be generated per year is calculated by multiplying amount of lubricant to be disposed of annually with the number of turbines.

[115] Regional Environment Center (REC) Türkiye. (2016). Waste Batteries and Accumulators Control Regulation: Municipality Application Guidance. Retrieved from https://rec.org.tr/wp-content/uploads/2016/11/apa_rehberi.pdf

Table 11-12: Waste Battery and Accumulator Generation

Phase	Number of Personnel Expected to Work	Number of Batteries Expected to be Generated per Person Annually	Amount of Waste Batteries to be Generated[116]
Construction	100	5 batteries/year-person	500 batteries/year
Operation	5		25 batteries/year

The waste batteries will be collected separately from the other waste streams, in accordance with the relevant provisions of the "Regulation on the Control of Waste Batteries and Accumulators" (OG Date/Number: 31.08.2004/25569) to be transferred to companies engaged in the distribution and sale of batteries or collection points destinated and inspected by municipalities.

- End-of-life tyres (ELTs)

The maintenance and repairs of vehicles used during the construction and operation phase will be conducted at nearby stations located in residential areas. Therefore, the formation of ELTs within the Project area is not anticipated. However, in the case of ELTs generated due to tire shredding, an average of 1 set (4 pieces) of ELTs is expected annually per vehicle.

In the event of an unforeseen circumstance resulting in the generation of the ELT wastes, the "Regulation on the Control of End-of-Life Tires" (OG Date/Number: 25.11.2006/29292) will be adhered to manage ELT wastes. According to the provisions of this regulation, ELTs will be transferred to companies engaged in tire distribution and sales or authorized carriers without storing in the Project area.

- Wind turbines

During the operation phase of the Project, the wind turbines, which cannot be reused, are required to be repaired or disposed of in case of any problem; they will be stored in the turbine platforms temporarily to be transferred to recycle or disposal facilities by the turbine manufacturer.

According to the technical specification of the wind turbines to be used for the Project, the design service life of the turbines is 25 years[117]. The Power Plant is planned to be operated for 49 years. Therefore, the planning before the end-of-life of the wind turbines is important to address necessary measures will be taken for maintaining sustainable operation of the Project. Even the potential impacts associated with the waste generation during the decommissioning phase is scope out of this Report, management of the end-of-life of wind turbines are questioned. The Project Company informed the Consultant that the reuse and/or recycling opportunities for the end-of-life wind turbines will be evaluated by carrying out life cycle analysis in accordance with ISO 14040 standard and considering the local market' needing. Dismantling of concrete tower and installing new wind turbines with site-specific technologies for minimising yield losses and reusing of some dismantled components of wind turbines will be considered therewith.

During the operation phase of the Project, the wind turbines, which cannot be reused, are required to be repaired or disposed of in case of any problem; they will be stored in the turbine platforms temporarily to be transferred to recycle or disposal facilities by the turbine manufacturer. The details regarding the management of waste wind turbine sections will be

[116] Amount of waste batteries to be generated per year is calculated by multiplying number of batteries per person to be generated annually with the number of personnel expected to work.

[117] It is to be noted that the lifetime of the wind turbines, in addition to type of the wind turbine, also depends on the environmental conditions e.g., wind shear, air density and operational conditions e.g., number of shutdowns (Ziegler et al., 2018).

discussed in the decommissioning strategy and further evaluated in the detailed Decommissioning Plan.

11.4.4 Wastewater

The water used for dust suppression will be evaporated, hence generation of wastewater is not anticipated for the dust suppression during the construction phase of the Project.

According to TurkStat (2020 Municipal Statistics), the amount of drinking and potable water is 231 L/person-day for Çanakkale province. It is assumed that the amount of water used will be transformed into wastewater completely. Thus, with the assumption that the general trend is similar, wastewater to be generated is projected below.

Table 11-13: Wastewater Generation

Phase	Number of Personnel Expected to Work	The amount of drinking and potable water	Amount of Wastewater to be Generated[118]
Construction	100	231 L/person-day	23.1 m^3/day
Operation	5		1.2 m^3/day

The domestic wastewater generated at site during the construction and operation phases will be collected in the septic tanks and will be transported via vacuum trucks to the existing local licensed wastewater treatment plants.

The domestic wastewater will be collected in a watertight septic tank structure in compliance with the Regulation on the Construction of Pits for Domestic Wastewater in Locations Where Sewerage System Construction is Not Possible (OG Date/Number: 09.03.1971/13783).

For the construction phase of the Project, approximate dimensions for a septic tank are estimated based on a daily wastewater generation of 23.1 m^3/day and factoring in an 80% filling capacity of a septic tank. The septic tank emptied when it reaches 80% capacity.

The depth of the tank is typically around 2 meters, approximate dimensions for the length and width of the tank could be chosen as 4 and 3 meters. It is assumed that each vacuum truck can remove 20 m^3 of wastewater, approximately two vacuum truck visits will be required daily to transfer this wastewater from site to licensed WWTPs.

These dimensions are preliminary and subject to adjustment as per the above mentioned regulation and considerations related to construction feasibility and available space.

11.4.5 Summary

Assessment of impacts on waste and resources are conducted based on the methodology presented in Section 11.2. Accordingly, the magnitude of each impact is estimated as a factor of the foreseen: geographic extent, duration, reversibility, and frequency of the impact, based on expert's judgement. Sensitivity/value of the associated resource/receptor was determined in consideration of the baseline conditions described in the previous sections and typical descriptor defined in Section 11.3. Specific sensitivity/value criteria considered in assessing the impacts on waste and resources is provided below.

Table 11-14: Waste and Resource Sensitivity/Value Criteria for Resource/Receptors

[118] Amount of wastewater to be generated per day is calculated by multiplying drinking and potable water amount per person, based on the assumption that it is transformed into wastewater completely, with the personnel number expected to work.

Resource/Receptor	High	Medium	Low	Negligible
Local community members / nearby settlements to be affected from Community Health and Safety related concerns by transport of waste from site to waste disposal areas	Local community members are located near the Project Area where can easily, inside WPP License Area	Local community members are located near the Project Area where can easily, close to WPP License Area	Local community members are identified away from WPP License Area (>10 km)	No local community member is identified nearby
The existing local waste and wastewater infrastructure (e.g., waste disposal facilities, waste transfer stations, wastewater treatment plants)	Insufficient local waste disposal facilities including landfills, waste transfer stations, excavation waste disposal facilities	The landfills that are close to their end-of-life	Insufficient existing local wastewater treatment plants in terms of technical capabilities and capacity	Existing local licenced waste recycling/disposal companies for the management of waste types e.g., medical, waste batteries and accumulators
Soil (Contamination)	Nationally and internationally protected areas, areas with ecologically critical habitat status	Lands having national importance, Lands having Class I-II land use capability, residential areas	Lands having Class III-IV land use capability.	Lands having Class V-VIII land use capability, industrial and mining areas.
Groundwater bodies	Project Area is located within groundwater protection zone	Groundwater is being used as major water source by local communities	Limited groundwater is available, city network for water supply is available	No groundwater source is available, groundwater table is too high

Table 11-15: Waste and Resource Magnitude Criteria for Resource/Receptors

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Soil Contamination due to poor waste management	Lands with Class VII & VIII LUC	Minor	Construction	AoI	Reversible	Unlikely	Minor	Low	Minor
Life and Fire Safety vulnerability due to not properly stored waste	Forest Area	Medium	Construction	AoI	Reversible	Possible	Moderate	Medium	Moderate
Poor management of high-volume excavation waste due to insufficient storage conditions onsite and offsite.	Existing excavated soil disposal waste disposal areas of the region and the Project area Local community members / nearby settlements to be affected from Community Health and Safety related concerns by transport of waste from site to waste disposal areas	Medium	Construction	AoI	Reversible	Possible	Minor	Medium to High	Moderate to High
Increase in load on the capacity of existing waste recycling/landfilling facilities	Existing local waste disposal facilities including landfills, waste transfer stations	Medium	Construction and Operation	AoI	Reversible	Occurring regularly under typical conditions	Minor	Low	Minor
Runoff from the exposed soil and concrete stockpiles	Surface water bodies	Minor	Construction	AoI	Reversible	Unlikely	Minor	High	Moderate
Groundwater contamination due to poor waste management	Groundwater	Minor	Construction and Operation	AoI	Reversible	Unlikely	Minor	Medium	Minor

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Increase in the load on the capacity of the existing wastewater treatment plants	Existing local wastewater treatment plants	Medium	Construction and Operation	AoI	Reversible	Occurring regularly under typical conditions	Negligible	Low	Negligible

11.5 Impact Mitigation & Residual Impact

This section presents mitigation measures and residual impacts to manage potential waste and resources related impacts during construction and operation. The mitigation measures have been identified based on the potential impacts identified above. The waste hierarchy will be followed as a methodology when addressing the impacts particularly for the cases where waste generation is unavoidable, it is essential to reuse, recycle and recover secondary raw materials, use them as an energy source or dispose of them in a hierarchical order. The prevention, reuse, recycling, recovery and disposal will be followed hierarchically as most preferred management methods in a given order.

Mitigation during Construction

Following mitigation measures have been identified for sustainable resource management during the construction phase of the Project:

- Using less harmful materials where possible, considering the GHG emissions of alternative materials and considering the impacts of extraction, processing and transport. In particular with source aggregates and materials from quarries operating with valid environmental and other permits and licenses and where the sites are managed in full compliance with all applicable environmental standards and specifications.
- Sourcing materials from local suppliers wherever possible so that construction materials are sourced from locations (material plants/borrow pits etc.) as close as possible to the Project site to minimize impacts related to transport.
- Monitor and manage energy consumption of the mobile crushing and screening machine to minimize the Project's overall environmental footprint.

Techniques for prevention, minimization, and control of waste associated impacts during the construction phase include:

- Hazardous materials to be generated during the construction phase will be properly segregated and stored in waste storage area with appropriate secondary containment.

The excavation waste to be generated during the earthworks of the Project will be handled according to the Mitigation Hierarchy. With this regard, to avoid the generation of waste, the excavated material will be used as filling material on the access road. The filling process will be carried out according to the suitability of the excavated material and limits of the final zoning planning permission (maximum road width)

The material that cannot be used as filling material, which will be classified as excavated soil, will be managed in a way that does not harm the environment and human health is carried out in accordance with the Regulation on the Control of Excavation Soil, Construction and Demolition Wastes published in the Official Gazette dated 18/3/2004 and numbered 25406. For this purpose, temporary waste storage areas will be identified. Within this scope agricultural land parcels will be bought with mutual agreement with the landowners. The lands will be selected according to the land stability and slope. In addition, environmental and social concerns such as air emissions due to material storage, noise generation due to truck movement, community health and safety concerns due to traffic load, impact on habitats and displacement of livelihood will also be assessed. For these areas permits from DSI and Provincial Directorate of Forestry and Agriculture will be granted.

If there are no proper number of agricultural lands to be bought for temporary waste storage, available lands will be identified with engagement of the relevant forestry directorate. The lands where no tree is located and can be considered as hollow areas will be filled with mutual agreement with the relevant forestry directorate. Mitigation measures regarding air quality, noise, erosion, water source protection, habitat and livelihood impacts will be assessed separately if any of these lands are considered to be used.

According to Regulation on the Control of Excavation Soil, Construction and Demolition Wastes published in the Official Gazette dated 18/3/2004 and numbered 25406:

- Excavation Soil and Construction/Demolition Waste Producers are obliged to
  - Obtaining the necessary permits and approvals during the generation, transportation and storage stages of waste,
  - During its activities, to collect, recycle and accumulate waste separately according to its components and not to contain harmful, dangerous and foreign substances in the waste,
  - Before starting the activity, obtain the Waste Transportation and Acceptance Certificate regarding the transportation and storage of waste,
  - Not to dump wastes in places other than recycling or storage facilities permitted by the municipality or local authority,
  - To cover the expenses to be incurred for the management of waste,
  - To compensate for the damage that may occur in accidents that may occur during the generation, transportation and storage stages of waste and to eliminate the pollution that may occur as a result of the accident,
- Activity owners who have an area of at least 2000 (two thousand) square meters outside the construction site can temporarily accumulate the excavated soil in this area for re-evaluation.
- During the extraction of excavated soil, natural drainage systems are protected and measures will be taken against possible erosion. The person/organization carrying out the excavation is obliged to protect the buildings, natural drainage, energy and telecommunication facilities/systems, pavement and road covering next to the excavation area during the removal of the excavation soil, and to take precautions against possible damage and erosion.
- During excavation, topsoil is collected separately from the subsoil. Depending on its depth and structure, it is excavated and piled up for reuse. The place where topsoil will be stored will not have a slope of more than 5%. Losses that may occur during the storage process of topsoil are prevented and the quality of the soil is preserved. If the topsoil will be left exposed for a long time, ensure that its surface is covered with fast-growing plants. Separately collected topsoil is reused in parks, gardens, green areas, agriculture and similar works.
- For large-scale constructions that will result in the generation of more than 2 (two) tons of waste, the activity owner must obtain permission by applying to the relevant municipality within the borders of the adjacent area, to the relevant district municipality in metropolitan cities, and to the highest administrative authority of the locality outside the borders of the adjacent area. The owner of the activity that will carry out the construction/demolition will apply to the relevant municipality/government authority or companies that have received permission/authorized from these authorities to collect and transport waste and ensure that a temporary collection container is placed at the location where the activity will be carried out. The construction operations cannot begin until this container is placed.
- Expenses related to the collection, transportation and disposal of the waste generated are covered by waste producers.

Companies that carry out construction are responsible for reducing construction/demolition waste at the source, reusing, recovering and transporting it to disposal facilities.Techniques for prevention, minimization, and control of wastewater associated impacts during the construction phase include:

- In accordance with the current legislation, the watertight reinforced concrete septic tank project must be reviewed and approved by the relevant administration.

- In the design of septic tanks, provisions published in the Official Gazette "Regulation on Pits to be Constructed in Places Where Construction of Sewage Channels is Not Possible" (OG Date/Number: 19.03.1971/13783) and "Wastewater Treatment Facilities Technical Procedures Communique" (OG Date/Number: 20.03.2010/27527) must be complied with.

Mitigation during Operation

Following resource management practices will be applied for the sustainable operation of the Project:

- Energy management program will be implemented including identification, and regular measurement and reporting of principal energy flows within a facility, definition and regular review of energy performance targets, and regular comparison and monitoring of energy flows with performance targets to identify where action should be taken to reduce internal energy use and maximize energy harness from the wind turbines. Digital energy monitoring and verification, building digitization, automation system, operational set points for Administration Building including a SCADA room and lighting, equipment will be considered.
- Passive efficiency measures (increase the insulation of walls or windows, reduce the need for artificial lighting, maximize opportunities for daylighting and natural ventilation where appropriate etc.) will be considered.
- The reuse and/or recycling opportunities for the end-of-life wind turbines will be evaluated and for the wind turbines, which cannot be reused, are required to be repaired or disposed of in case of any problem; they will be stored in the turbine platforms temporarily to be transferred to recycle or disposal facilities by the turbine manufacturer. Some components of end-of-life wind turbines will be reused as spare parts. Dismantling of concrete tower with site-specific technologies will be applied.
- Regular visual inspection/audits and maintenance programme will be established to minimise break-downs/repairs/replacements and extent life of wind turbines.
- The lifetime of the wind turbines can be prolonged and optimum operation can be ensured by conducting periodic inspections. The periodic inspections required for the power plant are listed below.
  - Inspection on safety relevant components and functions e.g., lightning protection system, pitch and yaw control, anchorage points and safety ladder.
  - Periodic inspection of electrical equipment including radio links, emergency generators, and batteries in the electrical infrastructure system once a year.
  - Comprehensive mechanical maintenance of wind turbines for every four or five years
  - Periodic lubrication, electrical and mechanical maintenance of wind turbines quarterly.
  - Periodic inspection for lubrification of wind turbines will be conducted annually.
- All activities undertaken will adhere to relevant legislation and comply with the applicable national legislation specified in Section 11.2.1 of this Report.

Mitigations during both Construction and Operation

Following mitigation measures have been identified for sustainable resource management during both the construction and operation phase of the Project:

- The existing systems and verification practices (i.e., Procurement Procedure) to identify where the supply is coming from and to limit procurement to suppliers that can demonstrate that they are not contributing to significant conversion or degradation of ecosystems will be a criteria used to evaluate the potential suppliers during the selection process.
- Engaging with suppliers to substitute raw materials or inputs with less hazardous or less toxic materials wherever economically and technically feasible will be ensured.

- Environmental and social performance of a supplier to ensure that materials to be sourced are disposed of with sustainable principles will be assessed.
- Efficient planning of the construction and operation activities to minimize materials and optimizing the use of resources to avoid potential waste will be conducted.
- The Waste and Wastewater Management Plan will be set up to efficiently plan the construction and operation activities for minimizing materials and optimizing the use of resources to avoid potential wastage.
- The periodic desktop duty of care audits to inspect that all waste records/documentation of the Project and their contractors will be maintained in accordance with national requirements; and visiting the principal third party waste transfer and treatment/disposal sites utilised by the Project to verify Project waste is being managed responsibly will be considered in the monitoring actions in the Waste and Wastewater Management Plan.

Techniques for prevention, minimization, and control of waste generated by the employee related impacts during the construction and operation phase include:

- The Project Company, and sub-contractors will be responsible in the construction and operation phase of the Project will work together to facilitate proper waste handling and disposal from the site.
- The Project Company and sub-contractors will segregate and separate the wastes properly to encourage recycling of some useful waste materials.
- Waste collection and segregation area will be established according to the applicable national regulations and international standards. The waste storage area will be organized according to respective waste categories (European Waste Codes).
- Designated waste segregation areas will be used for regular waste removals to ensure waste does not build up on site of works. The non-recyclable portion of waste will be stored in relevant storage areas and collected by the Municipalities to be sent to designated landfill facilities that are operated by the municipality in line with the environmental and safety standards and legislation.
- Hazardous wastes will not be mixed with other solid waste generated and will be managed by way of incineration or landfilling.
- Adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids will be provided.
- Impervious surfaces for refuelling areas and other fluid transfer areas will be used.
- Personnels on the correct transfer and handling of fuels and chemicals and the response to spills will be trained.
- Portable spill containment and clean up equipment on site and training in the equipment deployment will be provided.
- All personnel involved in waste handling will be trained on the waste handling treatment, and disposal techniques. Correct and efficient waste management will only be achieved through rigorous training and education of employees, supervisors and managers.
- Waste and Wastewater Management Plan in accordance with the national and international standards will be developed and implemented. The management plan acknowledges the key waste management practices such as, waste minimization, proper collection segregation, storage, transportation treatment and disposal of the waste, which in turn ensures that the correct disposal procedures are taken, personnel safety is maintained, and environmental harm is minimized.
- Waste minimization will be integrated in the Waste and Wastewater Management Plan of the Project to ensure that waste generation will be the barest possible minimum at source. Accordingly, following strategies are proposed as waste minimization strategies.

  - Purchasing will be restricted to ensure the selection of less wasteful materials as much as possible.
  - The materials and products will be recycled if applicable.
  - Good management and control practice will be applied.
- Proper segregation of waste at source will be implemented for efficient and effective in managing waste and to reduce the quantity of waste requiring treatment prior to final disposal and ultimately reduces the cost of waste treatment/management.
  - Segregation involves putting different classes of wastes into separate and appropriate temporary storage color-coded containers/bags as recommended by the national legislation to allow segregation and collection at the point of generation.
  - Colour coding is done by using colours to differentiate waste classes from one other. Colour coding is one of the efficient ways of achieving segregation of waste and for sorting out items such as paper, plastic, glass and metal for recycling.
  - The packaging would be appropriate for the type of waste involved.
  - All waste bags or containers would be labelled. Basic label information would include type of waste in the container, date of collection and, warning of hazardous nature. Labelling is important to identify the source of the waste or date of generation in case of an accident or improper segregation of the waste, to ensure that the workers responsible for waste management handle the different types of wastes safely.
  - Municipal waste will be separately collected at source (recyclable and nonrecyclable waste). Hence the recyclable portion of the waste (packaging waste) will be separately collected at source, waste load in the waste storage area would be decreased by implementing efficient waste separation methods at source.
- Monitoring: Regular visual inspection/audits for waste management strategies will be performed and audit mechanism will be integrated in the management plans.
  - All waste storage collection and storage areas will be inspected for evidence of accidental releases and to verify that wastes are properly labelled and stored.
  - Regular audits of waste segregation and collection practices will be conducted.
- Recording:
  - Waste generation trends by type and amount of waste generated will be tracked
  - The records of document including amount of waste generated and its destination will be kept.
- The disposal of end-of-life waste oils within the scope of the Project will be conducted in licensed disposal facilities. Additionally, waste oils and solid wastes contaminated with hazardous substances will be sent to licensed hazardous waste disposal facilities for proper disposal. The transportation of waste oils to disposal facilities will be carried out using licensed carriers.
- The Waste and Wastewater Management Plan will be established and implemented to guide and support the management of domestic onsite wastewater (septic tank) protecting the personnel health and the environment by properly treating wastewater before discharged it to the local WWTPs managed by the municipalities.
- All activities undertaken will adhere to relevant legislation and comply with the applicable national legislation specified in Section 11.2.1 of this Report.

Residual Impacts

Residual impacts are those that remain after mitigation and/or enhancement measures have been implemented. A summary of impacts is presented below in

Table 11-16.Although the likelihood of the impacts will greatly be reduced with the application of mitigation, sensitivity of the receptors does not change.

However, the application of mitigation including best practice measures means that the impact associated with the waste and resource management of the Project is reduced to negligible.

As this mitigation would remove the likely risk of runoff from the exposed soil and concrete stockpiles occurring that could affect water resources, any major spillages would be considered an emergency which would require implementation of the emergency spill response plan.

There should be no residual significant effects of waste and resources after the implementation of appropriate mitigation measures.

Table 11-16: Summary of Residual Effects, After the Application of Mitigation

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Soil Contamination due to poor waste management	Lands with Class VII & VIII LUC	Minor	Negligible
Life and Fire Safety vulnerability due to not properly stored waste	Forest Area	Moderate	Negligible
Poor management of high-volume excavation waste due to insufficient storage conditions onsite and offsite.	Existing excavated soil disposal waste disposal areas of the region and the Project area Local community members / nearby settlements to be affected from Community Health and Safety related concerns by transport of waste from site to waste disposal areas	Moderate to High	Negligible
Increase in load on the capacity of existing waste recycling/landfilling facilities	Existing local waste disposal facilities including landfills, waste transfer stations	Minor	Negligible
Runoff from the exposed soil and concrete stockpiles	Surface water bodies	Moderate	Negligible
Groundwater contamination due to poor waste management	Groundwater	Minor	Negligible
Increase in the load on the capacity of the existing wastewater treatment plants	Existing local wastewater treatment plants	Negligible	Negligible

12 Biodiversity

12.1 Introduction

This chapter presents the biodiversity baseline conditions and assessment of potential project impacts on biodiversity, biodiversity risks and impacts pertaining to construction and operation phases, critical habitat assessment and presents high level monitoring and management actions. This chapter is based on rapid field survey, National EIA, national and international databases as outlined in the sections below.

12.2 Methodology

12.2.1 Applicable Guidelines and Standards

12.2.1.1 National Requirements

The primary framework of the Turkish legislation for environmental legislation is the Environmental Law (Law No: 2872). National laws and regulations regarding protection of the habitats and species are listed in Table 12-1.

Table 12-1: National Legislation on Biodiversity

Legislation (Official Gazette Date/Number - Last Revision Date)	National Strategy Documents
Law on National Parks (11.08.1983/18132 - 09.07.2018) Terrestrial Hunting Law (11.07.2003/25165 - 28.10.2020) Law on Animal Protection (01.07.2004/25509 - 13.12.2010) Regulation on the Protection of Wetlands (04.04.2014/28962 - 23.06.2022) Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (27.12.2001/24623 - 20.07.2019) Regulation on Protection of Wildlife and Wildlife Development Areas (08.11.2004/25637) Law on Protection of Cultural and Natural Assets (23.07.1983/18113 - 15.06.2022) Regulation on Collection, Protection and Usage of Plant Genetic Resources (19.07.2012/28358) Law on Fisheries (04.04.1971/ 13799 - 17.02.2021) The Environmental Protection Agency for Special Areas (08.07.2011/ 27988) Environment Law (11.08.1983 / 18132 - 15.06.2022) Forestry Law (08.09.1956 / 9402 - 25.12.2021) Law on Pasture (28.02.1998 / 23272 - 18.01.2019) Law on Coastal Areas Management (17.04.1990 / 20495 - 28.10.2020)	National Plan on on-site Protection of Plant Genetic Diversity (1998) National Environmental Action Plan (1999) National Forestry Program (2004) Climate Change Action Plan (2012) Turkish National Action Plan against Desertification (2015) National Rural Development Strategy (2015) National Biological Diversity Strategy and Action Plan (2019)

12.2.1.2 International Requirements

International agreements, conventions, and protocols regarding protection of the habitats and species are listed below:

- The Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention) (1981)
- The Convention on the Conservation of European Wildlife and Natural Habitats (BERN) (1984)
- United Nations Framework Convention on Climate Change (1994)

- The Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR) (1994)
- International Convention for the Prevention of Pollution from Ships (MARPOL) (1998)
- The UN Convention on Biological Diversity (1997) and Cartagena Protocol on Biosafety (2004)
- Kyoto Protocol (2009)
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1996)
- Paris Agreement (2016)

12.2.1.3 Project Standards

The Project will be realized using the planned financing provided by a group of development finance institutions and commercial lenders, jointly “Project Lenders” and with partial coverage by the German ECA Euler Hermes Aktiengesellschaft (“EH”). The Project Company intends to develop the Project in alignment with the policy and requirements of the Lenders (i.e., EP IV, IFC and EBRD standards).

The international lender standards concerning biodiversity for the Project are represented by the IFC PS6 and related Guidance Notes (6), EBRD PR6 and Guidance Notes (6) as well EP IV.

The impact assessment and critical habitat assessment (CHA) are carried out in accordance with the following international requirements:

- IFC PSs on Environmental and Social Sustainability,
- EBRD’s Environmental and Social Policy and Performance Requirements
- International Union for Conservation of Nature (IUCN) Red List of Threatened Species
- The Birds Directive (2009/147/EC)
- The Habitats Directive (92/43/EEC10)
- Post-construction Bird and Bat Fatality Monitoring for Onshore Wind Energy Facilities in Emerging Market Countries - Good Practice Handbook (2023)

The IFC PS6 objectives can be listed as:

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

Similarly, the EBRD PR6 objectives are as defined below:

- Protect and conserve biodiversity using a precautionary approach,
- Adopt the mitigation hierarchy in the design and implementation of projects with the aim of achieving no net loss, and where appropriate, a net gain of biodiversity,
- Maintain ecosystem services, and
- Promote good international practice in the sustainable management and use of living natural resources.

12.2.2 Study Area and Area of Influence

The Project consists of 10 turbines and their pads, the site and access roads, the switchyard area and the entire length of the ETL and pylons. Although the ETL and pylons are owned and operated by TEİAŞ, the standards of Project Lenders include these structures, along with the site roads and access roads, in impact assessments and subsequent adaptive management and monitoring programmes.

The investigation into the region's ecology was carried out to define an "Ecologically Appropriate Area of Analysis" (EAAA), to determine the presence of features that may qualify for Critical Habitat. The EAAA was identified at a scale indirect area of influence of the Project area, considering large-scale ecological processes. This approach ensures that all potential risks within the Project footprint and surrounding vicinity are taken into consideration.

The EAAA was defined using a combination of water catchments, topographic information, and legally protected areas and/or internationally recognized areas of high biodiversity value information and similar habitat types. Species with a very specific distribution and ecological requirements were taken into account in defining the EAAA.

For the purposes of this Final Draft ESIA, the EAAA for flora and terrestrial fauna (amphibians, reptiles and non-bat mammals) was designated as the wider Biga Mountains Key Biodiversity Area borders, and since the Project is located at the northwest edge of the KBA, a section at the northwest edge of the KBA borders, extending toward the end point of the Project access road was delineated, stopping at the Bursa-Çanakkale highway. Further information regarding the KBA designation is provided under Section 12.3.3. The EAAA for flora and fauna encompasses an area of 516 km^2. The EAAA for flora and terrestrial fauna is shown on Figure 12-1.

For EAAA for birds and bats, the main consideration was bird migration since the Project is located along the Dardanelles routes of migrants. The overall route direction between Lapseki and Canakkale (center) is NW-SE. Therefore the EAAA is a NW-SE oriented approximately 20 km buffer which also encompasses Biga Mountains KBA entirely. The EAAA for birds and bats encompasses an area of 1689 km^2 and is shown on Figure 12-2.

Within the EAAA, an AoI of the Project on biodiversity values was designated. For flora species, since the main expected impact sourace is ground preparation during construction phase, and secondary impacts of habitat degradation during operation, the AoI was designated as extending 2 km from the Project footprint. A similar approach was taken for terrestrial fauna species (amphibians, reptiles, and non-bat mammals) however since these species are more mobile, the AoI was designated as extending 5 km from all Project components. For avifauna (birds and bats), which are highly mobile and migratory, and can utilize much larger territories, the extent of impact needs to be studied in a wider area. The primary expected impact source is due to interactions with moving and electrified Project components. Therefore, an AoI of 15 km was adopted. This AoI also ensures coverage of Project roads which are secondary sources of impact for avifauna. Project AoI for all taxa is shown on Figure 12-3.

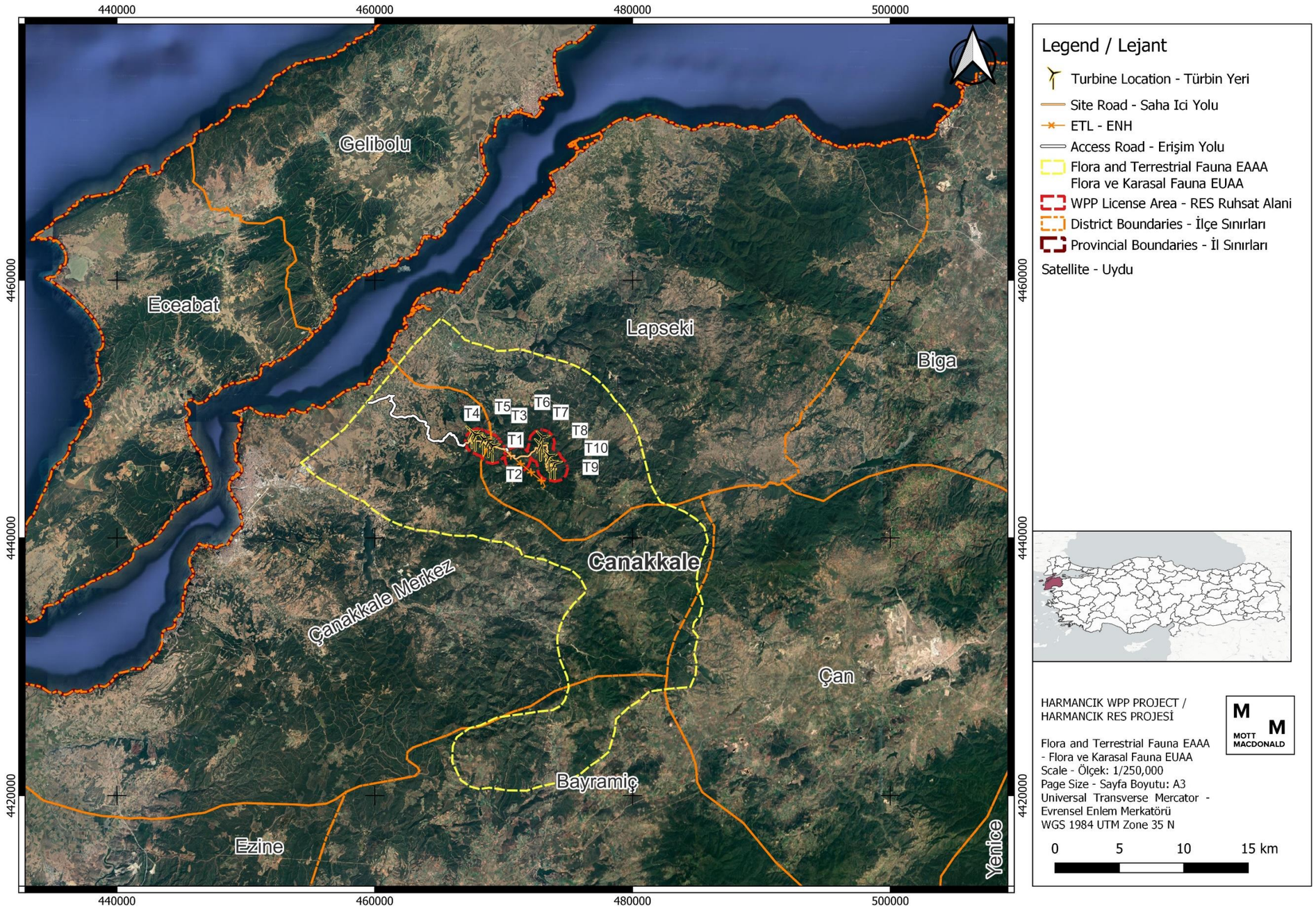


Figure 12-1: EAAA for Flora and Terrestrial Fauna for the Project.

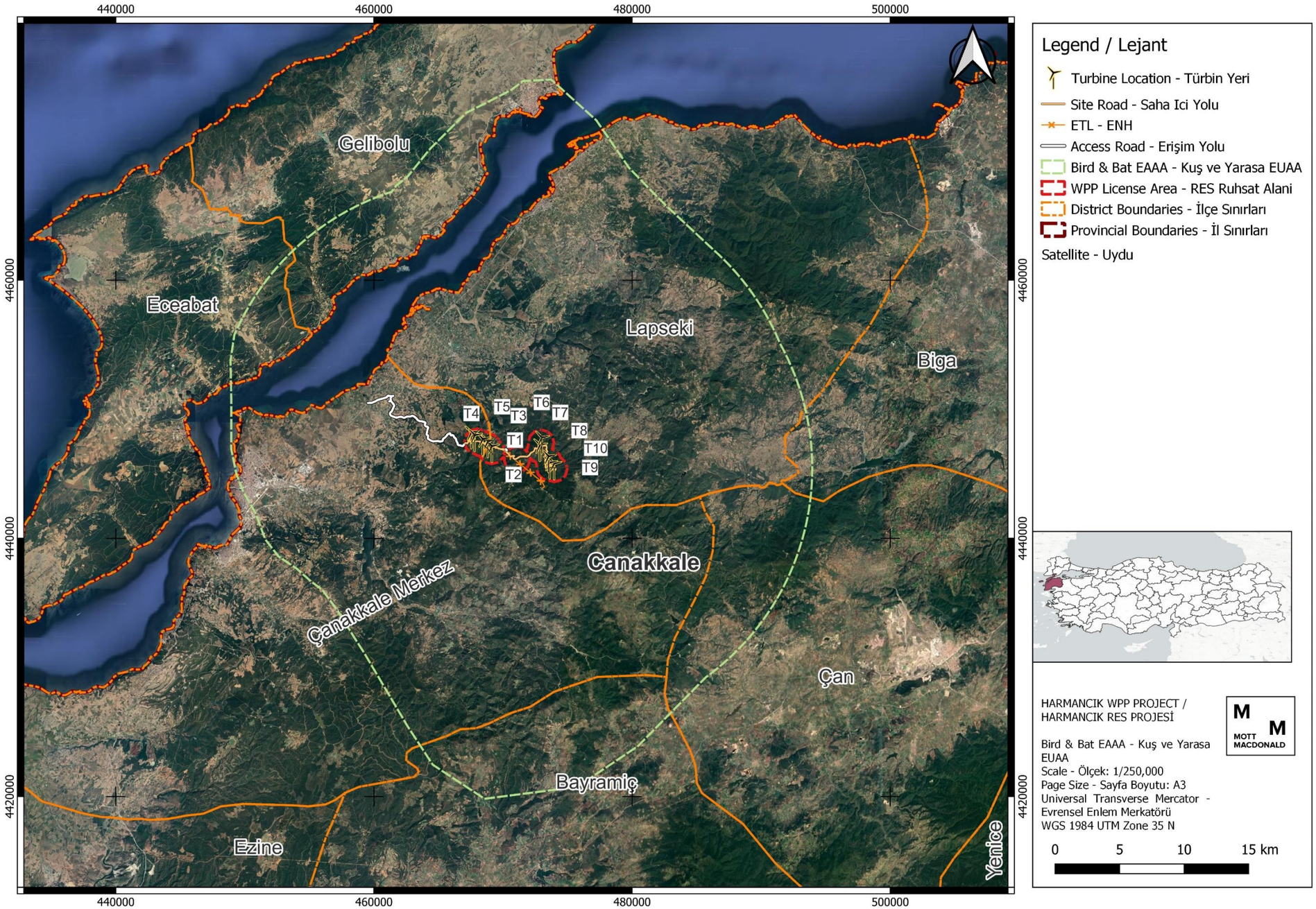


Figure 12-2: EAAA for Birds and Bats for the Project.

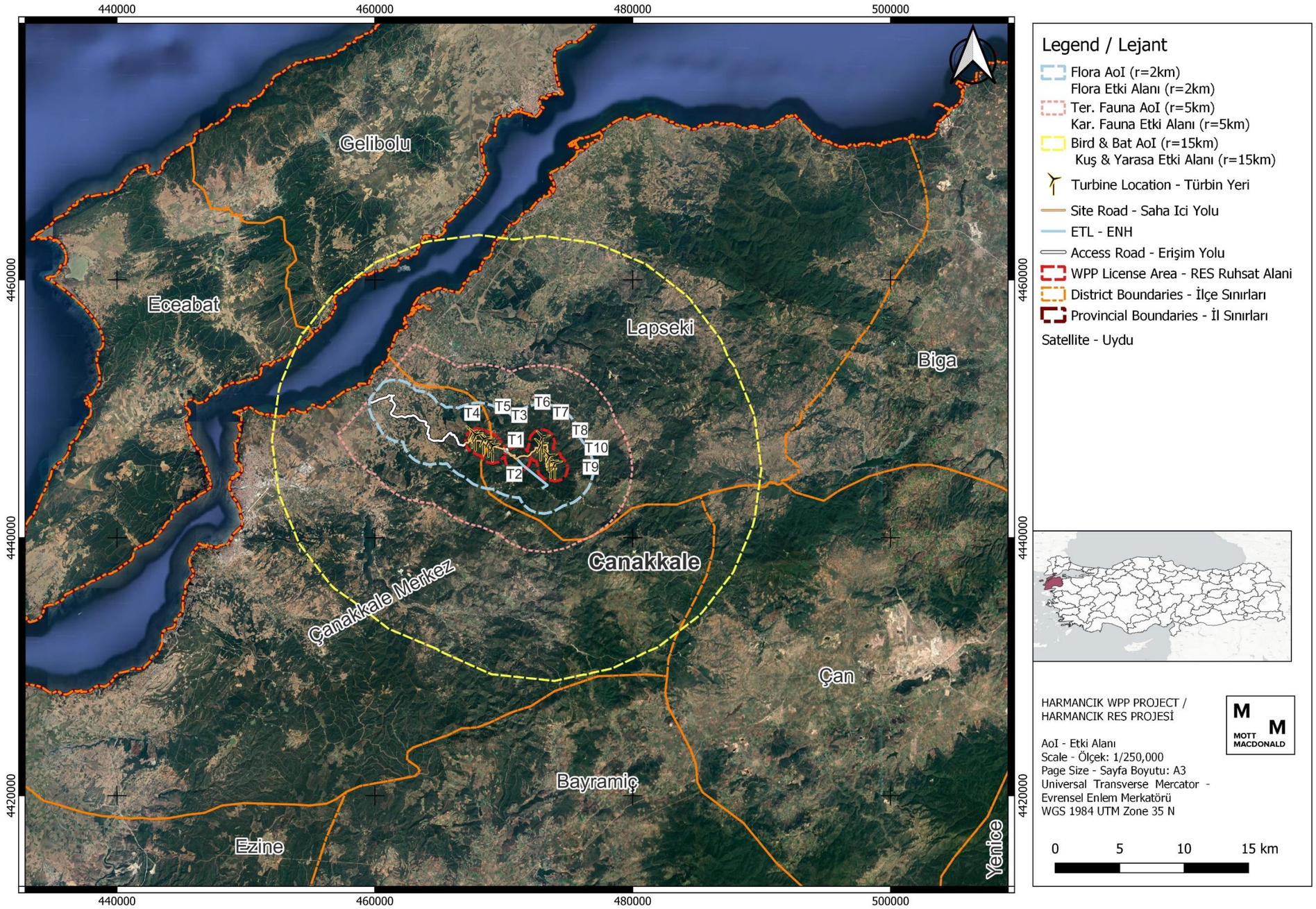


Figure 12-3: AoI for different biological taxa for the Project.

12.2.3 Limitations and Assumptions

The Consultant undertakes the ESIA study given the following important caveats and limitations:

1. **Field survey duration**: A very limited field survey was undertaken which can be described better as a field reconnaissance survey that lasted half a day. Given the limited timescale, it was not possible to undertake the biodiversity baseline surveys for appropriate duration or effort before the completion of the ESIA. The visit was partial due to the following reasons,
    - Access and site roads are only partially accessible by all terrain vehicle,
    - No time was available to cover the site on foot.
2. **Field survey season**: The season (autumn) of the reconnaissance survey was not very conducive to studying the biodiversity features of the Project. Only a general impression of the habitat characteristics was obtained.
3. **Field survey coverage:** Only a limited portion of the Project site was able to be accessed. The entirety of the Project was not visited due to lack of vehicle accessible roads and lack of time to cover the area on foot.
4. **Desktop analysis:** The desktop component relies heavily on National EIA field studies at the Project area. However, the National EIA biodiversity surveys have deficiencies in meeting lender methodology and standards. One of the most significant deficiencies was pertaining to the Vantage Point surveys and Collision Risk Model**.** Additionally, Bat Activity Index is not available.
5. **Critical Habitat Assessment (CHA):** The CHA will not be included in this ESIA and will be presented as a stand-alone document which will enable further revision and refinement as more biodiversity data is gathered
6. **Field surveys proposed:** Present ESIA relies mainly on (1) Desktop components and (2) National EIA surveys which are only considered preliminary. Additional comprehensive field surveys to be undertaken by the Project company are described in Section 12.5.

12.2.4 Baseline Collection Methodology

The baseline collection methodology of this Final Draft ESIA relies primarily on desktop components which are detailed below and the data from field surveys conducted as part of National EIA. The Consultant conducted a brief site reconnaissance visit as well.

12.2.4.1 Desktop Study

A desktop review of the study area comprises the major component of the present Biodiversity assessment. The desktop component was performed perusing the following:

- National EIA report (Flora and Fauna section)
- Relevant publicly available peer-reviewed literature
- White and grey literature
- Public biodiversity databases
  - eBird[119],
  - European Breeding Bird Atlas[120]
  - iNaturalist[121],

[119] URL: Ebird.org. Last accessed: 28 November 2023.
[120] URL: ebba2.info. Last accessed: 28 November 2023.
[121] URL: Inaturalist.org. Last accessed: 28 November 2023.

  - Tramem[122],
  - Trakel[123],
  - Trakus[124],
  - Movebank[125]
  - Global Invasive species database[126]
  - Bizimbitkiler[127]
- Satellite imagery and maps
- Opinions of local biodiversity experts (formal / informal)
- Internationally recognized areas
  - Key Biodiversity Areas
  - Important Bird Areas
- IUCN Red List
- Nationally threatened species
- BERN convention and appendices
- EU Habitats Directive
  - Annex I habitats
  - Annex II/IV species

2 km buffer around the Project footprint is defined as Area of Influence (AoI).

Baseline information on flora and fauna has been collected through ecological surveys conducted within the scope of the National EIA study. Accordingly, the timings of the field studies carried out are given below;

- Flora surveys conducted between 15-23 October 2021 (National EIA).
- Bat surveys were conducted in August 2021, September 2021 and October 2021 for a total of 6 day/nights (National EIA).
- For ornithological surveys, the site was visited between 18 August – 27 September 2021 and 24 March – 7 April 2022, 15 times each period, for unknown effort duration (National EIA).
- For terrestrial fauna (non-bat mammals, amphibians, reptiles), 15-23 October 2021 (National EIA).
- For honeybees and beekeeping, late autumn 2021 and early spring 2022 (National EIA).

12.2.4.2 Field Surveys

Given the limited timescale, it was not possible to undertake the biodiversity baseline surveys during appropriate season before the completion of the Final Draft ESIA study. It was possible to conduct a brief site visit (one day) which can be described as a site reconnaissance visit.

On 29 September 2023, the Project site was partially visited by two biodiversity consultants of Mott MacDonald. Brief point counts for birds and transect walks for flora and terrestrial fauna were conducted.

[122] URL: Tramem.org. Last accessed: 28 November 2023.
[123] URL: Trakel.org. Last accessed: 28 November 2023.
[124] URL: Trakus.org. Last accessed: 28 November 2023.
[125] URL: movebank.org. Last accessed: 28 November 2023.
[126] URL: iucngisd.org. Last accessed: 28 November 2023.
[127] URL: Bizimbitkiler.org.tr. Last accessed: 28 November 2023.

Due to the seasonality (autumn) of the day, the visit only provided an opportunity for general observations about habitat characteristics.

For the ecosystem services aspects of the ESIA, the use and functions of the flora/habitat was recorded. Information on the use of flora is provided by interviews with local people.

If some features were not observed by the Consultant during this visit, it does not necessarily indicate such features are not present and/or abundant.

12.2.5 Determining, Magnitude and Significance for Biodiversity

The magnitude of the potential impacts upon each ecological feature is assessed for the construction and operation of the Project using criteria in Table 12-2.

Table 12-2: Criteria for Determining Receptor Sensitivity (conservation importance)

Conservation Importance (Sensitivity)	Detail	Species Criteria	Habitat or Site Criteria
High	Very high or high conservation importance and rarity, international and/or national scale, or regional scale with limited potential for substitution.	Critically Endangered and Endangered species listed by IUCN. Restricted range species (IUCN classification). Migratory species likely to trigger Critical Habitat (>1% of the global population) Annex IV species designated in the EU Habitats Directive	Internationally recognised areas (IFC PS6 definition) and nationally designated sites in IUCN categories I and II. All areas of potential Critical Habitat (IFC PS6 definition). Natural Habitats of international and/or national conservation importance and/or high biodiversity, with limited potential for substitution. Annex I priority habitats designated in the EU Habitats Directive
Medium	Medium conservation importance and rarity, regional scale with good potential for substitution.	Vulnerable species listed by IUCN. Nationally protected species or rare species. Endemic species. Migratory species that do not trigger Critical Habitat (<1% of the global population) Annex II species designated in the EU Habitats Directive	Nationally designated sites in IUCN categories III-VI or with no equivalent IUCN category. Regionally important Natural Habitats. Natural Habitats which do not classify as Critical Habitat. Endemic Bird Areas (EBAs) Annex I habitats (non-priority) habitats designated in the EU Habitats Directive
Low	Low conservation importance, local scale.	IUCN Near Threatened and Least Concern species. Species of no national importance (threat and/or protection).	Sites designated at local level (no IUCN category). Undesignated sites and Natural Habitats of some local biodiversity and cultural heritage interest. Modified Habitats with limited biodiversity value. Artificial and converted habitats (e.g artificial water bodies, plantations, agricultural crops).
Negligible	Very limited ecological importance.	N/A	Hardstanding, bare ground and buildings.

The significance of biodiversity impacts is determined through consideration of conservation importance (sensitivity) of Project affected biodiversity features (biodiversity receptors), and the magnitude of the impact experienced by them. The significance matrix on Table 12-4 is used to assess the construction and operation phases of the Project.

Table 12-3: Criteria for Determining Magnitude

Category	Description (adverse impacts)
Major	Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature and requiring significant intervention to return to baseline; would violate national standards or GIIP without mitigation.

Category	Description (adverse impacts)
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but minor change to the specific conditions assessed.
Negligible	No perceptible change to the specific conditions assessed.

Table 12-4: Criteria for determining impact

Sensitivity	Magnitude						
	Adverse			Neutral	Beneficial		
	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
High	Major	Major	Moderate	Negligible	Moderate	Major	Major
Medium	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Negligible	Negligible	Negligible	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

12.3 Baseline Conditions

12.3.1 Biodiversity of Türkiye

Being located at the cross-roads of Europe, Asia and Africa, given the peculiar positioning of Anatolia as a peninsula and the variety of geographical features, grants Türkiye a significant place in global biodiversity.[128] Conversely, Türkiye has been and is one of the countries that has been on the fastest track for ecosystem collapse and biodiversity loss.[129]

Türkiye is home to the richest flora of any country in the temperate zone with high level of endemism, numerous globally threatened species of animals, major and minor bird migratory flyways and two significant migratory bottlenecks with counts of large soaring species totalling 750 thousand [130], along with populations of threatened bat species and bat migratory flyways.

12.3.2 Legally protected and internationally recognised areas

Harmancik WPP, including its ETL and parts of the access road, is located within Biga Mountains Key Biodiversity Area (KBA), code MAR009, which consists of woodland (mainly *Quercus* and *Pinus* sp), maquis, grassland, and agricultural land, and running and standing freshwater features.[131] Project site in relation to the KBA is shown on Figure 12-4. The KBA was designated with a focus on flora species and the plant species are trigger for the KBA; *Crocus candidus* (VU) and *Galanthus trojanus* (CR). [132] Parts of the access road also overlaps Dardanelles Strait KBA, however the access road makes use of existing roads through the KBA.

[128] Turkey's Nature | Key Biodiversity Areas of Turkey (keybiodiversityareasturkey.org)

[129] https://epi.yale.edu/epi-results/2020/component/bdh. Accessed on 10/11/23.

[130] IKGT, 2010. Unpublished.

[131] Eken, G., Bozdogan, M., Isfendiyaroglu, S., Kilic, DT., Lise, Y. (editors) 2006. Turkiye'nin Onemli Doga Alanlari (Key Bidoversity Areas of Turkiye). Doga Dernegi (BirdLife Turkey). Ankara.

[132] Key Biodiversity Areas Partnership (2023) Key Biodiversity Areas factsheet: Biga Mountains. 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, Re:wild, NatureServe, Rainforest Trust, Royal Society for the Protection of Birds, World Wildlife Fund and Wildlife Conservation Society. Downloaded from http://www.keybiodiversityareas.org/ on 02/11/2023.

KBAs are internationally recognised areas that currently do not have legal protection in Türkiye but are widely used for various conservation aims. Biga Mountains KBA does not have any national protection status.

Very importantly, Türkiye's KBA inventory is being re-evaluated for a long due overhaul by a team of experts led by BirdLife Turkiye at the time of writing this report (late 2023). The revised KBA inventory is expected to be published late 2024.

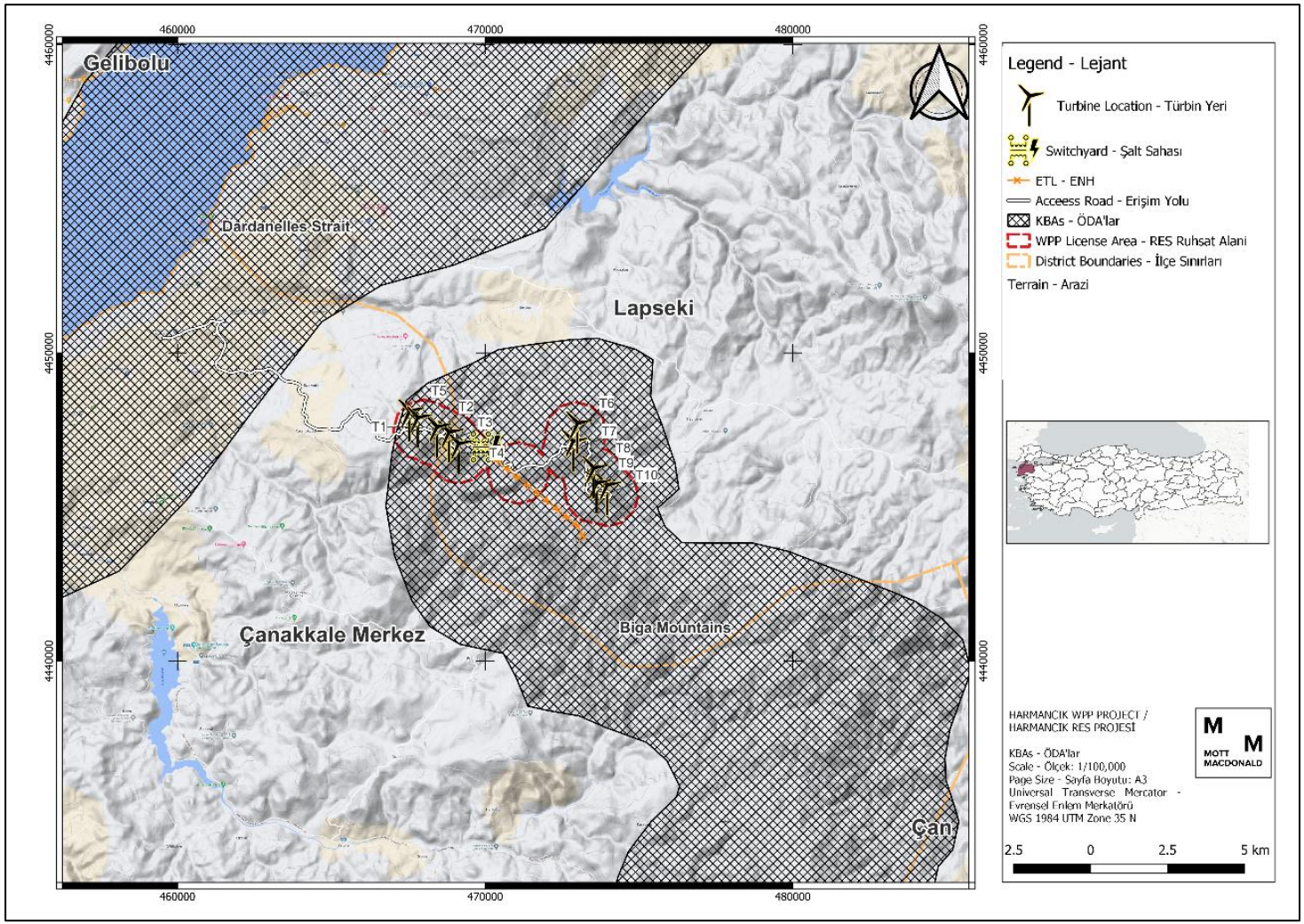


Figure 12-4: Location of the Project and Biga Mountains KBA

12.3.3 Habitats and Flora

The turbine pads, substation and the turbine roads are located between the villages Yukariokcular and Ucpinar, in Canakkale province, most of the Project area being in woodland. The proposed ETL route extends south-east from the substation for about 4 km traversing down the forest to the substation of the nearby Ucpinar WPP. The access road extends roughly 10 km from Bursa Canakkale motorway through existing village roads connects to the western side of the Project. Turbine sittings are located between 450-750 m elevation, with east-west extension of roughly 7 km and north-south extension of 2 km.

The study area contains suitable habitats for endemic species that trigger the KBA criteria; Crocus candidus (VU) and Galanthus trojanus (CR). *Crocus candidus* (VU) was recorded from the field in the National EIA study. Other local and regional endemics are also indicated, such as *Verbascum hasbenlii, Verbascum lydium var. heterandrum, Feulago trojana, Cirsium balikesirense, Centaurea olympica, Campanula lyrata subsp. lyrata, Stachys tmolea, Thymus zygioides var. lycaonicus.*

According to the information obtained in line with the opinions of biodiversity experts working in the region, rare local endemic *Paeonia mascula subsp. bodurii* was observed at an adjacent WPP but was not observed during National EIA studies or site reconnaissance conducted by the Consultant and was ruled out for the Project.

National EIA flora surveys were conducted on 15-23 October 2021. Although the survey dates do not reflect seasonally suitable periods, the species list given is satisfactory.

The recorded habitats are listed in the Table 12-5 below, along with their wide distribution areas within the study area and Figure 12-5 shown the determined habitat types in AoI. The amount of habitat lost due to site roads, turbine footprints, ETL and switchyard area are given in Table 12-5 through Table 12-9.

Table 12-5: Habitat Types of the Project AoI

Broad habitat type	EUNIS Habitat Type	Extend within Project AoI (ha)	Percentage (%)
Woodland	G1.3 Mediterranean riparian woodland	175.6282	1.75%
	G1.7 Termophilus deciduous woodland	1412.447	14.04%
	G3.5 Pinus nigra Woodland	3551.333	35.31%
	G3.7 Pinus brutia woodland (Lowland to montane Mediterranean Pinus woodland (excluding Pinus nigra))	122.578	1.22%
	G3.F Highly artificial coniferous plantations	2111.937	21.00%
Maquis	F5.2 Maquis	90.55021	0.90%
Inland unvegetated or sparsely vegetated habitats	H3.6 Weathered rock and outcrop habitats	31.18492	0.31%
Agricultural Areas	I1.1 Intensive unmixed crops	2357.264	23.44%
	I1.3 Arable land with unmixed crops grown by low-intensity agricultural methods	171.7301	1.71%
	I2.2 Small-scale ornamental and domestic garden areas	32.96199	0.33%

Table 12-6: Habitat Loss on Site Roads

EUNIS	Area (ha)	Percentage
G1.7 Termophilus deciduous woodland	5.25	0.3715%
G3.5 Pinus nigra Woodland	3.36	0.0947%
G3.F Highly artificial coniferous plantations	7.33	0.3469%
H3.6 Weathered rock and outcrop habitats	0.26	0.8472%
I1.1 Intensive unmixed crops	0.00	0.0000%
Total	**16.20**	

Table 12-7: Habitat Loss on Turbine Footprint

EUNIS	Area (ha)	Percentage
G1.7 Termophilus deciduous woodland	4.86	0.3442%
G3.5 Pinus nigra Woodland	3.57	0.1005%
G3.F Highly artificial coniferous plantations	6.72	0.3183%
H3.6 Weathered rock and outcrop habitats	0.00	0.0000%
I1.1 Intensive unmixed crops	0.00	0.0000%
Total	**15.15**	

Table 12-8: Habitat Loss on Switchyard Area

EUNIS	Area	Percentage
G1.7 Termophilus deciduous woodland	0.00	0.0000%
G3.5 Pinus nigra Woodland	0.00	0.0001%
G3.F Highly artificial coniferous plantations	1.20	0.0567%
H3.6 Weathered rock and outcrop habitats	0.00	0.0000%
I1.1 Intensive unmixed crops	0.00	0.0000%
Total	**1.20**	

Table 12-9: Habitat Loss on ETL

EUNIS	Area (ha)	Percentage
G3.F Highly artificial coniferous plantations	10.64516	0.50%
G3.5 Pinus nigra Woodland	12.24407	0.34%
G1.7 Termophilus deciduous woodland	16.59291	1.17%
G1.3 Mediterranean riparian woodland	4.696314	2.67%
Total	44.17846	

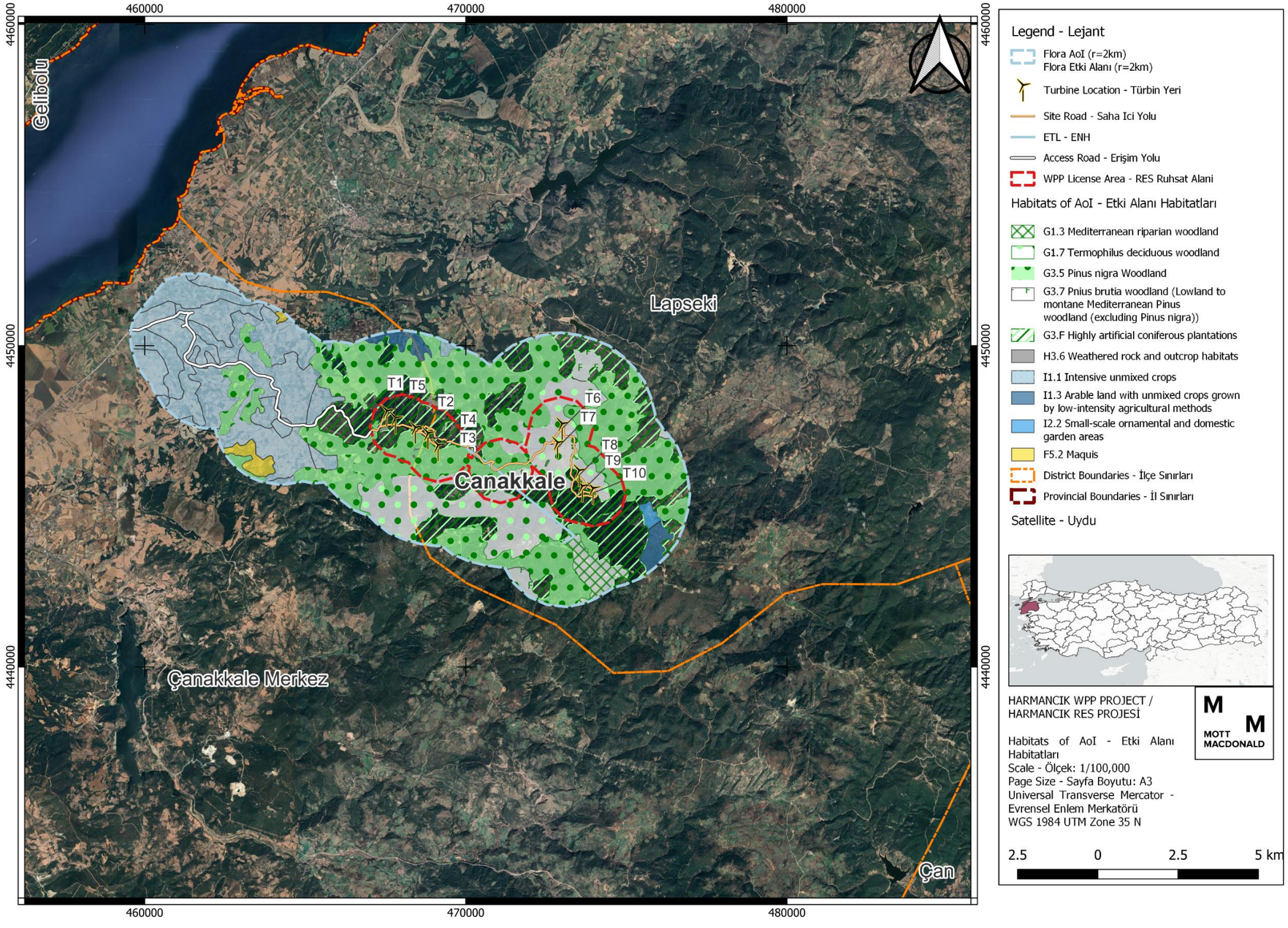


Figure 12-5: Habitat Types of the Project AoI

A list of endemic species, based on all available information with their conservation status and whether they were encountered during field studies at the Project site is provided in National EIA. A total of 304 plant taxa were identified. The full list of species is not presented in this document, endemic species are listed with National Red List categories and location coordinates in Table 12-10. Additionally, the locations of the endemic species are shown in Figure 12-6. Given these species have not yet been evaluated by IUCN, national red list categories have been used.

Table 12-10 The endemic species in the Project area and their coordinates

Taxon	National Red List Category	Bern	Coordinates
		Regional Endemic Species	
Verbascum hasbenlii (Locally endemic)	CR	-	35T 473322N 4447139D
Digitalis trojana	VU	-	35T 473745N 4444369D
Verbascum lydium var. heterandrum	VU	-	35T 473065N 4447197 D
Ferulago trojana	VU	-	35T 473532N 4444519D; 35T 469138N 4446784 D
Crocus candidus	VU	-	35T 468843N 4447190D
Cirsium balikesirense	VU	-	35T 473532N 4444519D
		Widespread Endemic Species	
Centaurea olympica	LC	-	35T 47375N 4444369D; 35T 473349N 4445851D; 35T 468843N 4447190D
Campanula lyrate subsp. Lyrate	LC	-	35T 474709N 4444821D
Stachys tmolea	LC	-	35T 473351N 4446911D
Thymus zygioides var. lycaonicus	LC	-	35T 468843N 4447190D

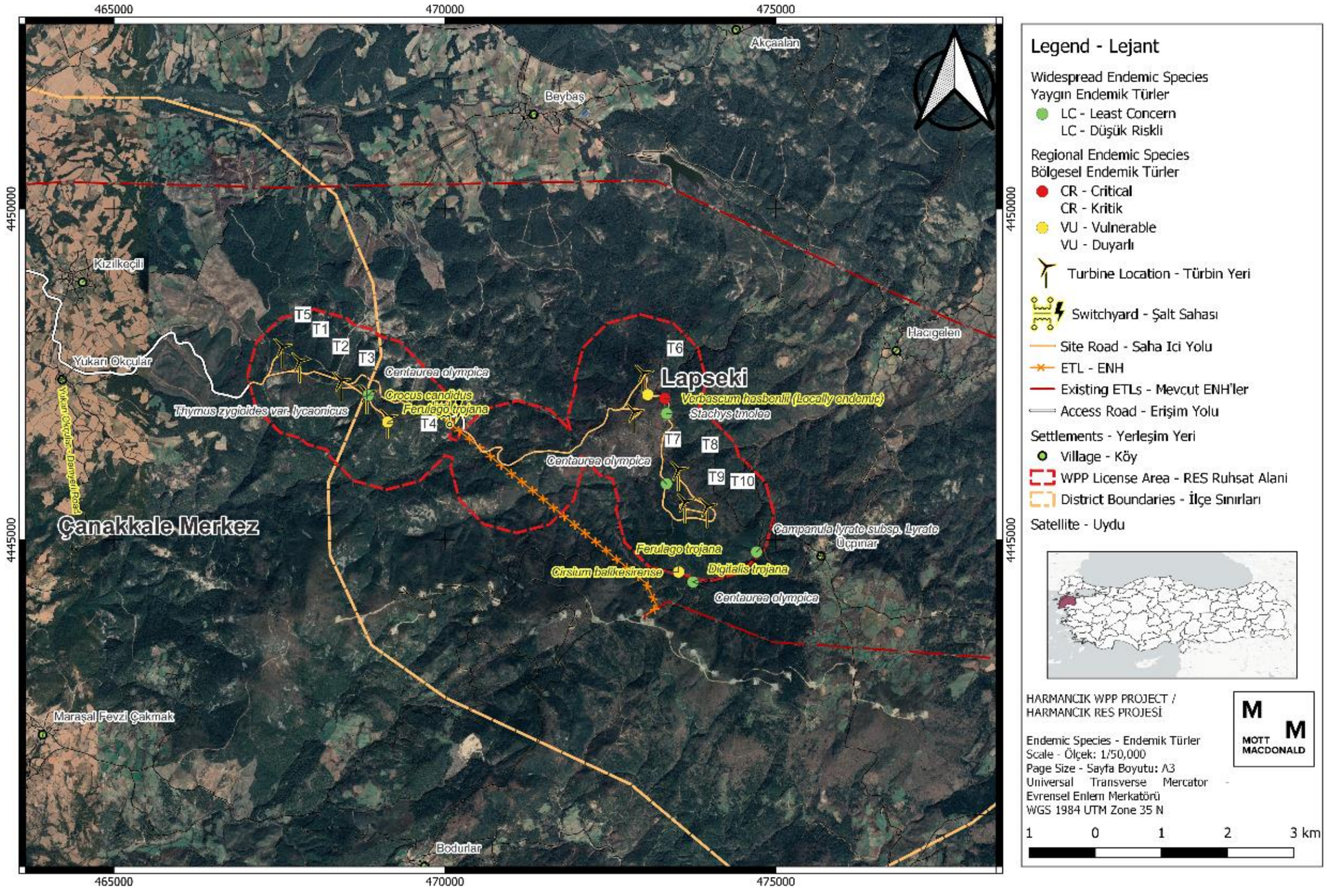


Figure 12-6: Location of Endemic Flora Species

Tree types and quantities (m^2), area sizes and cover, their current and planned protection and/or use purposes, approved stand maps were studied within the scope of National EIA. Forests and lands are given separate codes based on following circumstances on national bases:

According to calculations conducted from forest stand data maps, a total of 20,132 trees are expected to be cut. These are red pine, larch and oak species. These data are National EIA data provided in line with forest management maps and plans.

12.3.4 Birds

The Project is located on the minor migratory route of birds on the Dardanelles [133][134]. Moderate level of migrant activity, including that of large soaring species which are documented in Turkish migration counts, is expected for the Project area.

This idea is supported by National EIA survey findings for both migratory seasons. For ornithological surveys as part of National EIA, the site was visited between 18 August 2021 – 27 September 2021 and 24 March 2021 – 7 April 2022, 15 times each, for bird surveys compliant with local guidelines. The following deficiencies are noted about the ornithological surveys in meeting lender standards:

1. Locations and number of vantage points were changed completely between the two survey seasons.
2. The viewing angles and visual coverage of the turbines from the VPs were not provided.
3. Survey effort at each VP was not quantified.
4. Breeding bird survey using EBBA (European Breeding Birds Atlas) methodology was not conducted.
5. Target species list was not defined or provided.
6. The surveys did not cover significant time periods for migration: the month of October, which is the busiest migratory month for the Canakkale province in autumn, and May-early June, which is when young White Stork migration peaks.
7. Environmental parameters and survey conditions of each survey date were not provided.
8. Resident / migrant differentiation was not made for each encounter.
9. Risk height was not designated and categorized for field surveys.
10. Number of birds entering risk height and distance (risk zone) was not provided.
11. Flight routes maps with respect to turbine buffers were not provided.
12. Only one year of VP studies were conducted which does not account for year-on-year differences in activity and abundance (2 years needed).
13. Collision Risk Assessment is not available.

Large soaring migrant activity at the site was readily observed during site reconnaissance visit in the form of groups of Common Buzzard (*Buteo buteo*) during thermal soaring, and transit passage of Eurasian Sparrowhawk (*Accipiter nisus*). A very important field finding from the reconnaissance was adult Eleonora's Falcon (*Falco eleonorae*). The observation of this species in September is a clear indicator of general migrant activity and abundance, due to its behavioural trait of specifically taking advantage of the availability of migrant passerines in autumn to feed its young.

The Project area is not expected to carry a large number of resident raptors or other large soaring species due to a rather scarce amount of suitable nesting areas. Some common and

[133] UYSAL, İ., & TOSUNOĞLU, M., (2016). The Bird Migration Routes on the Gelibolu Peninsula and the Effects of Wind Energy Plants . 5th International Eurasian Ornithology Congress, Vol. V (pp.44). Çanakkale, Turkey

[134] Erciyas Yavuz, K. 2014. Turkiye'deki Kus Hareketliligi Haritalari; movebank.org and eBird data.

widespread raptors such as Common Buzzard (*Buteo buteo)*, Eurasian Sparrowhawk (*Accipiter nisus)* or Short-toed Snake Eagle (*Circaetus gallicus)* would be expected to breed here.

While not a KBA trigger or protected species, Kruper's Nuthatch (*Sitta kruperi*) is a species whose entire global distribution consists mainly of coastal Anatolian forests and is considered a regional endemic. Biga Mountain forests are a significant breeding region for this species.

Based on the three groups identified earlier that are significant for the site, namely (1) large soaring migratory species, (2) large soaring resident species and (3) other resident species of conservation significance, target species are provided on Table 12-11.

Table 12-11: List of significant species, conservation status and whether they were observed or are indicated in literature (L/O).

English name	Scientific name	IUCN	National	Bird directive	BERN	L/O
Levant Sparrowhawk	*Accipiter brevipes*	LC	VU	Annex I	Appendix II	O
Northern Goshawk	*Accipiter gentilis*	LC	NT	-	Appendix II	O
Eurasian Sparrowhawk	*Accipiter nisus*	LC	NT	-	Appendix II	O
Cinereous Vulture	*Aegypius monachus*	NT	EN	Annex I	Appendix II	L
Meadow Pipit	*Anthus pratensis*	NT	-	-	Appendix II	L
Golden Eagle	*Aquila chrysaetos*	LC	-	Annex I	Appendix II	O
Imperial Eagle	*Aquila heliaca*	VU	EN	Annex I	Appendix II	O
Gray Heron	*Ardea cinerea*	LC	-	-	Appendix III	O
Purple Heron	*Ardea purpurea*	LC	VU	Annex I	Appendix II	O
Eurasian Eagle-Owl	*Bubo bubo*	LC	-	Annex I	Appendix II	L
Common Buzzard	*Buteo buteo*	LC	-	-	Appendix II	O
Rough-legged Hawk	*Buteo lagopus*	LC	-	-	Appendix II	L
Long-legged Buzzard	*Buteo rufinus*	LC	NT	Annex I	Appendix II	O
White Stork	*Ciconia ciconia*	LC	-	Annex I	Appendix II	O
Black Stork	*Ciconia nigra*	LC	-	Annex I	Appendix II	O
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	VU	Annex I	Appendix II	O
Eurasian Marsh-Harrier	*Circus aeruginosus*	LC	NT	Annex I	Appendix II	O
Hen Harrier	*Circus cyaneus*	LC	DD	Annex I	Appendix II	O
Pallid Harrier	*Circus macrourus*	NT	CR	Annex I	Appendix II	L
Montagu's Harrier	*Circus pygargus*	LC	EN	Annex I	Appendix II	O
Greater Spotted Eagle	*Clanga clanga*	VU	VU	Annex I	Appendix II	O
Lesser Spotted Eagle	*Clanga pomarina*	LC	EN	Annex I	Appendix II	O
Black-winged Kite	*Elanus caeruleus*	LC	-	Annex I	Appendix II	L
Lanner Falcon	*Falco biarmicus*	LC	VU	Annex I	Appendix II	L
Saker Falcon	*Falco cherrug*	EN	CR	Annex I	Appendix II	L
Merlin	*Falco columbarius*	LC	-	Annex I	Appendix II	L
Eleonora's Falcon	*Falco eleonorae*	LC	EN	Annex I	Appendix II	O**
Lesser Kestrel	*Falco naumanni*	LC	VU	Annex I	Appendix II	L
Peregrine Falcon	*Falco peregrinus*	LC	VU	Annex I	Appendix II	O

English name	Scientific name	IUCN	National	Bird directive	BERN	L/O
Eurasian Hobby	*Falco subbuteo*	LC	-	-	Appendix II	O
Eurasian Kestrel	*Falco tinnunculus*	LC	-	-	Appendix II	O
Red-footed Falcon	*Falco vespertinus*	VU	-	Annex I	Appendix II	O
Bearded Vulture	*Gypaetus barbatus*	NT	EN	Annex I	Appendix II	L
Eurasian Griffon	*Gyps fulvus*	LC	EN	Annex I	Appendix II	O
White-tailed Eagle	*Haliaeetus albicilla*	LC	CR	Annex I	Appendix II	L
Booted Eagle	*Hieraaetus pennatus*	LC	VU	Annex I	Appendix II	O
Black Kite	*Milvus migrans*	LC	EN	Annex I	Appendix II	O
Red Kite	*Milvus milvus*	LC	DD	Annex I	Appendix II	L
Egyptian Vulture	*Neophron percnopterus*	EN	VU	Annex I	Appendix II	L
Osprey	*Pandion haliaetus*	LC	DD	Annex I	Appendix II	L
Dalmatian Pelican	*Pelecanus crispus*	NT	VU	Annex I	Appendix II	L
Great White Pelican	*Pelecanus onocrotalus*	LC	EN	Annex I	Appendix II	O
European Honey-buzzard	*Pernis apivorus*	LC	NT	Annex I	Appendix II	O
Eurasian Spoonbill	*Platalea leucorodia*	LC	EN	Annex I	Appendix II	L
Glossy Ibis	*Plegadis falcinellus*	LC	EN	Annex I	Appendix II	L
Krüper's Nuthatch	*Sitta krueperi*	LC	(Regional endemic)	Annex I	Appendix II	O
European Turtle-Dove	*Streptopelia turtur*	VU	VU	Annex II B	Appendix III	O
Tawny Owl	*Strix aluco*	LC	-	-	Appendix II	L
Redwing	*Turdus iliacus*	NT	-	Annex II B	Appendix III	L

*L: Literature, O: Observation

** Observed during field reconnaissance.

Vantage Point Survey

For ornithological surveys as part of National EIA, the site was visited between 18 August 2021 – 27 September 2021 and 24 March 2021 – 7 April 2022, 15 times each. In autumn two, and in spring three VPs were used (Figure 12-7, Table 12-12). Effort duration at each Vantage Point for each survey was not provided and could not be inferred from other details.

Table 12-12: Locations of the Vantage Points (WGS 84 UTM 35S)

Vantage Point	N	E
1 (autumn)	4446785.85	471931.25
2 (autumn)	4445024.00	473873.00
1 (spring)	4447381.08	467583.85
2 (spring)	4446067.40	470976.57
3 (spring)	4446630.14	472785.80

Based on the three groups identified earlier that are important for the site, namely (1) large soaring migratory species, (2) large soaring resident species and (3) other resident species of

conservation significance, the counts of species of significance obtained during the Vantage Point surveys are provided in Table 12-13.

Table 12-13: Counts of VP survey target species for each migratory season

Common Name	Scientific name	Autumn	Spring
Levant Sparrowhawk	*Accipiter brevipes*	12	3
Northern Goshawk	*Accipiter gentilis*	0	3
Eurasian Sparrowhawk	*Accipiter nisus*	14	30
Golden Eagle	*Aquila chrysaeetus*	0	10
Imperial Eagle	*Aquila heliaca*	3	5
Great Egret	*Ardea alba*	11	0
Gray Heron	*Ardea cinerea*	13	56
Purple Heron	*Ardea purpurea*	1	0
Common Buzzard	*Buteo buteo*	193	278
Long-legged Buzzard	*Buteo rufinus*	32	26
White Stork	*Ciconia ciconia*	117	313
Black Stork	*Ciconia nigra*	9	42
Short-toed Snake-Eagle	*Circaetus gallicus*	11	52
Eurasian Marsh-Harrier	*Circus aeruginosus*	3	11
Hen Harrier	*Circus cyaneus*	0	3
Montagu's Harrier	*Circus pygargus*	2	10
Lesser Spotted Eagle	*Clanga pomarina*	75	94
Peregrine Falcon	*Falco peregrinus*	1	2
Eurasian Hobby	*Falco subbuteo*	27	13
Eurasian Kestrel	*Falco tinnunculus*	16	32
Red-footed Falcon	*Falco vespertinus*	4	8
Eurasian Griffon	*Gyps fulvus*	0	8
Booted Eagle	*Hieraaetus pennatus*	10	10
Black Kite	*Milvus migrans*	15	57
Great White Pelican	*Pelecanus onocrotalus*	0	22
European Honey-buzzard	*Pernis apivorus*	52	53
European Turtle-Dove	*Streptopelia turtur*	17	51

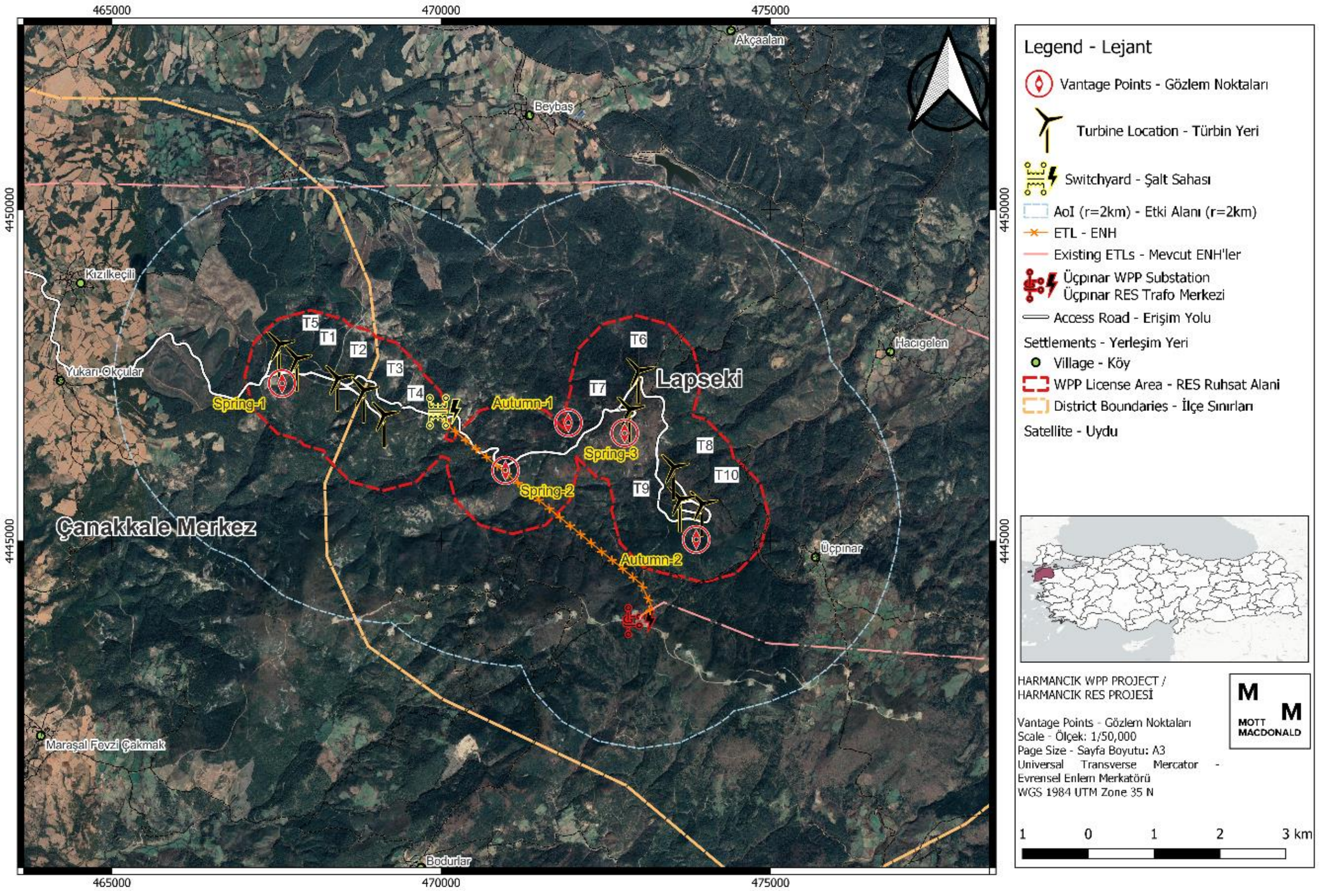


Figure 12-7: The vantage points used in VP studies.

12.3.5 Bats

The Project AoI could support populations of bats at different stages of their life cycle. Shelter for roosting (in the form of mature woodland and nearby human settlements) is available on-site, while suitable feeding areas of open space with scattered vegetation are available nearby.

As part of the National EIA biodiversity studies, bat surveys were conducted in August, September and October for a total of 6 day/nights 2021. The following deficiencies are noted about the ornithological surveys in meeting lender standards:

1. Roost survey methodology was not detailed and results not clearly shown.
2. Locations of static sampling points and justification for selection not provided.
3. Details regarding static sampling are not sufficiently provided.
4. Details regarding transect sampling are not sufficiently provided.
5. Bat Activity Index not available.
6. Heat maps are not available.
7. Surveys only cover one season (autumn). At least 3 seasons need to be covered.
8. Environmental parameters and survey conditions of each date were not provided.
9. Information regarding important areas for roosting, feeding etc. not provided.
10. Bat activity index not provided.
11. Transect locations, distances and effort durations not provided.
12. Only one year of studies were conducted which does not account for year-on-year differences in activity and abundance (2 years needed).

Given these limitations, the National EIA study reports recordings of *Pipistrellus pipistrellus, Pipistrellus kuhlii, Hypsugo savii*, *Pipistrellus nathusii, Tadarida teniotis, Nyctalus noctula, Nyctalus leislerii, Miniopterus schreibersii* (VU)*, Vespertilio murinus, Tadarida teniotis* and *Eptesicus serotinus.* A table detailing number of recordings for each species was not provided. From the graphs provided, *Pipistrellus pipistrellus* and *Nyctalus noctula* are the most active species. Both species are identified in literature as being prone to collision at WPPs. The activity levels for the study period may be interpreted as low from the graphs, however, it should be noted that due to above listed limitations, the National EIA study alone currently does not indicate low or high bat activity or populations for the Project. Sufficient temporal (year-on-year and seasonal) and spatial coverage is needed in order to confirm activity and population levels.

A list of bat species, their conservation status, collision risk and whether they were observed in National EIA (O) or at other wind farms nearby / indicated in literature (L) are provided in Table 12-14.

Table 12-14: List of bat species of the Project area with their conservation status, collision risk and whether they were observed in the National EIA.

Common Name	Scientific Name	IUCN Global	IUCN EU	IUCN Med	BE RN	EU Habitat Directive	Collision Risk	L/ O
Western Barbastelle	*Barbastella barbastellus*	NT	VU	NT	I, II	II, IV	Medium	L
Serotine	*Eptesicus serotinus*	LC	-	-	II	IV	Medium	O
Savi's Pipistrelle	*Hypsugo savii*	LC	LC	LC	II	IV	High	O
Schreiber's Bent-winged Bat	*Miniopterus schreibersii*	VU	-	-	I, II	II, IV	High	O
Alcathoe Bat	*Myotis alcathoe*	DD	-	-	II	IV	Low	L
Steppe Whiskered Bat	*Myotis aurascens*	LC	LC	LC	II	IV	Low	L
Lesser Mouse-eared Myotis	*Myotis blythii*	LC	NT	NT	I, II	II, IV	Low	L

Long-fingered Bat	*Myotis capaccinii*	VU	VU	VU	I, II	II, IV	Low	L
Geoffroy's Bat	*Myotis emarginatus*	LC	LC	LC	I, II	II, IV	Low	L
Greater Mouse-eared Bat	*Myotis myotis*	LC	LC	LC	I, II	II, IV	Low	L
Whiskered Myotis	*Myotis mystacinus*	LC	LC	LC	II	IV	Low	L
Giant Noctule	*Nyctalus lasiopterus*	VU	DD	NT	II	IV	High	L
Lesser Noctule	*Nyctalus leisleri*	LC	LC	LC	II	IV	High	O
Noctule	*Nyctalus noctula*	LC	LC	LC	II	IV	High	O
Kuhl's Pipistrelle	*Pipistrellus kuhlii*	LC	LC	LC	II	IV	High	O
Nathusius' Pipistrelle	*Pipistrellus nathusii*	LC	LC	LC	II	IV	High	O
Common Pipistrelle	*Pipistrellus pipistrellus*	LC	-	-	III	IV	High	O
Soprano Pipistrelle	*Pipistrellus pygmaeus*	LC	LC	LC	II	IV	High	O
Brown Long-eared Bat	*Plecotus auritus*	LC	-	-	II	IV	Low	L
Grey Long-eared Bat	*Plecotus austriacus*	NT	NT	0	II	IV	Low	L
Mediterranean Long-eared Bat	*Plecotus kolombatovici*	LC	NT	LC	II	IV	Low	L
Mountain Long-eared Bat	*Plecotus macrobullaris*	LC	NT	NT	II	IV	Low	L
Blasius's Horseshoe Bat	*Rhinolophus blasii*	LC	VU	NT	I, II	II, IV	Low	L
Mediterranean Horseshoe Bat	*Rhinolophus euryale*	NT	VU	VU	I, II	II, IV	Low	L
Greater Horseshoe Bat	*Rhinolophus ferrumequinum*	LC	NT	NT	I, II	II, IV	Low	L
Lesser Horseshoe Bat	*Rhinolophus hipposideros*	LC	NT	NT	I, II	II, IV	Low	L
Mehely's Horseshoe Bat	*Rhinolophus mehelyi*	VU	VU	VU	I, II	II, IV	Low	L
European Free-tailed Bat	*Tadarida teniotis*	LC	LC	LC	II	IV	High	O
Particoloured Bat	*Vespertilio murinus*	LC	LC	-	II	IV	High	O

*L: Literature, O: Observation

12.3.6 Terrestrial fauna (non-bat mammals, reptiles, amphibians)

During the National EIA terrestrial fauna studies, seven amphibian species, 24 reptile species and 29 non-bat mammals were either observed or were identified as relevant in desktop components. Vast majority of these species are common and widespread. None of them are endemic. A list of significant species is provided in Table 12-15. The following deficiencies with the National EIA study was noted:

1. Environmental parameters and survey conditions of each date were not provided
2. Transect locations, distances and effort durations not provided
3. Quantitative and geospatial data not provided

No noteworthy amphibians were identified. As for reptiles, Common tortoise (*Testudo graeca*) is Vulnerable (VU) and was observed in National EIA studies. The species would be expected to continue to occur at this site.

Roe deer (*Capreolus capreolus),* which is distributed in very few places in the Mediterranean and Aegean Region, is one of the important mammal species found in the area and was

observed at the Project area during National EIA. This species is under immense hunting pressure in the Canakkale province. Although its status is Least Concern, this species is considered to have national importance.

Although Mouse-tailed dormouse (*Myomimus roachi*) (VU) was not observed in the field, it was identified as a species which would use the habitat at the Project area (especially the old trees) by the local mammal expert.

Marbled polecat (*Vormela peregusna*) is Vulnerable. Its habitat preference (open land, arid, steppe areas) does not majorly overlap with the habitat characteristics of the Project area (forest and forest clearings) but it could be a rare occurrence here.

Brown bear (*Ursus arctos*) is Least Concern globally and in Europe, but Vulnerable in the Mediterranean. Considering the vast geographical occurrence of the species and presence of various subspecies and populations, the Mediterranean evaluation is very important for Anatolian populations. According to local mammal expert the species would be expected to occur at the site sporadically.

Table 12-15: List of significant terrestrial fauna for the Project area

Common Name	Scientific Name	IUCN	BERN	Habitats directive	L/O
Common tortoise	*Testudo graeca*	VU	Appendix I-II	Appendix II-IV	O
Roe deer	*Capreolus capreolus*	LC	Appendix III	-	O
Mouse-tailed dormouse	*Myomimus roachi*	VU	Appendix I-II-III	Appendix II-IV	L
Marbled polecat	*Vormela peregusna*	VU	Appendix I-II	Appendix II-IV	L
Brown Bear	*Ursus arctos*	LC	Appendix I-II	Appendix II-IV	L

***L: Literature, O: Observation

12.3.7 Invertebrates

Ottoman's Copper (*Lycaena ottomana*) is Vulnerable (VU) according to the global assessment in IUCN in 2000, and a much more recent assessment is available for the Mediterranean region which is LC (IUCN 2013), which is more informative for the present assessment since the species is common and populations are robust. Its habitat preference is low altitude, coastal maquis and woodland clearings in the region, favouring wet valley floors. Its preferred host species is *Rumex* genus, which is widespread and common.

Big-Bellied Glandular Bush-Cricket is found in forest, scrub and grassland habitats at altitudes ranging from 0 to 1,270 metres.The species inhabits steppe-like habitats dominated by xeric grasses and sparse scrub, in some areas like the Aegean coast of Anatolia it enters Mediterranean vegetation, such as sparse xerothermic oak forests or scrub or mesoxeric grass associations. The species prefers sparse vegetation cover areas in terms of forest and shrub areas. The Project AoI does not include these type of vegetation cover.

12.3.8 Ecosystem Services

PS6 acknowledges the significance of preserving the advantages that individuals and businesses obtain from ecosystems. Therefore, project development must be balanced, and the potential for utilizing the various economic, social, and cultural values of biodiversity and living natural resources should be evaluated in an optimized manner.

According to The Millennium Ecosystem Assessment (MA)[135], ecosystem services can be classified as follows.

- Provisioning services; are goods or products obtained from ecosystems, such as food, timber, fibre and freshwater.
- Supporting services; are the natural processes, such as nutrient cycling and primary production that maintain other services.
- Regulating services; are the contributions to human well-being arising from an ecosystem's control of natural processes, such as climate regulation, disease control, erosion prevention, water flow regulation, and protection from natural hazards.
- Cultural services; are the non-material contribution of ecosystems to human well-being, such as recreation, spiritual values, and aesthetic enjoyment.

During field surveys, ecosystem services such as "farming" and "animal grazing" were observed in the Project area and its close vicinity. In addition, during stakeholder interviews, it was understood that there was mushroom collecting in the area. The collected species are not traded, and it has been stated that they are collected only for domestic use. In addition, trees will be cut for access roads. The removal of trees has the potential to impact on regulating services.

12.3.9 Invasive Alien Species

Invasive alien species (IAS) are defined by the Convention on Biological Diversity (CBD) as species that threaten biological diversity by spreading outside their natural past or present distribution. IAS can occur in all taxonomic groups of organisms, including animals, plants, fungi, and microorganisms, and can affect all types of ecosystems. Invasion by alien species is reported to have caused significant degradation with negative impacts on biological diversity and people's livelihoods according to IUCN, which requires that all projects that may provide a key pathway for invasive species are screened for their potential to accidentally introduce invasive alien species. In line with provisions of PS6 and PR6, projects that potentially cause introduction of alien species are subject to a risk assessment. Once established, eradication of IAS requires more effort and resource allocation. Prevention is the first step in management.

While studies on terrestrial IAS in Türkiye have been rather limited, Türkiye has a wide marine IAS dataset. Studies that have already been conducted reveal that an estimated 1.5% of plant species in Türkiye are exotics. Additionally, the following species have been recorded in the EPPO list of invasive alien plants that are present in Türkiye: *Acroptilon repens, Ailanthus altissima, Ambrosia artemisiifolia (A. elatior), Carpobrotus edulis, Cortaderia selloana, Cyperus esculentus, Paspalum distichum (P. paspalodes), Oxalis pes-caprae and Sicyos angulatus. Furthermore, Azolla filiculoides* and *Rhododendron ponticum* are listed in the EPPO Observation List of Invasive alien plants and *Miscanthus sinensis*, listed in the EPPO Alert List, are also recorded in the Turkish flora[136]

The use of nitrogenous fertilizers in agricultural areas, destruction caused by plowing, manure of farm animals (feces), and transfer of seeds by vehicles can lead to an increase in the number of individuals of some species. These species are called "opportunists". The plants that are common in agricultural areas, roadsides, and around agricultural structures are the species found in the natural flora of Türkiye. It is possible that *Centaurea solstitalis, Cirsium arvense, Hedera helix* and *Rumex acetosella*, which are among the species defined as invasive in

[135] Milennium Ecosystems Assessment (MA). 2005. Ecosystems and Human Well-being: Biodiversity Synthesis. Washington, D.C.: World Resources Institute.

[136] Arslan, Z.F., Uludag, A., Uremis, I. (2015). Status of invasive alien plants included in EPPO Lists in Turkey. EPP/EPPO Bulletin 45 (1): 66-72.

Türkiye according to the global invasive database[137], will increase their spread in region during construction activities. Although these four species are natural for Türkiye, they are opportunistic species. *Centaurea solstitalis, Hedera helix* and *Rumex acetosella* were identified at the Project area during National EIA studies.

12.4 Assessment of Biodiversity Impacts

This section presents the identification and assessment of the likely beneficial and adverse biodiversity impacts of the Project during construction and operation. The Project's impacts have been addressed separately for each activity (construction and operation) and for each key receptor.

Mitigation measures are presented after impact assessment in Section 12.6. A summary of the significant residual impacts remaining following implementation of mitigation and the compensation required are also presented in Table 12-18.

12.4.1 Biodiversity Receptors

Sensitive biodiversity receptors confirmed or likely to be present within the AoI of the Project are outlined in Table 12-16 and discussed in the sections below. Those species that are likely to be absent in the AoI (they could be present in the EAAA) have been scoped out from the impact assessment in this section and are not discussed further.

The sensitivity levels of each biodiversity receptor are determined following the assessment methodology outlined above. The features listed in Table 12-16 below are the focus of the impact assessment and mitigation measures.

[137] Global Invasive Species Database. http://www.iucngisd.org/gisd/

Table 12-16: Summary of Main Biodiversity Receptors

Receptor	Sensitivity	Brief Description
Nationally protected and internationally recognized areas	High	Biga Mountains KBA
Terrestrial Natural Habitats	Medium	G3.5 Pinus nigra Woodland G3.7 Pinus brutia woodland G1.3 Mediterranean riparian woodland G1.7 Termophilus deciduous woodland H3.6 Weathered rock and outcrop habitats F5.2 Maquis
Terrestrial Modified Habitats	Low	Modified Habitats
Terrestrial flora	High	IUCN CR-EN-VU Species *Verbascum hasbenlii*
Terrestrial flora	Medium	IUCN CR-EN-VU Species *Digitalis trojana* *Verbascum lydium var. heterandrum* *Ferulago trojana* *Crocus candidus* *Cirsium balikesirense*
Terrestrial flora	Low	All other flora species within the AoI
Terrestrial mammals (excluding bats)	Low	All terrestrial mammal species within the AoI
Bats	High	High collision risk and/or conservation concern and/or migratory species *Hypsugo savii* *Miniopterus schreibersii* *Nyctalus lasiopterus* *Nyctalus leisleri* *Nyctalus noctula* *Pipistrellus nathusii* *Pipistrellus pipistrellus* *Pipistrellus pygmaeus* *Vespertilio murinus*
Bats	Medium	All other bat species within the AoI
Birds	High	IUCN CR-EN-VU Species Large soaring migrants of Turkish flyways Large soaring resident species
Birds	Medium	Large soaring migrants of Turkish flyways Large soaring resident species
Birds	Low	All other bird species within the AoI
Reptiles	Medium	*Testudo graeca*
Reptiles	Low	All other reptile species within the AoI
Terrestrial Invertebrates	Medium	*Lycaena ottomana* *Bradyporus macrogaster*
Terrestrial Invertebrates	Low	Invertebrate species within the AoI
Ecosystem services	Low	Provisioning services Supporting services Regulating services Cultural services

12.4.2 Construction Impacts

12.4.2.1 Summary of Impacts during Construction

Construction impacts were assessed as they pertain to biodiversity and found to cause both temporary disturbance type impacts and permanent impacts that would last after construction activities are over. Some of the more significant impacts are, in summary;

- Vegetation removal in areas of natural habitats leading to the permanent and temporary loss of areas of terrestrial habitat as well as loss of flora species present,
- Increased levels of noise, artificial light and vibration resulting from construction activities, vehicles and machinery, resulting in wildlife disturbance,
- Movement of construction vehicles and heavy machinery, leading to injury or killing of wildlife,
- Emissions from construction equipment, machinery and vehicle movement,
- Soil pollution from run-offs, accidental spills, wastewater, sewage and equipment cleaning, causing habitat degradation,
- Loss of ecosystem services
- Introduction of alien invasive species (AIS) impacting native biodiversity.

12.4.2.2 Assessment of Likely Construction Impacts

International Recognised Areas (KBAs)

The Project area is situated within the Biga Mountains KBA. One of the qualifying species of the overlapping KBA is present within the 2 km AoI. Construction activities will impact the KBA integrity in the forms of habitat loss and degradation (as a result of vegetation clearing and rock blasting for installation of the Project components such as roads, turbine pads, ETL route) including fragmentation and edge effects, disturbance to biodiversity values during construction activities, air pollution and invasive species introduction and competition. These effects are certain to occur within the AoI due to construction activities. Considering that the project area does not cover the entire KBA and the species is observed in a limited area, the magnitude of construction impacts on KBA is considered to be moderate (all receptor sensitivities are listed on Table 12-16).

Habitats

The Project AoI supports several types of natural habitats Approximate effected habitats for each type is as follows: Pinus nigra Woodland (19.1 ha), Mediterranean riparian woodland (4.7 ha), Termophilus deciduous woodland (20.71 ha), Weathered rock and outcrop habitats (5 ha). The possibility of construction activities to affect basic biodiversity features is medium. Construction activities will impact the natural and modified habitats in the forms of habitat loss and degradation (as a result of vegetation clearing and rock blasting for installation of the Project components such as roads, turbine pads, ETL route) including fragmentation and edge effects and are limited to the footprint. These effects are certain to occur within the AoI due to construction activities and are irreversible. The Project impacts on all these habitats affected directly are likely to be of moderate magnitude during construction.

Flora

One CR, five VU species were identified by National EIA within Project footprint. *Verbascum hasbenlii* is critical habitat trigger species and this species is likely to be affected by project activities. Addition of AIS during construction will impact native biodiversity and vegetation removal in the areas of agricultural crops and forest will lead to the permanent and temporary loss of areas of terrestrial habitat as well as loss of flora species present. Construction activities will impact the flora species in the forms of habitat loss and degradation (as a result of vegetation clearing and rock blasting for installation of the Project components such as roads, turbine pads, ETL route) including fragmentation and edge effects, air, soil and water pollution, dust emission and invasive species introduction and competition. These effects would possibly occur due to construction activities but will be limited to the footprint. It is likely that the magnitude of impact to existing flora is likely to be major.

Terrestrial fauna

No threatened or protected terrestrial fauna were identified as potentially present within the 5 km AoI. Some small and common mammal species could be affected within the AoI especially during blasting activities. Construction activities will impact the mammals and other terrestrial fauna the forms of habitat loss and degradation (as a result of vegetation clearing and rock blasting for installation of the Project components such as roads, turbine pads, ETL route). Direct loss of nests and shelter structures of these species will be limited to the footprint, while fragmentation and edge effects can be considered as impacting the AoI. Temporary disturbance during construction activities, pollution, light and noise disturbance, and accidental injury or death are possible. The magnitude of this impact to mammals of low conservation importance is minor.

Bats

Globally vulnerable bat species were indicated for the site in the National EIA studies, along with other regionally threatened and near threatened species, which are most likely to face negligible impacts through increased noise, lighting and minor levels of habitat loss (e.g. loss of roosting structures) if present. Construction activities will impact bats in terms habitat loss and degradation (as a result of vegetation clearing and rock blasting for installation of the Project components such as roads, turbine pads, ETL route). Some loss of roosting structures is expected for parts of access road, turbine pads and ETL route where forest will be cleared for construction. Fragmentation and edge effects will also be more pertinent to the ETL route. Creation of forest clearing can serve as creation of foraging habitat for the bat species. Temporary disturbance during construction activities, pollution, light and noise disturbance, and accidental injury or death are possible. Construction impact on these species will be reversible for the most part, considering tree planting activities will be undertaken for the cleared forest.

Birds

Construction activities will impact bird species in terms habitat loss and degradation (as a result of vegetation clearing and rock blasting for installation of the Project components such as roads, turbine pads, ETL route). Direct loss of nests and perch structures of these species will be limited to the footprint. Extensive habitat loss and degradation is not expected except where forest will be cleared for construction, however the forest is not mature for the most part and generally presents limited breeding opportunity. Fragmentation and edge effects will also be more pertinent to the areas with forest clearing. Edge habitat creation effect will persist after construction and will attract a greater diversity of species, while species with interior habitat preference will be able to utilize the nearby interior forest habitat. Temporary disturbance during construction activities, pollution, light and noise disturbance, and accidental injury or death are possible. Construction impact on these species will be reversible for the most part except edge effect, which can be seen as neutral. Construction impacts of the Project are limited and minor for the described impact types. Impact on the high sensitivity bird species is considered minor since the forest is young and would not be suitable for breeding activities of the critical habitat raptors. Forest clearing is expected to affect Kruper's Nuthatch (*Sitta krueperii)* to a minor extent, and the species will be able to use nearby suitable habitat to continue breeding, and the impact on this species can be reversible through simple measures such as installation of bird boxes.

Invertebrates

Construction activities will impact invertebrate species in terms habitat loss and degradation (as a result of vegetation clearing and rock blasting for installation of the Project components such as roads, turbine pads, ETL route). Ottoman's Copper (*Lycaena ottomana*) is Vulnerable (VU) globally (IUCN 2000), and LC in the Mediterranean (IUCN 2013). The species is common in the region and populations are stable. Any construction impacts to this species are minor.

Big-Bellied Glandular Bush-Cricket (Bradyporus macrogaster) prefers sparse vegetation type and the Project area contains dense vegetation cover in habitats that may be suitable. Therefore, project-induced habitat loss for this species is low.

Ecosystem Services

The ecosystem services defined for the Project are agricultural activities, grazing, , and the benefits provided by forests.. Further information on agricultural activities and grazing are given in RAP (Affected Lands and Land-Based Livelihoods, Pasturelands and Animal Husbandry, Agricultural Lands and Farming Sections) in detailed. The impact of the project's footprint on ecosystem services is considered negligible when compared to the existing entire habitats in the region.

12.4.3 Operational Impacts

12.4.3.1 Summary of Impacts during Operation

Operational phase impacts were assessed as they pertain to biodiversity and found to cause mainly permanent impacts that would last for the lifetime of the Project without proper management. Some of the more significant impacts are, in summary;

- Permanent habitat loss as a result of presence of turbine areas and switchyards,
- Loss of ecosystem services,
- Introduction of IAS impacting native biodiversity,
- Wildlife disturbance due to an eventual increase in noise levels, artificial light as a result of presence of turbines,
- Collision and electrocution mortality risks of bird and bat species,
- Barotrauma mortality risks of bat species.

12.4.3.2 Assessment of Likely Operation Impacts

International Recognised Areas (Kaz Mountains KBA)

The Project area is situated within the Biga Mountains KBA. One qualifying flora species (*Crocus candidus*) of the overlapping KBA is present within the 2 km AoI. Operational activities will not have an impact that would threaten the existence of the species. Based on this, the operational impacts on the KBAs are considered to be minor (all receptor sensitivities are listed on Table 12-16). Some persisting impacts from construction in terms of habitat loss and degradation (as a result of vegetation clearing and rock blasting for installation of the Project components such as roads, turbine pads, ETL route) including fragmentation and edge effects, disturbance to biodiversity values during operation (mainly through regular vehicle access), air pollution and invasive species introduction and competition. These effects are possible to occur within the AoI due to operation activities.

Habitats

The Project AoI supports several types of natural habitats of not priority conservation importance. Approximate effected habitats for each type is as follows: Pinus nigra Woodland (19.1 ha), Mediterranean riparian woodland (4.7 ha), Termophilus deciduous woodland (20.71 ha), Weathered rock and outcrop habitats (5 ha). Permanent habitat loss and habitat fragmentation will occur via the existence of the Project. The habitat fragmentation effect is expected mostly in forest areas due to opened access roads and turbine settlements. The possibility of operation activities to affect basic biodiversity features is medium. The Project impacts on all these habitats affected directly are likely to be of moderate magnitude during operation.

Flora

One CR, five VU species were identified by National EIA within Project footprint. Due to limited habitat loss, a high rate of decline in populations is not expected if the relevant species are present in this grassland habitat. It is estimated that the operational impacts will be moderate.

Terrestrial fauna

No threatened or protected terrestrial fauna were identified as potentially present within the 5 km AoI. Persisting effects from construction will impact the mammals and other terrestrial fauna the forms of habitat loss and degradation (as a result of vegetation clearing and rock blasting for installation of the Project components such as roads, turbine pads, ETL route). Disturbance during operation due vehicular traffic, artificial light and noise, air pollution, and accidental injury or death are possible. The magnitude of operational impacts through disturbance, vehicular collisions, and injury to mammals of low conservation importance is negligible. Hunting bans at the Project are expected to have positive impact on medium and large mammals.

Bats

Considering the high collision / barotrauma mortality risk and migration processes, a total of 9 bat species with high sensitivity were identified. At the operational phase, bat species including those that have high conservation value and those that belong to mid to long distance migratory populations will experience injury and mortality effects due to interaction with fast moving components i.e., the turbine blades. This can occur either due to direct collision with the blades or due to getting in the vicinity of the moving blades and experiencing barotrauma (internal injury) due to sudden and large changes in surrounding air pressure. Collision effect can be compounded by presence of artificial lights due to attraction of the prey species to light sources which in turn may attract population of bats to forage at the Project area. ETL is generally viewed as a negligible factor during operation, on the one hand habitat loss effects will persist, on the other hand foraging habitat will be made available. Direct collision with ETL structures is not a concern. It has been evaluated that operational impacts may have a major impact on these species. Other impact types during operational phase are displacement and avoidance and barrier effects (for migrants) which are less pronounced.

Birds

Collision and electrocution injury and mortality of resident and migratory large soaring species, and other species of conservation importance are a major impact source during operation. In general, resident and migratory large soaring species are the most affected due to a combination of their behavioural traits, morphology, and life cycle characteristics.

Due to its location on the Dardanelles migratory route, activity of migratory birds, especially those of large soaring species is of concern for Harmancik WPP during operation. Known migrants of the flyway will be expected to continue to occur and might occasionally be recorded in high numbers. National EIA ornithological studies during spring and autumn documented activity of the key migrants of the region, such as Lesser Spotted Eagle, White Stork, and Short-toed Snake Eagle. Additionally, the list of species includes those that have conservation significance globally and nationally.

While this impact type is highlighted for large bodied species due to their longer reproductive cycles, passage of songbirds and other species also occur here. Eleonora’s Falcon (*Falco eleonorae*) times its breeding season to overlap with the migration of songbirds, taking advantage of abundance of these species to feed its young. Mortality and injury effects can be compounded by artificial lights which can attract or disorient songbird species during nocturnal migration. Operation phase mortality monitoring will elucidate the extent of impact.

Most of the resident and breeding species indicated in the National EIA and literature are common and widespread and have low conservation significance. The Project area does not appear to be suitable to sustain much breeding activity of large soaring species, however such

species might regularly utilize the area for foraging or for accessing foraging areas. European turtle dove (*Streptopelia turtur*) also breeds in the region, but available long-term mortality monitoring studies from operational WPPs in the region does not imply high mortality risks of this species. Hunting bans at the Project area would constitute a positive impact for this species.

The National EIA does not have a collision risk component, therefore further clarifications to baseline will be undertaken prior to operation to update the bird baseline.

Other impact types during operational phase are displacement and avoidance and barrier effects (for migrants) which are less pronounced, along with more minor influences like increased levels of disturbance and pollution. Collision effect can be compounded by artificial lights which can attract songbird species during migration.

Although barrier effect to migrants is considered to be less of a concern than the more immediate danger of collision and electrocution, it should be noted that migration is a very energy demanding process and barrier effect comes at a high energetic cost during a high stress part of the life cycle. Barrier effects are more pronounced as a cumulative effect in the Çanakkale province due to the province being located on a minor migration route and high extent of wind energy developments.

Invertebrates

Operation impacts on invertebrate species is limited to persisting habitat loss and degradation effects from construction phase. Ottoman's Copper (*Lycaena ottomana*) is Vulnerable (VU) globally (IUCN 2000), and LC in the Mediterranean (IUCN 2013). The species is common in the region and populations are stable. Any operation impacts to this species are negligible.

Disturbance during operation due vehicular traffic, air pollution are possible and would be negligible as lack of suitable habitat for Big-Bellied Glandular Bush-Cricket.

12.4.4 Summary

The impact assessment summary for construction and operation phases of the Project is given in Table 12-17.

Table 12-17: Summary of Construction and Operation Impacts, Pre-Mitigation

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Habitat loss and degradation Disturbance Air pollution Death or injury AIS competition	Biga Mountains KBA	Medium	Construction	AoI	Irreversible	Certain	Moderate	High	Major
Habitat loss and degradation Disturbance Air pollution Death or injury AIS competition	Biga Mountains KBA	Minor	Operation	AoI	Irreversible	Possible	Minor	High	Major
Habitat loss and degradation	Natural Habitats	Medium	Construction Operation	AoI	Irreversible	Certain	Moderate	Medium	Moderate
	Modified Habitats	Low	Construction Operation	AoI	Irreversible	Certain	Minor	Low	Negligible
Habitat loss and degradation Air, soil and water pollution Dust emissions AIS competition	Flora	High	Construction Operation	AoI	Reversible	Possible	Major	High	Major
		Medium		AoI	Reversible	Possible	Moderate	Medium	Moderate
		Low		AoI	Reversible	Possible	Minor	Low	Negligible
Habitat loss and degradation Air, soil and water pollution Artificial light Dust emissions Disturbance Accidental injury or death	Mammals (excluding bats)	Low	Construction	AoI	Reversible	Possible	Minor	Low	Negligible

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Habitat loss and degradation Air, soil and water pollution Dust emissions Disturbance	Bats	Low	Construction	AoI	Reversible	Possible	Negligible	High	Negligible
		Low	Operation	AoI	Reversible	Possible	Negligible	Medium	Negligible
Collision / barotrauma mortality	Bats	High	Operation	AoI	Irreversible	Possible	Major	High	Major
			Operation	AoI	Irreversible	Possible	Major	Medium	Major
Artificial light	Bats	Medium	Operation	Project footprint	Reversible	Possible	Moderate	High	Major
			Operation	Project footprint	Reversible	Possible	Moderate	Medium	Moderate
Habitat loss and degradation Air, soil and water pollution Dust emissions Disturbance	Birds	Low	Construction Operation	AoI	Reversible	Possible	Minor	High	Moderate
		Low					Minor	Medium	Minor
		Low					Minor	Low	Negligible
Collision / electrocution mortality	IUCN CR EN VU Large soaring migrants of Turkish flyways Large soaring resident species	High	Operation	AoI	Irreversible	Possible	Major	High	Major
	Large soaring migrants of Turkish flyways Large soaring resident species						Major	Medium	Moderate
	All other species						Minor	Low	Negligible

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Artificial light	Birds	Medium	Operation	Project footprint	Irreversible	Possible	Major	High	Major
							Moderate	Medium	Moderate
							Minor	Low	Negligible
Habitat loss and degradation Air, soil and water pollution Dust emissions Disturbance Accidental injury or death	Herpetofauna	Low	Construction Operation	AoI	Reversible	Possible	Minor	Low	Negligible
Habitat loss and degradation Air, soil and water pollution Dust emissions Disturbance Accidental injury or death	*Lycaena ottomana* *Bradyporus macrogaster*	Low	Construction Operation	AoI	Reversible	Possible	Minor	Medium	Minor
Habitat loss and degradation Air, soil and water pollution Dust emissions Disturbance Accidental injury or death	*Testudo graeca*	Low	Construction Operation	AoI	Reversible	Possible	Minor	Medium	Minor

12.5 Impact Mitigation & Residual Impact

12.5.1 Habitat, Flora and Ecosystem Services Loss and Degradation

The most significant impact of the land preparation and construction phase of the Project would be habitat loss or degradation for terrestrial flora and fauna species, which would result in loss of species' populations for flora, and for fauna it would be losing areas important for their ecological functions. The impact would be limited to the area where the access roads, turbine location, ETL pylons and switchyard would be constructed. Minimising the direct loss of the habitats that could support species of conservation importance such as scrub, open forest and herbaceous vegetation will reduce the impact magnitude.

The Project activities is not expected to lead to a net loss or reduction in the global or national/regional population of any species. It is likely that any potential impact on these species would be tolerated by the local population. Therefore, the potential impacts due to habitat loss would be minor in magnitude.

The following generic mitigation measures should be applied throughout the Project:

- All construction and operational working areas should be kept to a minimum to reduce habitat loss,
- All type of impact on natural habitats outside the Project footprint should be avoided during land clearance and topsoil removal,
- Boundaries of the construction areas, including traffic routes, should be limited only to designated sites,
- Seed collection of wildflower species should be conducted for critical habitat trigger species and priority biodiversity features and the seeds may be used during the restoration process.

A "Landscape Plan" should be developed to restore the vegetation of the area including landscape analyses, methodology to be applied for repairing, assessment and determination of landscape characteristics and management. Please refer to Sections 6.5.1 and 6.5.2 for more information related to this section.

12.5.2 Disturbance to Animal Species, Injury/Mortality

Amphibians and reptiles in the Project AoI are likely to be affected by construction through habitat loss/degradation, disturbance (presence of people, artificial lighting, dust and noise), injury or mortality due to construction works and increased traffic, and temporary habitat fragmentation.

All of the detected species are evaluated in low sensitivity except Common Tortoise. This species has been determined to be of medium sensitivity due to its global IUCN category (VU). The population status of the species is rather good in the region and in Türkiye and this category of IUCN is thought to be only valid for Europe. Therefore, it is estimated that the impacts will be low with the implementation of mitigation measures within the scope of construction and operation activities.

Mammals are likely to be affected by construction through habitat loss/degradation, disturbance (presence of people, artificial lighting, dust and noise), injury or mortality due to construction work, increased traffic and temporary habitat fragmentation. Construction activities will be limited to the Project area and the AoI; therefore, associated impacts will be confined to the AoI.

Loss of breeding sites and nests is another significant impact related to habitat loss, especially for those that are ground-nesting. Fauna species identified at the Biodiversity Study Area, are those that are found in the larger area, with alternative habitats outside the AoI.

The increase in human activity in the Project area, the use of machinery and equipment, and the increase in activity on the transportation roads may cause disturbance in natural areas. This effect would be more pronounced during the construction phase. it is expected to decrease during operation phase.

All mammal species recorded in the AoI are of low conservation value. The construction impacts described above are considered to be of low magnitude and the resulting effect is negligible.

In addition to the items in Section 12.6.1, the following measures will be considered;

- On-site vehicle speed limits should be implemented to avoid potential road-kills,
- Dust suppression measures, such as water sprays, should be implemented for reduction of dust during the working period,
- Installing artificial structures within the AoI for nesting, roosting or hibernating fauna, such as bird nesting boxes, bat roost boxes, shelter for terrestrial fauna should be considered. Siting decisions should be made to minimize the injury and mortality risks (consider proximity to roads, ETL and turbines).
- Tree cutting (mainly for ETL) and rock blasting works should be accompanied by an experienced wildlife surveyor to check for nests and roosts.
- Site employees should be trained to be aware of significance of habitats and species, nests of fauna species, to avoid any destruction or displacement without an expert opinion on the status of the nests. Collaborate with biodiversity experts to implement a training and awareness program.

12.5.3 Accidental Introduction and Dispersal of Invasive Species

Introduction or spread of non-native invasive species accidently is also a risk that can occur during construction activities which may cause impact with minor significance. The following generic mitigation measures should be applied throughout the Project:

- Minimise traffic and the distance it has travelled,
- Source goods/materials locally where possible,
- Contain any alien invasive species and report their presence,
- Where AIS have been confirmed, ‘as-new’ wash-down is essential before entering non-infested areas of the site and after working in infested areas,
- Train and raise awareness of all site personnel regarding alien invasive species.
- Invasive Species Management Plan should be develop to minimize construction and operation impacts

12.5.4 Collision, electrocution, and barotrauma injury and mortality

One of the major sources of impact on biodiversity during operational phase can be attributed to collision, electrocution, and barotrauma injury and/or mortality risks of bird and bat species.

While collision with the moving turbine blades is the main source of collision mortality, collision with other present structures such as turbine towers, pylons, fences, structures associated with the switchyard etc. can also cause injury and/or mortality. Collision risks affect both bird and bat species and the effect are sustained throughout the WPP’s lifetime.

Electrocution effects are more pertinent to bird species. Triggering electrocution often requires interacting with multiple different electrified components, hence a certain body size is needed for electrocution although some bat species might also be large enough for electrocution.

Barotrauma injury and mortality is an impact type that is more pertinent for bat species. It requires no physical interaction with the turbines, it is sufficient that the bats are near turbines.

As the turbines spin they cause sudden and relatively large changes in surrounding air pressure, which the small bodies of bats cannot tolerate. The result is internal damage to the organs due to pressure change which often causes the individual to suffer a slow death.

A robust, well designed and comprehensive pre-operational and operational phase bird and bat monitoring programme is needed in order to assess the full scope of risks and manage them for this type of impact. These are detailed in Table 12-18.

The Operation Phase Biodiversity Management Plan developed for the Project describes a range of actions to manage and mitigate associated impact which will be further refined with additional baseline collection and operation monitoring results. The following mitigation measures should be applied throughout the Project:

- Artificial lighting will be managed carefully to avoid attracting and dazing migrants,
- The ETL will be marked throughout to increase visibility,
- A Shut-down on demand (SDoD) or equivalent turbine management program will be developed by the Project company;
    - The Project company will develop a technical note investigating different approaches available for shut down on demand systems and technologies, providing a framework,
    - Interim ornithology reports prepared from 2024 additional baseline will further inform suitable approaches for implementation,
    - The full technical assessment regarding shut down on demand will be developed following completion of 2024 baseline and CHA revision. SDoD will be applied for areas defined as Critical habitat in terms of ornithology. Additionally, Biodiversity Action Plan (BAP) Framework will include SDoD commitments.
    - The most widely used method involves observers strategically located at vantage points around the Wind Energy Facilities (WEF) implementing shutdown of one or more turbines in response to birds approaching rotor blades. Turbines are restarted once observers determine that birds are no longer at risk (observer-led shutdown on-demand). Shutdowns of this type are typically short (<30 minutes). In some cases, radar is used to assist observers (radar-assisted shutdown on-demand). When WEFs are in areas of intense flight activity (e.g., bird migration corridors), shutdown protocols may allow for a larger proportion of the WEF turbines to be shut down for an extended period (several hours or more) when flight activity is observed or predicted to be particularly high. In addition to observer-initiated shutdown, some automated turbine shutdown systems focused on safeguarding larger bird species have been demonstrated to be effective and may be a good option in some circumstances. The most sophisticated of these systems combine imaging, artificial intelligence, and machine learning to detect target flying bird species and will automatically trigger a shutdown of turbines if a bird approaches within a threshold distance of turbine blades[138].
- A turbine curtailment approach for minimising bat mortality will be developed,
- The Project components will be managed to not offer perching and nesting opportunities,
- Safe perching, roosting and nesting opportunities will be provided,
- Trainings will be provided to raise awareness of all site personnel.

[138] Post-Construction Bird and Bat Fatality Monitoring for Onshore Wind Energy Facilities in Emerging Market Countries,2023. Good Practice Handbook and Decision Support Tool

Table 12-18: Summary of Residual Effects, After the Application of Mitigation

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Habitat loss and degradation Disturbance Air pollution Death or injury AIS competition	Biga Mountains KBA	Major	Moderate
Habitat loss and degradation	Natural Habitats	Moderate	Minor
Habitat loss and degradation Disturbance Air pollution AIS competition	Flora (High sensitivity species)	Major	Moderate
Collision / barotrauma mortality	Bats	Major	Major (need to re-evaluate according to results of future monitoring)
Habitat loss and degradation Air, soil and water pollution Dust emissions Disturbance	Birds (high sensitivity species)	Moderate	Minor
Collision / electrocution mortality	Birds	Major	Moderate (need to re-evaluate according to results of future monitoring)
		Moderate	Moderate (need to re-evaluate according to results of future monitoring)
Habitat loss and degradation Air, soil and water pollution Dust emissions Disturbance Accidental injury or death	*Testudo graeca* *Lycaena ottomana*	Minor	Negligible

12.6 Biodiversity Monitoring and Adaptive Management

Table 12-19 summarises additional baseline collection, and Table 12-20 summarises the biodiversity monitoring to be implemented during the construction and operation of the Project. The high-level critical habitat screening undertaken for this Final Draft ESIA concluded that this Project is in critical habitat and therefore a detailed biodiversity monitoring and evaluation plan is required (see Section 12.4).

An adaptive management programme should be implemented. This will be put in place to ensure that if significant impacts are detected during construction and operation stages these will be addressed. Data will need to be analysed and if significant changes in the ecological receptors are reported, further mitigation measures will need to be put in place.

BAP will be developed to define net gain targets for critical habitat trigger species. Note that the CHA prepared for this Project was conducted taking into account the potential species. In order to prepare a BAP based on this document, field verifications must be carried out. The project company will carry out detailed field surveys in 2024 and the CHAs will be updated accordingly. Additionally, Project company has created a BAP framework. After the revision of the CHA, a project specific BAP will be created regarding the framework, if necessary.

Table 12-19 Additional biodiversity baseline collection for the Project

Receptor / Monitoring Topic	Responsibility	Monitoring/Management parameters	Monitoring locations	Monitoring frequency	Project Phase (timing)	Adaptive Management / Mitigation
Invasive species	Project Company	• Identification of invasive species	Working areas of Project and adjacent habitats (including access roads)	Every three months during construction	Construction	Develop Invasive Species Management Plan
Flora Seed Collection	Project Company Flora Expert	• *Verbascum hasbenlii* • *Digitalis trojana* • *Verbascum lydium var. heterandrum* • *Ferulago trojana* • *Cirsium balikesirense* • *Crocus candidus*	Location given in Table 12-10	2024 spring- summer season (May- September)	Construction	Revise BMP and CHA regarding results of Monitoring Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary)
Birds	Project Company Bird Expert	• Baseline survey migrant and resident/breeding bird populations and activity, • Identification of locations that support different parts of the life cycles of significant species (nesting and feeding locations etc) • Identification of levels of activity within a clearly defined collision risk zone, a robust collision risk assessment. • Pre-operation surveys will constitute 2nd year of biodiversity baseline. • Since construction interference with migration activity is expected to be low, and since 1st year surveys indicate low resident activity, baseline will be collected at the Project during construction. Any	1. Migration monitoring regarding NatureScot methodology 3 Vantage Points covering (to be confirmed on-site prior to monitoring activities) the turbines and the ETL route. 2. Breeding bird survey involving line transect distance sampling and point counts, including breeding raptor searches within the AoI High coverage will be achieved within AoI (>70%)	Migration monitoring and breeding bird survey Migration and breeding seasons VP survey at least 36 hr/VP/season (for spring, summer and autumn), observation effort spread out over the seasons For spring and autumn migratory seasons, 72 hr/VP/season will be implemented due to Project's location on migratory routes Breeding bird once a month (April – July)	Construction	Revise BMP and CHA regarding results of baseline Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary) Develop Shut-down on demand protocol

		uncertainties with species with high sensitivity will be addressed with shut-down on demand protocol. • Shut-down on demand protocol can either be camera and radar assisted, or full-time field surveyor assisted, or a combination of both. The best approach will be determined following baseline clarification according to specific site needs				
Bats	Project Company Bat Expert	• To determine the population and activity levels of bat species in the area, bat activity surveys using static and transect acoustic sampling techniques, along with exploration of caves and cavities, roost counts, mist netting and potentially genetic sampling techniques. Acoustic sampling will be carried out using commercially available ground level full spectrum (FS) bat detectors and identification software during pre-operation. Bat activity and population data to be gathered. Quantitative and geospatial data gathered. • Baseline collection from the Project is feasible since construction is halted before bat activity begins. • Surveys will constitute 2nd year of baseline collection	NatureScot (2021) guidelines will be followed. 6 static sampling points at selected turbine locations, supplemented with transect coverage of roads and pads (to be confirmed on site).	2 years and at least 3 seasons (spring, summer, autumn) to account for seasonal differences in environment, species compositions, activity and abundance 10 consecutive nights of data collection at each station for 3 seasons (spring, summer, autumn) covering all times bats are active	Construction	Revise BMP and CHA regarding results of baseline Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary) Develop and implement turbine curtailment approach
Terrestrial fauna	Project Company Fauna Expert	Fauna surveys to establish baseline terrestrial fauna activity and populations	Access roads with priority for sections overlapping KBA, and where existing roads will be widened, or new road will be constructed (AoI = 500 m buffer on either side of centre line)	April-May-June 2024 3 days for herpetoaufuna 4 days for mammals excluding bats	Construction	Revise BMP and CHA regarding results of baseline Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary)

Table 12-20: Biodiversity monitoring to be implemented by the Project

Receptor / Monitoring Topic	Responsibility	Monitoring parameters	Monitoring locations	Monitoring frequency	Project Phase (timing)	Adaptive Management / Mitigation
Biga Mountains KBA	Project Company	● Habitat area/cover/ condition and land use change ● Cleanliness of construction site ● Degradation of habitats outside construction areas ● Quantity and quality of vegetation ● Quality of landscaping at restored sites (planted species)	All habitats of high sensitivity in Project-affected areas (including restored areas).	Operations: once annually in years 1 to 5 and 10	Operation	Revise BMP and CHA regarding results of Monitoring Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary)
Natural Habitats and Flora	Project Company	• Habitat area/cover/ condition and land use change • Target flora species including KBA triggers (population status) • Quality of landscaping at restored sites, if any (planted species)	All natural habitats, turbine locations and access roads with priority to KBA overlap areas The areas that identified in Monitoring Methodology	Operation: once annually in years 1 to 5 and 10	Operation	Revise BMP and CHA regarding results of Monitoring Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary)
Invasive species	Project Company	• Identification of invasive species	Working areas of Project and adjacent habitats (including access roads)	Annually during operation	Operation	Develop Invasive Species Management Plan
Wildlife Mortality (roads)	Project Company Ecologist	Identification of species of conservation importance that have been killed by vehicles and equipment	All roads on Project area	Ongoing during operation	Operation	Revise BMP and CHA regarding results of Monitoring
Wildlife Mortality (Turbines and ETL's)	Project Company Ecologist	● Identification of species of conservation importance that have been killed by moving turbine blades and electrocution.	All turbine locations and ETL's on Project area	Operation	Operation	Revise BMP and CHA regarding results of Monitoring

		• Bird fatality monitoring • Bat fatality monitoring • Survey design will include appropriate carcass search methodology				
Birds	Project Company Bird Expert	Post construction VP bird monitoring to establish operational phase Collision Risk and operational phase bird activity and populations compared to baseline.	Surveys will follow the same methodology as the construction phase surveys. In addition, breeding raptor searches with appropriate buffers, will be conducted.	At least 2 years of operation, re-evaluated after monitoring Migration and breeding seasons Breeding raptor will be determined targeting the breeding windows of species of concern	Operation	Revise BMP Develop shut-down on demand protocol and implement with operation start Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary)
Birds	Project Company Bird Expert	Post construction bird fatality monitoring (PCFM) (2023). • The operational phase surveys need to be designed according to principles outlined in the Post Construction Fatality Monitoring guidance. • Survey design will include appropriate carcass search methodology, experimental and control techniques. • Survey design needs to include the ETL route. • Surveys will account for yearly differences in activity and abundance and run for more than 1 year as needed.	To be designed according to Good Practice Handbook on Post-construction Bird and Bat Fatality Monitoring (PCFM) for Onshore Wind Energy Facilities (WEFs) in Emerging Market Countries (2023) guidelines. Turbine swept areas and ETL route.	At least 2 years and will be further revised according to PCFM guidelines	Operation	Revise BMP Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary) Shut down demand protocol
Bats	Project Company Bat Expert	Monitor the population and activity levels of bat species in the area, bat activity surveys using static and transect acoustic sampling	NatureScot (2021) guidelines will be followed.	2 years and at least 3 seasons (spring, summer, autumn) to account for seasonal differences in	Operation	Revise BMP and CHA regarding results of Monitoring

		techniques, along with exploration of caves and cavities, roost counts, mist netting and potentially genetic sampling techniques. Acoustic sampling will be carried out using commercially available ground level full spectrum (FS) bat detectors and identification software during pre-operation. Bat activity and population data to be gathered. Quantitative and geospatial data	6 static sampling points at selected turbine locations, supplemented with transect coverage of roads and pads (to be confirmed on site). 10 consecutive nights of data collection at each station for 3 seasons (spring, summer, autumn) covering all times bats are active	environment, species compositions, activity and abundance		Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary) Develop and implement turbine curtailment approach
Bats	Project Company Bat Expert	Post construction bat fatality monitoring (PCFM) (2023). The operational phase surveys need to be designed according to principles outlined in the Post Construction Fatality Monitoring guidance by the Lenders. Survey design will include appropriate carcass search methodology, experimental and control techniques. Survey design will include ETL route.	To be designed according to Good Practice Handbook on Post-construction Bird and Bat Fatality Monitoring (PCFM) for Onshore Wind Energy Facilities (WEFs) in Emerging Market Countries (2023) guidelines Turbine swept areas and ETL route.	At least 2 years and will be further revised according to PCFM guidelines.	Operation	Revise BMP Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary) Develop and implement turbine curtailment approach
Terrestrial fauna	Project Company Fauna Expert	Fauna surveys to monitor applied mitigation measures (e.g. monitoring of artificial nest and shelter structures)	Will be as outlined in revised BMPs.	Quarterly	Operation	Revise BMP Develop Net Gain Requirements (if necessary) Prepare BAP (if necessary)

13 Social Environment

13.1 Introduction

This Chapter provides the details of the social baseline conditions of the Project-affected villages on the basis of district and village levels. The methodology of the information collection process, the Project impacts on the communities and other social receptors, the assessment process carried out during the ESIA study, and mitigation measures defined for the Project impacts are provided in line with the findings of the social studies conducted during the ESIA process of the Project.

13.2 Methodology

The following methods were utilized to understand the social impacts of the Project in the affected villages and to identify the extent of potential impacts of the Project on the local community members, households, vulnerable groups, and other social receptors:

- Desktop study,
- Site visit to the Project area,
- In-depth Interviews and surveys with the local community members and key stakeholders.

13.2.1 Desktop Study

Secondary official data and documents about socio-economic conditions of Central and Lapseki districts published by governmental authorities are assessed during the desktop study. Documents provided by Enerjisa Üretim and official documents obtained from the public institutions during the site visits as well as information gathered through web research were utilized to describe demographic profile of the Project affected villages and Project's social area of influence (AoI), including but not limited to the population data, main livelihood activities, land use practices, infrastructural conditions and access to certain services (i.e., education, transport, water and health services).

13.2.2 Site Visit to the Project Area

Through the support of the Enerjisa Üretim representatives, the Project area, residential areas, and Project affected villages, including the ones intersecting with the Project's access roads, were visited as part of the ESIA studies. The villages located in the immediate vicinity of the Project area were visited, local residents in these settlements and key stakeholders (i.e., representatives of official institutions and village mukhtars) were consulted, which are listed below:

- Mukhtar of Hacıgelen village (Çanakkale)
- Mukhtar of Üçpınar village (Çanakkale)
- Çanakkale Provincial Director of Agriculture and Forestry

The information obtained from these consultations is provided as a separate document (see Appendix B) and the main findings of the site visit are given under Section 13.3.

Additionally, Resettlement Action Plan (RAP) study addressed the following:

- Identification of eligible Project affected persons (PAPs) and preparation of an asset inventory and census include formal and informal users of affected lands;
- Assessment of land acquisition-based impacts of the Project;

- Identifying gaps between national expropriation legislation and PS5/PR5 and preparing a plan to eliminate gaps.

In this context, Community Level Survey (CLS), Household Level Survey for Socio-Economic Baseline and Asset Inventory and Census studies were carried out. Although the results and details are discussed in the RAP, in the ESIA, especially the land use information of the Project has been formed according to the outputs of the RAP study.

The sampling strategy for surveys is presented in Table 13.1. Representatives of all PASs were interviewed. In these interviews, both community level information was obtained, and land users (formal and informal) were identified.

Table 13.1: Sampling Strategy

Survey	Sampling	Implementation
Community-level survey	Full census The settlement heads in five settlements based on the available expropriation data	Semi-structured community level questionnaires with the five mukhtars in all Project Affected Settlements (PASs)
Households-level surveys	Full census The owners (154 PAPs) and users of affected 62 private parcels. The owners (75 PAPs) and users of affected 53 private and 1 public lands. Public lands include roads (5) raw land (1) and forestland areas. There is only one arable public land.	40 households with 118 members who are owner/user of 48 affected private lands and 1 public land. The owner/user of 4 lands could not be reached (4 people). It is learn that they are unknown people/investors who bought land in the region for investment purposes. A formal public land user has been identified. The household is included in Household Level Survey (HLS).

13.2.3 Limitations and Assumptions

Out of the seven affected villages, only two were visited by the Consultant as a part of the site visit conducted in October 2023. This limitation in the site visit can be attributed to various factors such as time constraints and logistical challenges. However, despite this limitation, the potential information gaps were effectively addressed through various strategies. Primarily, the Consultant relied on extrapolation of interview results to gain a broader understanding of the overall situation since the villages in the scope of the Project have similar baseline characteristics.

Additionally, secondary data sources were extensively utilized to supplement the information obtained on-site. These sources included reports, studies, and statistical data that provided a holistic perspective on the broader context. Some of the statistical data was available at district level and these were obtained from the governmental institutions' websites and Turkish Statistical Institute (TurkStat) database; they do not cover certain issues on social environment such as gender aspect, vulnerable groups, workforce distribution, and unemployment rates. Similarly, the statistical data at village level either remain as limited for some indicators (i.e., gender) or are based on estimated/ approximate numbers (i.e., educational level, vulnerable groups, workforce distribution, unemployment rates) since majority of these data were gathered through the verbal statements of the mukhtars or representatives of the governmental authorities rather than the officially registered data.

Through the combined approach of extrapolation from interviews and the use of secondary data, the potential information gaps resulting from limited site visits were effectively mitigated.

This ensured that the findings and conclusions derived from the assessment were as comprehensive and accurate as possible.

The limitations of the RAP preparation study are as follows:

- The owners/users of some lands could not be reached during the field visit. In order to access the full census, the owners/users of these lands were contacted by phone.
- The owner/user of 4 lands could not be reached (4 people). It is learn that they are unknown people/investors who bought land in the region for investment purposes.
- Women did not want to answer detailed questions about lands and livelihoods. Therefore, interviewed household representatives were mostly men.

13.2.4 Social Receptors and Area of Influence (AoI)

The desktop studies that were conducted as per the documents shared by the Project Company concluded that the social AoI of the Project covers a total of seven villages in Central and Lapseki districts. These are the nearest settlements to the Project area including Yapıldak, Musaköy, Kızılkeçeli and Yukarıokçular which are located in Central district, and Beybaş, Üçpınar and Hacıgelen villages in Lapseki district.

A site visit was conducted by Mott MacDonald Social Team on 30 and 31 October 2023. During this site visit, baseline information on the villages affected by the construction and operation phases of the Project was collected.

The positive social impacts of the Project will be on local employment and local economic through procurement of goods and services specifically during the construction phase. In addition to these, the Project will also improve local infrastructural capacity such as improving the access roads' of the villages while increasing the domestic production capacity of clean energy on a country basis.

The major adverse impacts of the Project during the construction phase are also assessed and these are identified as land acquisition and expropriation, dust, noise, and traffic generation. When looking at the impacts of the Project on resettlement and livelihoods, it can be seen that there has been no economic or physical displacement process so far. Considering the current planning of the Project, physical displacement is not expected while economic displacement will be occurred.

No major adverse impacts on social environment are assessed for operation phase within the ESIA study. Community health and safety impacts, which are related to noise and visual impacts (i.e., shadow flicker), are assessed in *Chapter 15: Community Health and Safety*.

Direct social receptors of the Project during the construction phase are defined below:

- Local community members whose livelihoods have the potential to be significantly and adversely affected due to land acquisition and/or expropriation,
- Nearby villages and business enterprises located in the immediate vicinity of the Project area that are likely to be exposed to increased traffic volume, road safety risks, dust and noise impacts,
- Local community members who are on the access roads to the Project area and/or use these roads, and are likely to be exposed to increased traffic volume and road safety risks,
- Local community members using the Project License Area for agriculture and animal husbandry purposes and that may experience livelihood loss, increased traffic volume and road safety risks,
- Local community members who may benefit from the Project's local employment opportunities,

- Business enterprises that may benefit from the Project's local procurement activities,
- Vulnerable groups who may be in need for essential consultation in the Project, and
- All construction phase workers employed within the scope of the Project (including subcontractors).

Table 13.2: Communities located within the Social Area of Influence (AoI) during construction phase of the Project

Village	Information on the Location	Impact Prioritization	Potential Adverse Impacts
Central District Villages			
Yapıldak	Located to the east of the nearest turbine. Although the village is quite far from the turbines, the access road of the Project directly passes through the village.	Primary	An urgent expropriation decision on non-agricultural and agricultural lands has been taken on November 24, 2023 with the construction of access road. Since the land acquisition process is still ongoing, there is a potential risk of economic displacement. Problems including dust, noise and traffic are expected to be experienced in the village during the construction phase.
Musaköy	Located to the east of the nearest turbine. Although the village is quite far from the turbines, it is 700 m distance to the access road.	Primary	There will be traffic congestion and dust generation on the roads used to access the village, especially during the construction phase. Additionally, an urgent expropriation decision on agricultural lands has been taken on November 24, 2023 with the construction of access road. Since the land acquisition process is still ongoing, there is a potential risk of economic displacement.
Kızılkeçili	The village is located to the west of the turbines and the nearest turbine is approximately 3.3 km from the centre. The access road goes around the settlement boundaries of the village and passing through by close vicinity of several houses.	Primary	There will be traffic congestion and dust generation on the main roads used to access the village, especially during the construction phase. Additionally, an urgent expropriation decision on non-agricultural and agricultural lands has been taken on November 24, 2023 with the construction of access road and turbines. Since the land acquisition process is still ongoing, there is a potential risk of economic displacement.
Yukarıokçular	Located to the west of the turbines and the nearest turbine is approximately 3.2 km from the centre. The access road goes around the settlement boundaries of the village and passing through by close vicinity of several houses	Primary	There will be traffic congestion and dust generation on the main roads used to access the village, especially during the construction phase. Additionally, an urgent expropriation decision on agricultural lands has been taken on November 24, 2023 with the construction of access road. Since the land acquisition process is still ongoing, there is a potential risk of economic displacement.

Village	Information on the Location	Impact Prioritization	Potential Adverse Impacts
Lapseki District Villages			
Beybaş	Located to the north of the nearest turbine and the proximity of the turbine is around 4.5 km distance. The access road is far from the settlement.	Secondary	Potential adverse impact may occur during the construction phase since the residents use the turbine locations and the construction site as pasture for animal husbandry activities. There iş only one parcel which is subjected to land acquisition plan of the Project.
Üçpınar	Located to the east of the nearest turbine and the proximity of the turbine is around 1.6 km distance. The access road is far from the settlement. It is approximately 2.8 km distance to Üçpınar central to the Switchyard.	Secondary	The village is away from the access road and in the light of current information, no expropriation will be carried out on any land belonging to the residents of the village. The main potential adverse impact may occur during the construction phase since the residents use the turbine locations and the construction site as pasture for animal husbandry activities.
Hacıgelen	Located to the northeast of the nearest turbine and the proximity of the turbine is around 3.5 km distance. The access road is far from the settlement.	Secondary	The village is away from the access road and in the light of current information, no expropriation will be carried out on any land belonging to the residents of the village. The main potential adverse impact may occur during the construction phase since the residents use the turbine locations and the construction site as pasture for animal husbandry activities.

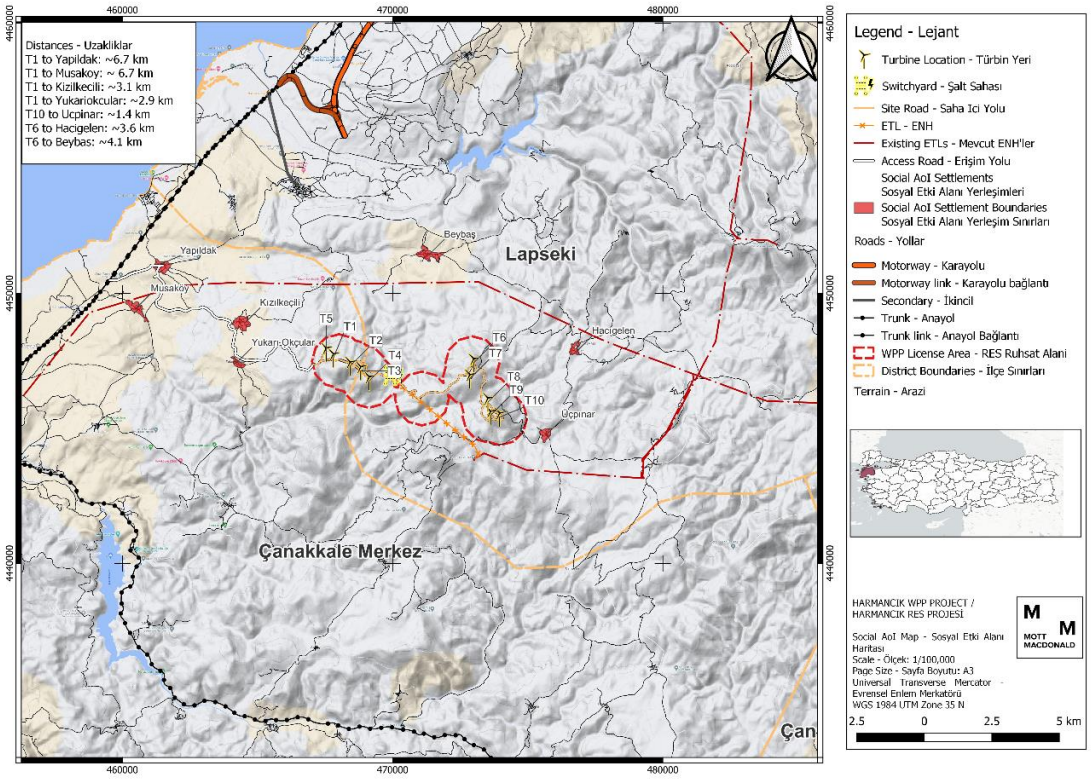


Figure 13.1: Project's area of influence for social impacts

The social receptors that are estimated to be affected by the Project during the operation phase are listed below:

- Neighbouring communities located in the close proximity of the Project area that are likely to be exposed to noise and visual impacts,
- Local community members who may benefit from the Project's local employment opportunities,
- Business enterprises that may benefit from the Project's local economic activities,
- Vulnerable groups who may be in need for essential consultation in the Project, and
- All operation phase workers employed within the scope of the Project (including subcontractors).

Table below summarizes the communities located within the social AoI and the potential adverse impacts during the operation phase of the Project.

Table 13.3: Communities located within the Social Area of Influence (AoI) during operation phase of the Project

Villages	Information on the Location	Impact Prioritization	Potential Adverse Impacts
Central District Villages			
Yapıldak	Located to the east of the nearest turbines. Although the village is quite far from the turbines, it is located right in the heart of the access road.	Secondary	It is critical that animals are not harmed during the operation phase in turbine areas used by village residents for pasture purposes.

Villages	Information on the Location	Impact Prioritization	Potential Adverse Impacts
Musaköy	Located to the east of the nearest turbine. Although the village is quite far from the turbines, it is 700 m distance to the access road.	Secondary	It is critical that animals are not harmed during the operation phase in turbine areas used by village residents for pasture purposes.
Kızılkeçili	The village is located to the west of the turbines and the nearest turbine is approximately 3.3 km from the centre. The access road goes around the settlement boundaries of the village, passing by some households.	Secondary	It is critical that animals are not harmed during the operation phase in turbine areas used by village residents for pasture purposes.
Yukarıokçular	Located to the west of the turbines and the nearest turbine is approximately 3.2 km from the centre. The access road goes around the settlement boundaries of the village, passing by some households.	Secondary	It is critical that animals are not harmed during the operation phase in turbine areas used by village residents for pasture purposes.
Lapseki District Villages			
Beybaş	Located to the north of the nearest turbine and the proximity of the turbine is around 4.3 – 4.5 km distance. The access road is far from the settlement.	Secondary	It is critical that animals are not harmed during the operation phase in turbine areas used by village residents for pasture purposes.
Üçpınar	Located to the east of the nearest turbine and the proximity of the turbine is around 1.6 – 1.8 km distance. The access road is far from the settlement. It is approximately 2.8 km distance to Üçpınar central to the Transformer Substation.	Secondary	It is critical that animals are not harmed during the operation phase in turbine areas used by village residents for pasture purposes.
Hacıgelen	Located to the northeast of the nearest turbine and the proximity of the turbine is around 3.5 km distance. The access road is far from the settlement.	Secondary	It is critical that animals are not harmed during the operation phase in turbine areas used by village residents for pasture purposes.

13.3 Baseline Conditions

13.3.1 Population and Population Changes

13.3.1.1 Central District (Çanakkale Province)

Central district is one of the 12 districts of Çanakkale. Central District, with a population of 197,841 in 2022, is the first most populous district in Çanakkale[139]. Population density of Central district was 6594,70 person/km^2 in 2022[140]. There has been a continuous increase in the population over the 10 years. There has been a decrease in the population growth rate of the district since 2021. The male population ratio in the total population is 50.9%, while the female population ratio is 49.1%[141]. Average household size was 2.81 in 2022[142]. Table 13.4 given below shows the population of Central district by years.

Table 13.4: Population of Central District by years

Years	Total	Male	Female
2022	**197,841**	97.059	100.782
2021	**195,439**	96.707	98.732
2020	**184,184**	91.235	92.949
2019	**184,631**	91.048	93.583
2018	**180,823**	90.261	90.562
2017	**175,032**	88.211	86.821
2016	**165,517**	81.789	83.728
2015	**159,758**	80.009	79.749
2014	**155,657**	78.909	76.748
2013	**149,881**	75.807	74.074
2012	**143,041**	72.798	70.243

Source: nufusu.com, Statistics on Population, 2022[143]

Population growth rate of Central district in 2022 is 1.23%. There have been fluctuations in the rate of population growth throughout the years. It has shown a tendency to decrease in recent years, except for the year 2021. The following Figure 13.2 shows the population growth rate of Central district throughout the years.

[139] Nufusune, 2023 Statistics on Population. Retrieved from nufusune.com/merkez-ilce-nufusu-canakkale on 24 November 2023

[140] Endeksa, 2023 Statistics on Population. Retrieved from endeksa.com/en/analysis/turkiye/canakkale/merkez/demography on 24 November 2023.

[141] Nufusu, 2023 Statistics on Population. Retrieved from nufusu.com/ilce/merkez_canakkale-nufusu on 24 November 2023

[142] Endeksa, 2023 Statistics on Population. Retrieved from endeksa.com/en/analysis/turkiye/canakkale/merkez/demography on 24 November 2023.

[143] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/merkez_canakkale-nufusu on 24 November 2023

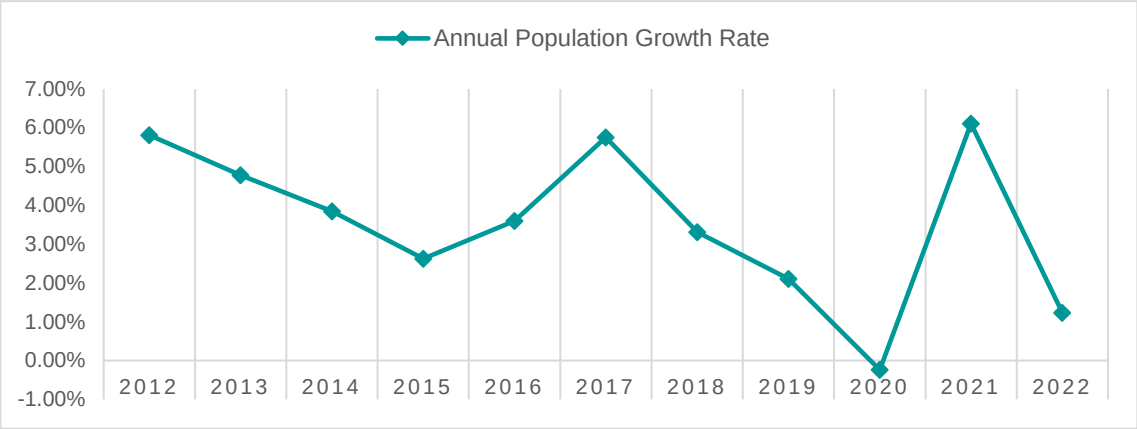


Figure 13.2: Population growth rate of Central District by years

Source: nufusu.com, Statistics on Population, 2022

Table 13.5 given below summarizes the population of Project affected villages in Central district by gender.

Table 13.5: Population of the Project affected villages of Central District (2022)

Name of the villages	Total population	Male	%	Female	%
Kızılkeçili	186	92	49.46	94	50.54
Yukarıokçular	89	51	57.30	38	42.70
Yapıldak	463	226	48.81	237	51.19
Musaköy	166	84	50.60	82	49.40

Source: Nufusu, Statistics on Population, 2022[144]

Kızılkeçili village is approximately 3.3 km distance to the nearest turbine in the Project area. With a population of 186 people, it is the village with the second highest population among the villages in the Central district located within the Project area of influence. The male population rate is 49.46% while the female population rate is 50.54%.

Yukarıokçular village is approximately 3.2 km distance to the nearest turbine in the Project area. With a population of 89 people, Yukarıokçular is the village with the lowest population among the villages in the Central district located within the Project area of influence. The male population rate is 57.30% while the female population rate is 42.70%.

Yapıldak village is approximately 6 km distance to the nearest turbine in the Project area. With a population of 463 people, Yapıldak is the village with the highest population among the villages in the Central district located within the Project area of influence. The male population rate is 48.81% while the female population rate is 51.19%.

Musaköy village is approximately 7 km distance to the nearest turbine in the Project area. With a population of 166 people, it is the village with the second lowest population among the other villages in the Central district located within the Project AoI. The male population rate is 50.60% while the female population rate is 49.4%.

[144] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/merkez_canakkale-nufusu on 24 November 2023

13.3.1.2 Lapseki District (Çanakkale Province)

Lapseki district is one of the 12 districts of Çanakkale province. Lapseki District, with a population of 29,336 in 2022, is the fifth least populous district in Çanakkale.[145] Population density of Central district was 651,91 person/km^2 in 2022[146]. There has been a significant increase in the population over the 10 years. There have been fluctuations in the population growth rate of the district in the last 10 years. The male population ratio in the total population is 49.59%, while the female population ratio is 50.41%[147]. Average household size was 2.62 in 2022[148]. Table 13.6 given below shows the population of Lapseki district by years.

Table 13.6: Population of Lapseki District by years

Years	Total	Male	Female
2022	**29,336**	14,548	14,788
2021	**28,742**	14,347	14,395
2020	**28,313**	14,150	14,163
2019	**27,838**	13,9790	13,868
2018	**27,327**	13,658	13,669
2017	**26,370**	13,125	13,245
2016	**25,931**	12,917	13,014
2015	**25,865**	12,846	13,019
2014	**25,987**	12,937	13,050
2013	**25,661**	12,804	12,857
2012	**25,620**	12,690	12,930

Source: nufusu.com, Statistics on Population, 2022[149]

Population growth rate of Lapseki district in 2022 is 2.07%. It has shown a tendency to decrease in recent years, except for the last year. Figure 13.3 shows the population growth rate of Lapseki district throughout the years.

[145] Nufusune, 2023 Statistics on Population. Retrieved from nufusune.com/canakkale-nufusu on 27 November 2023.

[146] Endeksa, 2023 Statistics on Population. Retrieved from endeksa.com/tr/analiz/turkiye/canakkale/lapseki/demografi on 27 November 2023.

[147] Nufusu, 2023 Statistics on Population. Retrieved from nufusu.com/ilce/lapseki_canakkale-nufusu on 27 November 2023

[148] Endeksa, 2023 Statistics on Population. Retrieved from endeksa.com/tr/analiz/turkiye/canakkale/lapseki/demografi on 27 November 2023.

[149] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/lapseki_canakkale-nufusu on 27 November 2023

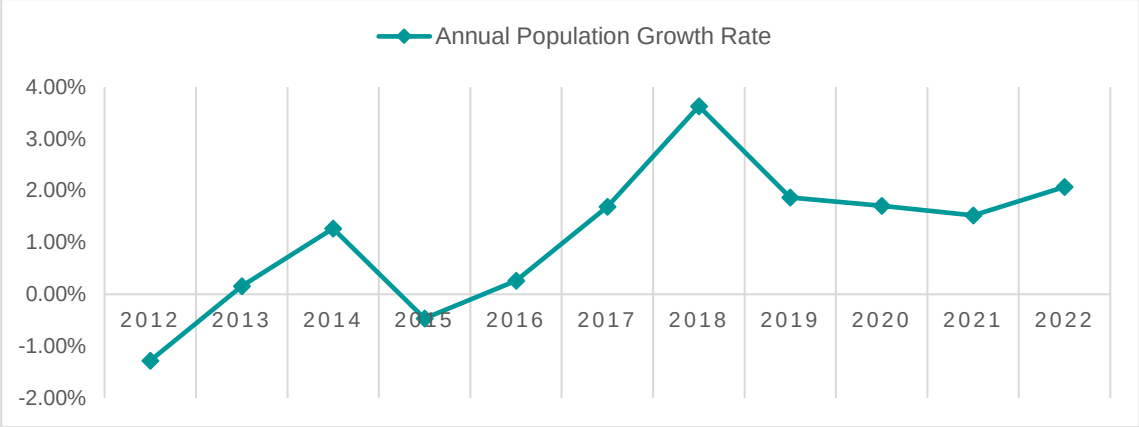


Figure 13.3: Population growth rate of Lapseki District by years

Source: nufusu.com, Statistics on Population, 2022[150]

Table 13.7 given below summarizes the population of Project affected villages in Lapseki district by gender.

Table 13.7: Population of project affected villages of Lapseki District (2022)

Name of the village	Total population	Male	%	Female	%
Hacıgelen	80	40	50	40	50
Üçpınar	60	31	51.6	29	48.4
Beybaş	146	76	52	70	48

Source: nufusu.com, Statistics on Population, 2022[151]

Hacıgelen village is approximately 3.5 km distance to the nearest turbine in the Project area. With a population of 80 people, it is the village with the second lowest population among the villages in the Lapseki district located within the Project area of influence. The male and female population rate is equal.

Üçpınar village is approximately 1.6 km distance to the nearest turbine in the Project area. With a population of 60 people, Üçpınar is the village with the third highest population among the villages in the Lapseki district located within the Project area of influence. The male population rate is 51.6% while the female population rate is 48.4%.

Beybaş village is approximately 4.5 km distance to the nearest turbine in the Project area. With a population of 146 people, it is the second lowest population among the villages in the Lapseki district located within the Project area of influence. The male population rate is 52% while the female population rate is 48%.

[150] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/lapseki_canakkale-nufusu on 27 November 2023

[151] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/lapseki_canakkale-nufusu on 27 November 2023

13.3.2 Education Services

13.3.2.1 Central District (Çanakkale Province)

There are 11 kindergartens in Central district[152]. The number of primary schools and high schools are noted as 36 and 17 respectively in 2023[153]. There is also a Public Education Centre, Vocational Education Centre, Science and Arts Centre, Special Education Centres, and Guidance and Research Centre within the district. Table 13.8 given below summarizes the educational level of the residents in Central district.

Table 13.8: Education rates in Central District (%)

Education level	Population (%)
Illiterate	0.7
Literate/ not graduate	5.6
Primary school	31.8
High school	25.5
University or higher degree	26.8
Unknown	9.6
Total	**100**

Source: Endeksa, Statistics on Educational Levels (2023)[154]

85% of the total population in Central district has at least a primary school degree, which shows the high rates of literacy in the region. Only one in each twenty people is within the category of “literate but do not have a diploma” whereas the illiterate people constitute less than 1% of the population.

Figure 13.4 below shows the locations of the educational services in the Project affected villages.

[152] Merkez District Directorate of National Education, 2022. Educational Institutions Statistics. Retrieved https://www.meb.gov.tr/baglantilar/okullar/index.php?ILKODU=17 on 29 November 2023.

[153] Merkez District Directorate of National Education, 2022. Educational Institutions Statistics. Retrieved https://www.meb.gov.tr/baglantilar/okullar/index.php?ILKODU=17 on 29 November 2023.

[154] Endeksa, 2023 Statistics on Educational Levels. Retrieved from endeksa.com/tr/analiz/turkiye/canakkale/merkez/demografi on 29 November 2023.

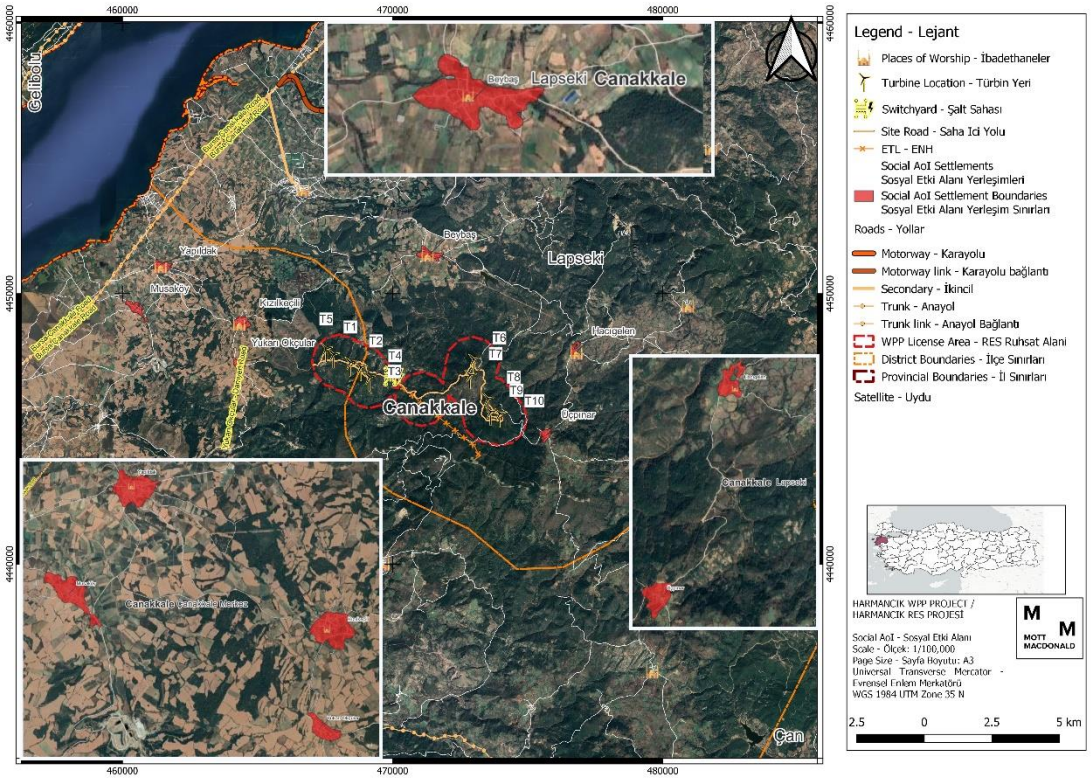


Figure 13.4: The locations of social infrastructures for Project's area of influence

There are no schools in the Project affected villages in Central district. The educational patterns within the Project affected villages in Central district can be summarized as follows:

- The school in Kızılkeçili village, which used to be operational in the past, is currently closed. It was stated that five students living in the village continue their education through mobile education system. The school building is currently used as a rental house or warehouse. Residents said that the school could be reopened if there were minimum 15 students and stated that the building was well-maintained because there were people living in it since the school was closed.
- It was reported that there was no school in the Yukarıokçular village after the transition to the mobile education. Mukhtar stated that people who have children moved to Çanakkale for them to receive better education.
- The approximate number of students in Yapıldak village is not known. Regarding the education practices in Yapıldak village, no data could be obtained through the methodologies of this ESIA study, including desktop research and site visit.
- The approximate number of students in Musaköy village is not known. Regarding the education practices in Musaköy village, no data could be obtained through the methodologies of this ESIA study, including desktop research and site visit.

13.3.2.2 Lapseki District (Çanakkale Province)

Lapseki district has two kindergartens, six primary schools, seven middle schools and three high schools. There is also a Public Education Centre and a Vocational Education Centre, and a Rehabilitation Centre within the district[155]. The educational level of the residents of Lapseki

[155] Lapseki District Directorate of National Education, 2022. Educational Institutions Statistics. Retrieved lapseki.meb.gov.tr/ on 29 November 2023.

district is provided in the table below. Table 13.9 given below summarizes the educational level of the residents in Central district.

Table 13.9: Education rates in Lapseki District (%)

Education level	Population (%)
Illiterate	0.8
Literate/ not graduate	8.3
Primary school	52.3
High school	17.0
University or higher degree	11.8
Unknown	9.8
Total	**100**

Source: Endeksa, Statistics on Educational Levels (2023) [156]

The number of illiterate people in Lapseki district constitutes the least populated category among other levels of education. The distribution of the population that has a university or higher degree is quite close to the number of people with a high school diploma and those who are literate but not graduate. On the other hand, people with primary school diploma have the highest rate among the population in Lapseki district.

According to the consultations with the mukhtars and secondary statistical data, Project affected villages in Lapseki district do not have any educational facilities. The statement given below summarize the baseline information about the students in the Project affected villages:

- As reported by the mukhtar of Hacıgelen village, a few children living in the village go to Umurbey for primary school education. It has been stated that mobile education plays an important role in the migration of people from villages to provincial or district centres. The school in the village, which was closed with the transition to mobile education, is used as a hay warehouse today. Mukhtar said that the residents moved to the provincial and district centres, especially Umurbey, in order to access better education opportunities.
- As reported by the mukhtar of Üçpınar village, a few children living in the village go to Umurbey for primary school education. The mukhtar also said that the school in the village was closed because of the transition to mobile education and currently the school building was idle.
- The approximate number of students in Beybaş village is not known. Regarding the education practices in Beybaş village, no data could be obtained through the methodologies of this ESIA study, including desktop research and site visit.

13.3.3 Local Economy

13.3.3.1 Central District (Çanakkale Province)

Central district is a region where many different economic activities take place, as it is one of the most populous and developed regions of Çanakkale.

Although agriculture is the most important activity in the Çanakkale economy, agriculture-based industries have been developing in recent years and, accordingly, the share of industry in the economy is increasing. In existing industrial establishments, rebar, frozen and dried food,

[156] Endeksa, 2023 Statistics on Educational Levels. Retrieved from endeksa.com/tr/analiz/turkiye/canakkale/lapseki/demografi on 29 November 2023.

aquatic products, dairy products, flour, feed, cement, mineral ore, ceramic and ceramic tiles, and olive oil are produced[157].

In Çanakkale, where the organic farming has a great potential, olive cultivation is carried out in most of the areas where organic farming activities are engaged. Within the scope of feed production, which is a significant cost for the livestock sector, forage crops such as corn, oats (green grass), alfalfa (green grass), Italian grass, and common vetch (green grass) are grown. Fishing is also among the important sources of income in the region. Products such as fresh chilled and frozen fish, processed seafood (canned), processed bivalve mollusc, marinated shrimp and sand mussels are exported. Çanakkale is among the top 10 provinces in Türkiye in terms of good agricultural practices production area. Within the scope of good agricultural practices, more than 20 products in total are grown, such as olives, peaches, apples, tomatoes, nectarines, grapes, and cherries. Good agricultural practices are implemented in many districts, including the central district. Çanakkale has a rich flora suitable for beekeeping activities. Although flower honey is mainly produced in the province, pine honey production is also exist.[158]

The main sources of income of the Kızılkeçili village are based on agriculture, forestry, and animal husbandry. There are 300 cattle and around 1000 small cattle in the village. It has been stated that in Kızılkeçili, where dairy farming is carried out, an average of 1 ton of milk is given daily from the village, and the dairy farms are decreasing their milk purchase prices day by day. They stated that animal husbandry has become difficult due to the serious increase in fertilizer and feed prices. The residents stated that dry farming was carried out in the village and that wheat, barley and sunflower were produced. They stated that in the past years, in addition to these products that they sold in the domestic market, they also planted broad beans, sesame and chickpeas, but they could not continue planting these products due to the fungal disease seen in the village. Mushroom picking activities are carried out in the autumn season which are used for individual consumption.

The main sources of income of the Yukarıokçular village are based on agriculture and animal husbandry. There are 40 cattle and 1000 small cattle in the village. Residents engaged in dairy farming sell their animals' milk to a dairy farm from Lapseki district. It was stated that although they had previously established a cooperative for livestock activities, the cooperative was closed. On the one hand, mukhtar said that young people continue agriculture and animal husbandry, on the other hand, he added that there is a decrease in animal husbandry. It has been stated that barley, wheat, and sunflower are grown as agricultural products in the village, and the grown products are both sold and seen as products that animals will consume throughout the year. Beekeeping and mushroom picking activities are carried out for household consumption and are not sold.

Desktop studies cannot provide sufficient information on local economy, livelihood, and employment for Yapıldak and Musaköy villages. On the other hand, limited time to complete the site visit studies remained as a limitation to receive detailed data on these issues.

13.3.3.2 Lapseki District (Çanakkale Province)

Lapseki is a district with 361,788 decares of agricultural land. 32% of this land is used as arable crops, 18% as fruit garden, and 3% as vegetable agricultural land. Commercially valuable products have come to the fore and have significantly affected the production of the local people. Fruits are grown intensively in the region and high-quality products can be obtained. Lapseki has become a brand in peach, nectarine and cherry cultivation. Peach cultivation, which

[157] Çanakkale Municipality. Economical Structure of Çanakkale. Retrieved from https://www.canakkale.bel.tr/tr/sayfa/1126-ekonomik-yapi on 01 December 2023

[158] South Marmara Development Agency (2021). Çanakkale Agriculture and Livestock Guide. Retrieved from https://www.gmka.gov.tr/dokumanlar/yayinlar/Canakkale-Tarim-Hayvancilik-Rehberi.pdf on 01 December 2023

brings high income, constitutes the livelihood of the population engaged in agriculture. 11.10% of Türkiye's peach production comes from Lapseki district[159].

At the same time, products such as cucumber, lettuce, tomato, pepper, green beans, eggplant and strawberries are produced in the field of greenhouse cultivation[160]. Table 13.10 given below shows the agricultural areas and their purpose of land usage in Lapseki district.

Table 13.10: Agricultural areas and their purpose of land usage in Lapseki District

Type	Area (da)	Percentage (%)
Arable crops	114,105	32
Fruit garden	63,862	18
Vegetables	12,159	3
Fallow pasture	30,512	8
Vacant land suitable for agriculture	141,150	39
Total	**361,788**	**100**

Source: The Agricultural Potential of Lapseki District (2021)[161]

The main source of income in the Hacıgelen village is animal husbandry. It is engaged in small livestock farming. It has been stated that the young people of the village are mostly engaged in animal husbandry. There are nearly 600 animals and all of them graze in the pastures around the region for 12 months. The people of Hacıgelen, who engage in dairy farming and obtain an average of 2 tons of milk per day, give their animals' milk to a dairy farm coming from Lapseki district. It has been said that agricultural activity is carried out on a subsistence basis and is aimed only at meeting the needs of animals. In Hacıgelen, where dry farming activities are carried out, mostly oats and barley are cultivated. In addition to dry farming and animal husbandry, it is said that women work in fruit farming in Umurbey village. It is stated that women who went to Çanakkale continued to work in domestic or agricultural labour. There are no mushroom farming or beekeeping activities being carried out in the village. It has been stated that forestry was previously a source of income in the village. Now, forestry has been defined as an unsafe area by the residents according to a contract signed by the state to forestry workers which emphasizes, "the state does not accept liability for any work accidents".

The main sources of income of the Üçpınar village are based on agriculture and animal husbandry. There are 300 cattle in the village. All the animals graze in the pastures around the region for 12 months. There is no one engaged in agriculture in the village.

Additionally, there are no mushroom picking, forestry, or beekeeping activities. Although fruit farming is not being carried out in the village, in Umurbey it is an important source of income for the village.

Desktop studies cannot provide sufficient information on local economy, livelihood, and employment patterns for Beybaş village. On the other hand, limited time to complete the site visit studies remained as a limitation to receive detailed data on these issues.

The Project Company pointed out the possible collaborations with the Provincial Directorate of Agriculture and Forestry to improve the livelihood resources. Accordingly, the following projects can be developed:

[159] The Agricultural Potential of Lapseki District (2020). Retrieved from dergipark.org.tr/en/download/article-file/1397847 on 29 November 2023

[160] South Marmara Development Agency (2021). Çanakkale Agriculture and Livestock Guide. Retrieved from https://www.gmka.gov.tr/dokumanlar/yayinlar/Canakkale-Tarim-Hayvancilik-Rehberi.pdf on 01 December 2023

[161] The Agricultural Potential of Lapseki District (2020). Retrieved from dergipark.org.tr/en/download/article-file/1397847 on 29 November 2023

- Socioeconomic development projects for women empowerment (i.e., awareness trainings on marketing, tomato paste machine support to increase production growth)
- Grass support for the households whose livelihoods are based on animal husbandry
- Certified wheat and barley seed support whose livelihoods are based on agriculture and animal husbandry

13.3.4 Land Use and Ownership of Assets

The lands in the Central and Lapseki districts of Çanakkale province, which constitute the impact area of the Project, provide different uses for the people of the region.

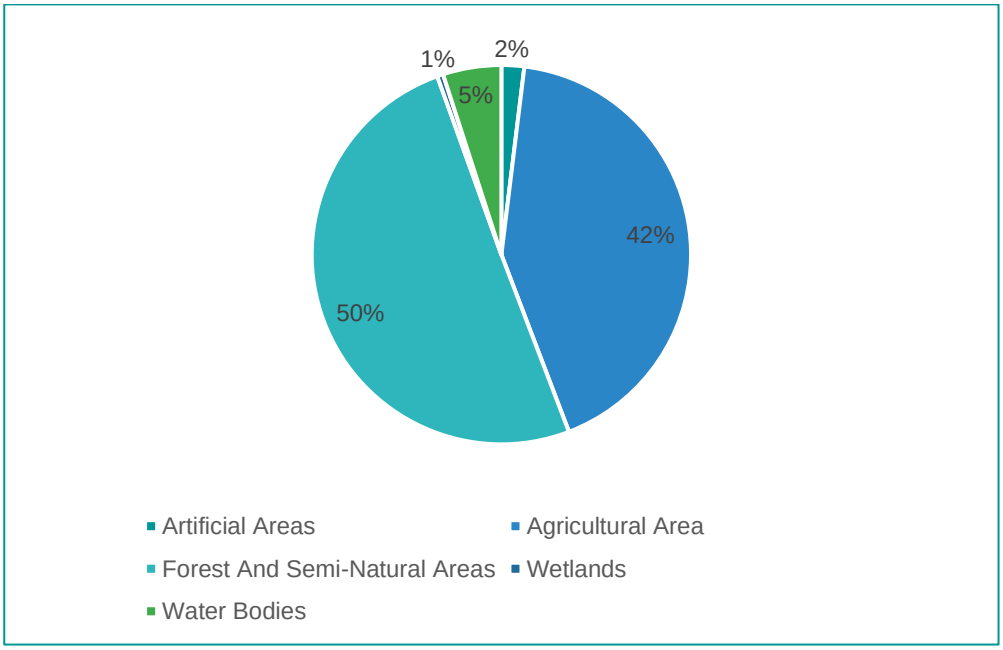


Figure 13.5: Çanakakle Province land use distribution chart in 2018

Source: Republic of Türkiye Ministry of Agriculture and Forestry, Corinecbs[162]

As it can be seen in the Figure 13.5 above, forest and semi-natural areas consists half of the total use of land in Çanakkale with %50. This is followed by agricultural land with 42%.

The table below covers all settlements specifically for housing buying and selling.

Table 13.11: Çanakkale housing sales in 2022

Total Housing Sales	Mortgage Sales	Other Sales
11,917	2,423	9,494

Source: TurkStat & General Directorate of Land Registry and Cadastre

Addition to this, Figure 13.6 below provides a summary of the size of agricultural land in operation in Çanakkale province for the last five years.

[162] Retrieved from: Corine (tarimorman.gov.tr) on 26 November 2023

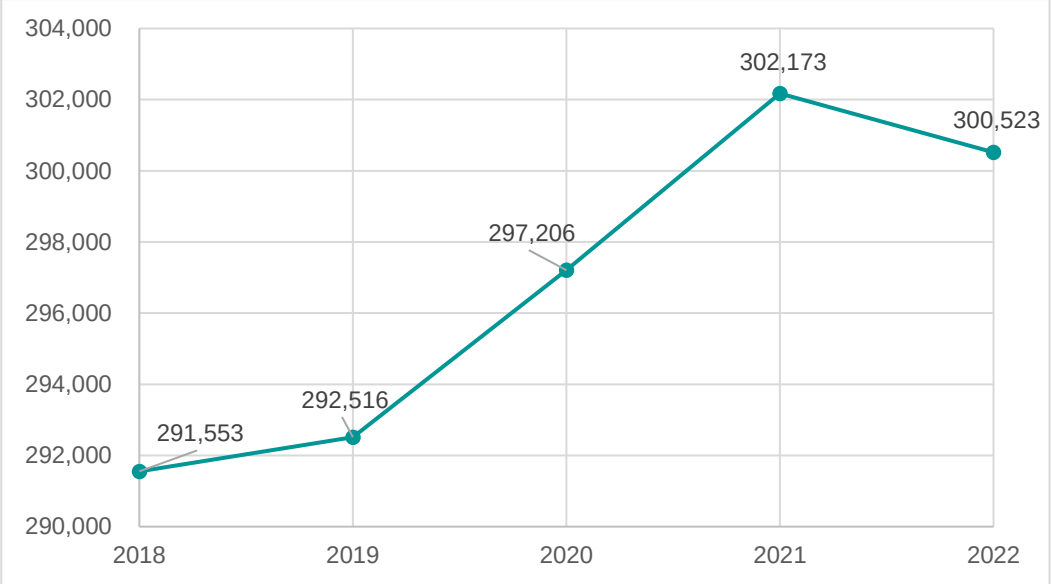


Figure 13.6: Land use in Çanakkale: Total cultivated agricultural area and perennials (hectares)

From 2018 to 2021, there is a steady increase in agricultural areas. In 2022, it declined slightly and lost its momentum. The main reason for this can be the bottleneck in the country's economy and the decline in the profits of agricultural producers as a source of livelihood.

In Lapseki, which has a total of 361,788 decares of agricultural land, 32% of these lands are used as agricultural land, 18% as orchards and 3% as vegetable production areas. Fruit is grown extensively in the region. For example, Lapseki has an important place in the country in peach, nectarine and cherry cultivation. High-income peach cultivation constitutes the livelihood of the population engaged in agriculture. 11.10% of Türkiye's peach production is obtained from Lapseki district.[163] The fact that its soils are fertile, and the climate is not too harsh has increased the importance of agricultural production in the district.

13.3.4.1 Urgent Expropriation

According to the Turkish legislation, the land acquisition, expropriation and urgent expropriation processes are based on the Expropriation Law No. 2942 (Official Gazette (OG) Date/Number: 08.11.1983/18215) and relevant laws concerning amendments to the Expropriation Law.

Article 27 of the Expropriation Law authorizes the administration (Energy Market Regulatory Authority in this case) responsible for expropriation to confiscate the immovable assets required by the project earlier than the time needed in normal expropriation procedure. This process does not prevent challenges of the property owners against the determined valuation. If the urgent expropriation is unavoidable, right owners (displaced persons) should be meaningfully informed about the expropriation of needed immovable properties and initial compensation at initial phase of land acquisition by responsible agency.

Pursuant to Article 15, it is compulsory to form a committee of experts of at least three persons, depending on the type and nature of the land to be expropriated. One of the experts must be chosen from among experts with a master’s degree or doctorate in real estate development or

[163] Gür, E., Agricultural Potential of Lapseki District (2020), Retrieved from: https://dergipark.org.tr/en/download/article-file/1397847 on 26 November 2023

from among real estate appraisers authorised in accordance with the Capital Market Law of 6 December 2012, number 6362.

The decision of the court to seize the immovable property shall be notified to the land registry office. The provision that the immovable property cannot be transferred, alienated or assigned to another person shall be annotated in the land registry.

Urgent Expropriation Procedure (UEP)

The steps of the UEP process for a private sector investor are as listed below;

- The investor applies to the relevant public authority (administration), i.e. a regulatory agency or local government, for urgent expropriation of immovable properties on which the project will be located.
- A “Public Interest Decision” is taken by the administration as a requisite for requesting the Presidency to take an “Urgent Expropriation Decision”. The Public Interest Decision is to be approved by the local government where the project is located.
- An “Urgent Expropriation Decision” is issued by the Presidency, affective by the Official Gazette publication date.
- The administration conducts another decision for the start of expropriation process, i.e. UEP and prepares or have others to carry out a scaled plan (which is called expropriation plan) including borders, surface area and type of immovable properties or resources and list of owners or possessors of such properties in case there exist no registered title deed and their addresses. In practice, administrations make this plan prepared by the private sector investors.
- The administration requests the local civil court of first instance to initiate the immediate seizure of the target property (*First Lawsuit*).
- The local civil court establishes a valuation committee who determines the price within seven days. The administration deposits the determined amount in the name of the owner. The usual practice is that the requesting private entity investor covers the cost of expropriation.
- Local civil court notifies/invites the owner either in writing (if the contact addresses of the owners available) or via newspaper announcement. Such an announcement includes information about the bank where the money has been transferred.
- At this stage, the parties can reach an agreement. If an agreement is signed, the expropriation process is completed with the payment of the agreed price and the registration of the property in the name of the public authority at the local Title Deed Registry. If not, the process continues with administration’s appeal to court for completing the expropriation process pursuant to Article 10 of the Expropriation Law (*Second Lawsuit*).
- However, regardless of whether or not an agreement is reached, seizure is made after the amount specified is deposited by the administration in the name of the owner. Following the seizure order of the court, utilization rights is formalized between the public authority and private entity investor. The investor can begin to utilize the relevant target property.
- If needed, the administration entitles the Execution Office under local Administration of Justice to evacuate immovable property within 15 days. In practice, administrations and investors try to execute a peaceful evacuation process by informal consultation and assistance. In case of the cultivated land to be evacuated, the cost of the crop is compensated before evacuation.

It should be noted that some lands acquired for the access roads and wind turbines are subject to urgent expropriation within the scope of the Project.

13.3.4.2 The Project's Land Use

There is a land acquisition process performed by the Project Company together with the support of the appointed social consultant for the realization of the Project. Site visit findings and cadastral checklist provided by the Project Company point out that acquired lands are privately-owned agricultural lands overlapping access road construction.

Areas are needed on 60 parcels located in five settlements in two district and one province for the seven of them are public lands and 461,081.44 m2 forestland. The distribution of the affected parcels is given in figure below.

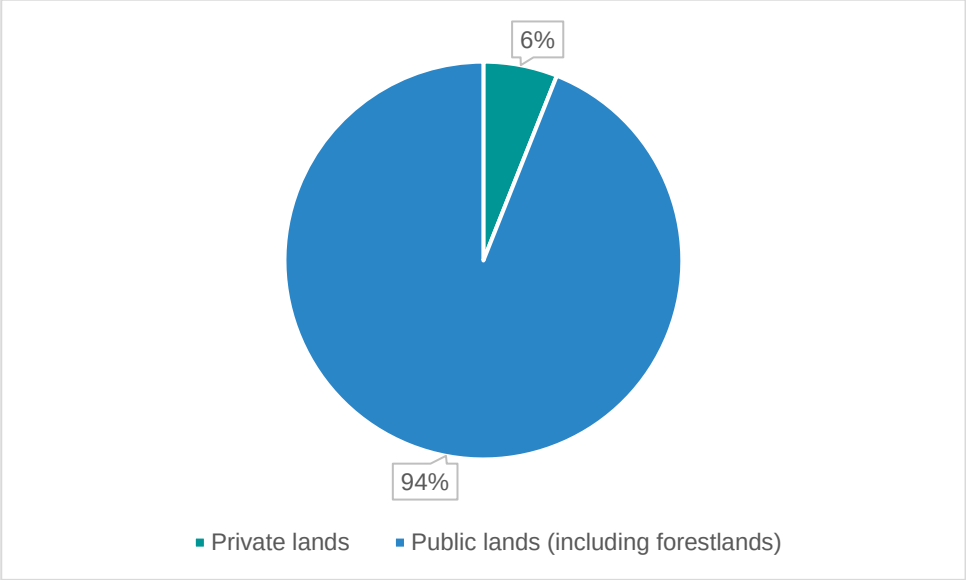


Figure 13.7: Distribution of Affected Parcels by Surface Areas (m^2)

6% of size of the affected areas constitute private lands. The owners/shareholders of private lands are a total of 75 PAPs. Information regarding the public and private lands together with the number and size of parcels and their number of owners/shareholders are given in Table 13.12.

Table 13.12: Project's Needed Lands

Province	District	Settlement	Private lands			Public lands		
			No. of parcels	Size of lands (m2)	No. of owners/ shareholders	No. of parcels	Size of lands (m2)	Size of forestlands (m2)
Çanakkale	Merkez	Kızılkeçili	16	9,641.66	34	4	4,823.62	
Çanakkale	Merkez	Musaköy	4	1,448.58	10	1	1,731.11	
Çanakkale	Merkez	Yapıldak	20	8,279.14	16	0	0	461,081.44
Çanakkale	Merkez	Yukarıokçular	13	1,0731.8	15	1	229.61	
Çanakkale	Lapseki	Beybaş	0	0	0	1	1,989.34	
Total lands			**53**	**30,101.18**	**75**	**7**	**8,773.68**	**461,081.44**

Source: Enerjisa Üretim, Harmancık WPP EMRA Real Estate List

These parcels cover the turbines, access roads and switchyards and all other key elements of Project infrastructure other than the ETL. A Project-specific RAP is being prepared to identify the actual impacts of the Project on household level due to the land acquisition and expropriation activities.

13.3.4.3 Acquisition of Private Lands

The lands that will be affected by the Project have been identified and the expropriation process has started. Public benefit and urgent expropriation decision was taken by President of the Republic of Türkiye for the Project on 24 November 2023. These decisions show the legal compliance of the Project. As of this date, as the first stage of the expropriation process, the preparation of the Census and Asset Inventory has been started. The owners were listed, and the lands are valuated including fixed assets.

Project construction could be only conducted after the owner or users are offered a compensation package in line with the requirements of IFC PS5 and EBRD RP5, and the compensation is paid.

There are five acquisition types of the lands to be obtained within the scope of the Project, which are listed below:

- **Willing Buyer- Willing Seller:** Purchase of lands at market price with the consent of the owners. 2 parcels are bought by the Project Company.
- **Deed of Consent (Muvafakatname in Turkish):** Even though the expropriation process has not been completed, some lands can be entered with a deed of consent from the owners. Owners/users of 49 parcels crossing the road gave consent for construction.
- **Permanent Acquisition or Ownership Right:** Ownership rights mean permanent land acquisition. The land expropriation is permanent, and the ownership right is registered under the name of the administration. Since a permanent facility will be built on the transferred land, the former owner cannot use the land.
- **Permanent Easement Right:** The parcel is not divided; this right keeps the original owner as title deed holder but establishes right (as annotation) in favour of the administration. Since the permanent facility (tunnels or viaducts) passes under or above the transferred land, the landowner will be able to continue using the land with certain restrictions (such as not being able to build houses).
- **Land Rentals through Lease Contracts:** In case of any temporary land need (e.g., for the camp site, storage area) land can be rented for a certain period under the terms and rates mutually agreed between the Contractor and the landowner. After the contract expires, the land will be reinstated and returned to its owner in its original condition.

As a result of the agreements made with the landowners during the negotiations, the offer prices are determined before the purchase process. The area to be purchased is divided into agricultural area classes (Irrigated Agriculture, Dry Agriculture, Covered Vineyard, etc.) for which different average prices will be used by an independent valuation firm licensed by the CMB (Capital Markets Board of Türkiye), taking into account social and geographical criteria. Valuation prices are made according to this specific grouping; parcels within the same group are not given different prices. In the valuation studies, the ongoing economic and social activities in the parcels affected by the Project were taken into consideration.

In addition, for the time-limited operations to be carried out on state lands, in order to start the construction works of the Project without delay on the lands that were cultivated by the citizens before the cadastre was carried out but later allocated as Forest / Treasury / Pasture land by the cadastre, firstly, the prices of the buildings and / or trees and / or crops are paid. The amounts to be paid are determined by the assessments of experts licensed by the CMB as will be explained in detail in the RAP document to be prepared. Payments are made by obtaining

"Consents" from the landowners and with these consents, the Project construction starts. In this case, the right holders are paid for the buildings and/or trees and/or products with a "Record" and "Letter of Commitment".

Settlement negotiations with landowners are conducted by the "Land Acquisition Commission" with the participation of the relevant Survey Engineer, Procurement Officer, Project / Operation / Power Plant Manager and/or persons deemed appropriate by these persons. Before the settlement negotiations begin, the Map Expropriation Unit informs the landowners participating in the negotiations about the Project, the areas affected by the Project and the land acquisition processes. In this context, important regulatory information such as how the negotiations will work, what needs to be done and the necessary documents when a compromise is reached, and the legal expropriation procedure to be followed in cases where no compromise is reached are shared.

When the information is completed, settlement negotiations are carried out by meeting with the landowners one by one in front of the public within the scope of the transparency policy. Negotiations are completed in a way to remain loyal to the minimum and maximum prices previously determined within the company. At the end of the negotiations, the list of parcels on which a final agreement is reached is printed out and signed by the team conducting the negotiations and the Project / Operation / Power Plant Manager.

13.3.4.4 Acquisition of Public Lands

Forestlands

Forest lands (wholly owned by the Ministry of Agriculture and Forestry) will be purchased through long-term lease (49 years) agreed by the local Forestry Directorates.

Treasury Lands

The acquisition of Treasury land is processed by correspondence and no payment is made for these plots.

Lands Belonging to Other Public Institutions

Land owned by other state authorities (such as municipalities, Water and Sewerage Administration, General Directorate of Highways) is subject to Article 30 of the Land Acquisition Law. This process is very similar to private land ownership, but the negotiation is carried out in written correspondence.

Pasturelands

Land allocated for pasture will be acquired through changing the status from pastureland to Treasury land and will be treated as Treasury land.

Common Lands of the Settlements

Land allocated to the settlements will be acquired through changing the status from pastureland to Treasury land and will be treated as Treasury land.

Non-Registered Areas

When it is necessary to register areas that are excluded from title deed (mostly stony, bushes, raw soil, stream culverts, etc. and are not suitable for income-generating use), it is a method to register them with the Treasury.

13.3.4.5 ETL Construction Design and Land Use

Document provided from Türkiye Ministry of Energy and Natural Resources, General Directorate of Turkish Electricity Transmission Corporation (TEİAŞ) comprises of 154 kV single-

circuit transmission line of approximately 4.5 km for connection to Üçpınar Transformer Substation which is currently operated by TEIAS. Therefore, the ETL is exempt from the National EIA and further information regarding the exemption is provided in Section 2.5.1.3.

According to the Project Information Document (PID) prepared for the ETLs to be constructed within the scope of the Project, excavation works will be performed to open the pits where the pylons will be placed. A total of four pits, each with a depth of 3 m and and a surface area of 9 m*2*, will be dug for each pylon. Excavated materials will be stored nearby storage area and used to backfill the excavated pits. Therefore, there will be no surplus excavation material to be transported outside of the construction site.

According to the information obtained from Project National Final EIA Report, January 2023, and Eltemtek, 2023, ETL Project Final Project Description Document, there is one type of land within the ETL master plan. The area within the ETL that are considered within the scope of the Environmental Plan in the Zoning Law is listed as Forest Land. This information will be updated when the exact parcels to be crossed by ETL are revealed.

It is planned that there will be no expropriation process to be followed for the construction of the ETL. Since location of the poles are not certain yet, the further assessments will be made for both the pylon points and the line route once the land acquisition procedures on the parcels to be affected by the ETL construction are finalised. When parcel information becomes available for ETL, Project-specific RAPs will be updated accordingly. In the RAP, a framework to ETL construction will be presented and potential entitlements will be revealed.

13.3.5 Infrastructure: Health, Transport, Water Supply and Sewerage

Figure 13.8 below shows the locations of the social infrastructural services (e.g. educational institutions, local shops, and mosques) in Project affected villages.

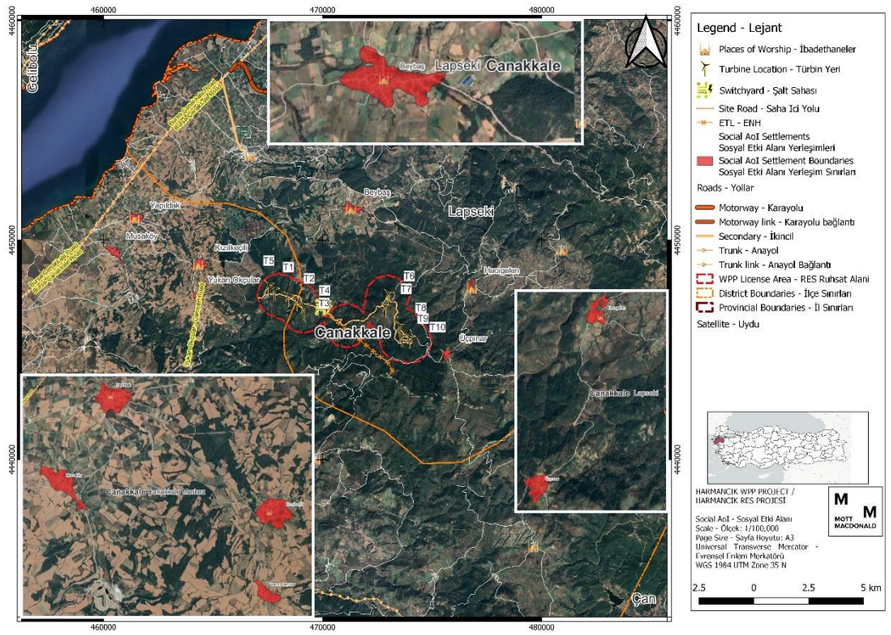


Figure 13.8: Social infrastructural services in Project affected villages

13.3.5.1 Central District (Çanakkale Province)

There is an electricity network and a landline telephone in the Kızılkeçili village. It has been stated that there is a spring water and a 50-ton water tank in the village and that another water tank is planned to be built in the future. For more detailed information please see *Chapter 5: Water Quality, Hydrology and Hydrogeology*. There is sewerage system in the village. The residents stated that there is a garbage storage area at the intersection of four villages, including three villages in the surrounding area, and added that this garbage storage area opened an employment area for their village. For more detailed information please see *Chapter 11: Waste and Resources*. Residents said that there were no common health problems in the village and added that they heard of problems such as leg pain, joint pain, and hernia. Although there is no health centre in the village, they stated that a doctor comes every week or every 15 days for check-ups. The nearest health care facility to the village is in the Umurbey town, which located approximately 11 km away from the Kızılkeçili village.

There is an electricity network and a landline telephone in the Yukarıokçular village. Mukhtar stated that there is a spring water and is supplied to all parts of the village from the same line. It is said that there is a possibility of water problems due to the water supplied to fields and animals. There is a water tank and a 300-ton pool in the village. Stating that their infrastructure is developed, mukhtar said that the village has a sewage treatment system. It has been stated that there is no common health problem in the village. The nearest health care facility to the village is in the Umurbey town, which located approximately 12.5 km away from the Yukarıokçular village.

There is an electricity network and a landline telephone in the Yapıldak village. The village has a water supply network and sewerage system. There is no health centre in the village. The nearest health care facility to the village is in the Umurbey town, which located approximately 6.9 km away from the Yapıldak village. Although the road providing access to the village is asphalt, it has a poor quality. The roads connecting the villages to agricultural areas are mostly stabilised roads.

There is an electricity network and a landline telephone in the Musaköy village. The village has a water supply network and sewerage system. However, there is a septic tank in the village from which wastewater is conveyed to the municipal treatment plant. There is no health centre in the village. The nearest health care facility to the village is in the Umurbey town, which located approximately 9,6 km away from the Musaköy village. Although the road providing access to the village is asphalt, it has a poor quality. The roads connecting the villages to agricultural areas are mostly stabilised roads.

13.3.5.2 Lapseki District (Çanakkale Province)

There is an electricity network and a landline telephone in the Hacıgelen village. The water of the village is a spring called "iron melting water (demireriten su)". Residents stated that the most recognizable feature of the surrounding villages is related to this water source in their village. It is among the information given about the infrastructure that there is no sewage system in the village. However, there is a septic tank in the village from which wastewater is conveyed to the municipal treatment plant. . There is no health centre in the village. The nearest health care facility to the village is in the Umurbey town, which located approximately 15 km away from the Hacıgelen village. Although the road providing access to the village is asphalt, it has a poor quality. The roads connecting the villages to agricultural areas are mostly stabilised roads.

There is an electricity network and a landline telephone in Üçpınar village. There is both spring water and well water in the village. It is among the information given about the infrastructure that there is no sewage system in the village while there is a septic tank from which wastewater is conveyed to the municipal treatment plant. There is no health centre in the village. The nearest

health care facility to the village is in the Umurbey town, which located approximately 19,3 km away from the Üçpınar village. Although the road providing access to the village is asphalt, it has a poor quality. The roads connecting the villages to agricultural areas are mostly stabilised roads.

There is an electricity network and a landline telephone in Beybaş village. The village has a water supply network. There is no sewerage system in the village. However, there is a septic tank in the village from which wastewater is conveyed to the municipal treatment plant. There is no health centre in the village. The nearest health care facility to the village is in the Umurbey town, which located approximately 7,2 km away from the Beybaş village. Although the road providing access to the village is asphalt, it has a poor quality. The roads connecting the villages to agricultural areas are mostly stabilised roads.

13.3.6 Gender Considerations

As per the Turkish Constitution, women have equal rights with men in terms of access to certain services such as health and education, participation in the labour market, and rights on the lands and inheritance. However, women cannot find the same opportunities as men in Türkiye in many fields of social life.

According to the 2023 Gender Gap Index of the World Economic Forum, Türkiye is the 129th country out of 146 countries depending on the indicators of economic participation and opportunity, educational attainment, health, and survival, and political empowerment[164].

In terms of labour force participation, the rate among women was 32.8% whereas it was 70.3% among men in 2021, which is the most recent data at national level[165]. Unemployment rate for men was 10.7% and 14.7% for women in the same year.

There is also some gender-based inequalities in terms of educational attainment. The illiteracy rate among women who are older than 25 years was recorded as 6.1% and it was 1% for men in 2021[166]. The rate of individuals who are older than 25 and have completed at least one educational level was 87.3% for women and 97.1% for men for the same year.

Türkiye has some areas of improvement in terms of political empowerment as well. While half of the total population in Türkiye is women, the female parliament members constitute only 20% of the whole Turkish parliament as of May 2023[167]. The figure is not very different when the rate of women in local governance is considered. The women's representation in local government has been only 10.1% since 2019[168].

At provincial level, Çanakkale was ranked as 6th amongst 81 provinces for gender equality according to 2020 Gender Equality Assessment in 81 provinces conducted by TSKB, Tepav and TOBB[169]. This finding illustrates that Çanakkale province has lower gender equality gaps than the overall average of Türkiye; however, there is still need for progress.

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[164] World Economic Forum, Global Gender Gap Report. June 2023. Retrieved from https://www3.weforum.org/docs/WEF_GGGR_2023.pdf on 30 November 2023.

[165] Turkish Statistical Institute, Women in Statistics, 2022. Retrieved from TÜİK Kurumsal (tuik.gov.tr) on 30 November 2023.

[166] Turkish Statistical Institute, Women in Statistics, 2022. Retrieved from TÜİK Kurumsal (tuik.gov.tr) on 30 November 2023.

[167] Members of the 28th Term Turkish Parliament. Retrieved from Türkiye Büyük Millet Meclisi (tbmm.gov.tr) on 30 November 2023.

[168] World Economic Forum, Global Gender Gap Report. June 2023. Retrieved from https://www3.weforum.org/docs/WEF_GGGR_2023.pdf on 30 November 2023.

[169] TSKB, Tepav and TOBB, Gender Equality Assessment in 81 Provinces, 2020. Retrieved from https://www.tskb.com.tr/uploads/file/8c1cb7177b044d3e4d0aaae6a7ed121c-1639646238384.pdf on 30 November 2023.

Within the scope of the ESIA studies of the Project, the district or village level data remained limited with the verbal statements of the local community members since there are no officially registered data on gender considerations on the basis of district or village. In the gender-based equality index calculation made in 81 provinces and 234 districts of Türkiye in 2020, 27 indicators were used in four main categories such as political participation and decision-making, education, economic life and access to resources, and health and sports. As a result of this evaluation, Çanakkale central district was among the top 5 districts with the highest gender equality[170]. Also, in Lapseki district, it is observed that gender equality in terms of female labour participation and educational attainment figures is higher compared to other districts in Türkiye.

At village level, the gender-based division of labour is prominent within the households as per the statements of the consulted local community members and official representatives. During the site visit in October 2023, it is seen that the effects of modernity are strong due to the migration from the villages in the Harmancık WPP impact area to the city centres, the high level of socio-cultural interaction with the urban space and the fact that these villages are very close to touristic areas. Parallel to this, in the context of gender equality, when compared to Türkiye in general, it is observed that the rural traditional structure and patriarchal relations in the Harmancık WPP impact area are losing their strength. Fruit farming, which is an important source of income for the villages, is usually performed by women. On the one hand, women in the village help their husbands' agricultural and animal husbandry activities, while they work as daily wage workers for fruit farming. It has been observed that particular attention is paid to the education of girls, and women's participation in business life is supported, at least partially. However, it should be noted that some traditional codes and rural relations continue to be influential. Expectations regarding the Project's local employment of both female and male local community members were reported by the consulted local community members during the site visit in October 2023. According to the expert opinion of the ESIA Team, type of jobs that local women would be interested in may include but not limited to catering and cleaning activities within the scope of the Project, which may not require specific training other than the obligatory induction trainings which will be provided by the Project Company upon recruitment.

Apart from above-mentioned issues, women are considered to be the main beneficiaries within the scope of the potential corporate social responsibility activities of the Project Company.

13.3.7 Vulnerable Groups

EBRD Environmental and Social Policy (2019) and IFC's Sustainability Framework (2012) define vulnerable groups as the individuals and groups that may be directly and differentially or disproportionately affected by the project because of their disadvantaged or vulnerable characteristics such as their gender, sexual orientation, religion, ethnicity, indigenous status, age (including children, youth and the elderly), physical or mental disability, literacy, political views, or social status.

For the identification and qualification of the vulnerable groups residing in the Project's social AoI, main issues and vulnerabilities in the Project affected villages reported by the consulted mukhtars as well as available data from the governmental institutions are taken into consideration together with the site visit observations.

The vulnerable groups relevant to the Project are identified as economically displaced people whose livelihoods are significantly and adversely affected due to land acquisition process of the Project, the disabled, the poor, the elderly, students, women, woman-headed households, the landless/homeless, seasonal workers, and the unemployed.

[170] İstanbul University Centre for Research and Practice in City Policies, Gender-based Equality Index, 2020. Retrieved from https://www.yanindayiz.org/wp-content/uploads/2020/11/TCEndeksReport.pdf

The number of economically displaced people whose livelihoods are significantly and adversely affected due to land acquisition process of the Project is uncertain since the processes have not been completed yet.

According to the statements of the mukhtars of Hacıgelen and Üçpınar villages, there is no disabled population within the Project affected villages. On the other hand, the percentage of the elderly is quite high among the total population in the villages except for the Hacıgelen village. The mukhtar of the Hacıgelen village stated that there is no elderly population in the village because they are mostly living outside. It was said that those who worked and retired in Çanakkale did not return to the village and continued to live in there. However, in other Project-affected villages the number of the young people and children are quite low. The mukhtar of Yukarıokçular village stated that there is no young population in the village. One of the reasons for the relatively low population of children and young people is that these groups migrate to district and provincial centres for reasons such as education and job opportunities.

There is a balanced gender distribution within the populations of the Project affected villages. As reported by the mukhtars, mostly the older women live alone in the Project affected villages, but they receive retirement pension or old age pension, and their children, grandchildren, relatives and neighbours provide support to them for accessing to health facilities and food shopping.

The unemployment rate within the Project affected villages is reported as low by the mukhtars. Each household has some income ranging from the old age and retirement pension to higher levels of income through various types of economic activities (including agriculture, animal husbandry and wage labour). For the unemployed population, the local employment opportunities are regarded as a positive outcome.

Unpaid domestic labour is not considered by the mukhtars when they mention the unemployment rates. Employment rate is evaluated as per the employment status of the head of households and majority of the men who are head of the households are employed in the Project affected villages. Moreover, the unemployment rate is evaluated on the basis of people who are actively looking for a job. Therefore, women's unpaid labour does not create a situation that contradicts the unemployment rate.

An estimated 365 seasonal workers come from Konya province to three of the affected settlements. According to the information received from the mukhtars, the working and accommodation areas of seasonal workers are not affected by the Project.

There is no Syrians under temporary protection (SuTP) population in the Project-affected villages. The data for district level district is not available. However, it is assumed that the SuTP population is low in the district since the SuTP population in Çanakkale province is only 0.72 % of the whole population[171]. There is also no official data available at village, district, or provincial level about the refugees under international protection (UIP). None of the consulted stakeholders (mukhtars, local community members and district directors of agricultural and forestry) mentioned the specified groups.

[171] Turkish Presidency of Migration Management, 2023. Retrieved from goc.gov.tr/gecici-koruma5638on 01 December 2023.

13.4 Impact Assessment

13.4.1 Construction

13.4.1.1 Population Influx

Considering the population structure of the settlements in the area of influence, it is seen that the annual population growth rates have negative values (1.23% in Central and 2.07% in Lapseki) as given in Section 13.3.1. During the construction phase of the Project, there will be a need for semi-skilled and skilled workers. According to the Project Company's stakeholder engagement strategy, the Project Company tends to employ its workers from the affected villages. During the construction of the turbines, it is likely that semi-skilled workers who have undergone the necessary training will be employed from Central and Lapseki districts, particularly the Project affected villages. With access to this potentially mentioned source of employment, reverse migration is not thought to impact the population at this point.

According to the data provided by the Project Company representatives in December 2023, the estimated number of workforce may increase up to 106 depending on the scope and timeline of the Project during the construction phase, and six personnel within this workforce will be the Project Company employees. . For the operation phase, the number of workforce is estimated to be five, two of whom will be subcontractors. Although it is important to utilize the workers needed for a short time during the construction phase, it cannot be said that it will provide a large influx of workers and a stable employment area that will change the course of the population over the years. In this regard, influx impacts associated with non-local workers' use of local infrastructure (i.e., shops, mosques) are not estimated to occur in the scope of the Project.

In this regard, the Project will not lead to a population influx and the magnitude of the impact as well as the sensitivity of the social receptors regarding this impact are considered to be negligible, which leads to an overall negligible significance within the impact assessment.

13.4.1.2 Education

No impacts are anticipated on the access to education due to the Project's construction activities.

13.4.1.3 Land Use, Physical and Economic Displacement

The Project's land acquisition has been performed with valuation of affected assets according to National Law on Expropriation 2942. Areas are needed on 60 parcels located in five settlements in two district and one province for the seven of them are public lands and 461,081.44 m2 forestland. While turbines will be located on public parcels, access road construction activities will utilize both public and private parcels. The comprehensive overview will be crucial for planning and managing the Project effectively. The outputs of the field study conducted under RAP reveal the adverse land-based impacts of the Project.

The RAP study prepared for the Project addresses the identification of eligible local community members and the preparation of an asset inventory and census, including formal and informal users of affected land, the assessment of the impact of the Project on land acquisition, and the identification of gaps between national expropriation legislation and IFC PS5/ EBRD PR5 and the preparation of a plan to address the gaps. The findings of the site visit in February 2024 can be summarized as follows:

- All mukhtars of the five Project affected villages had knowledge about land acquisition activities of the Project and four of them stated that they received information about the land acquisition process from institution officials.

- During the surveys with household members in the Project's social AoI, household members were asked for their opinions about the problems arising from the land acquisition and land use of the Project. Accordingly, the answers of the household representatives include adverse impact on agricultural activity due to land loss, access and irrigation problems in agricultural activities and additional costs due to the division of lands, damage risks on irrigation system and difficulties to irrigate other lands, loss of land value, damage risks on products due to dust during construction. In accordance with the principle of compensation at full replacement cost of IFC PS5 and EBRD PR5, measures have been taken to ensure that all households can replace the land they have lost. Other concerns were also evaluated, and the necessary commitments were proposed in the RAP.
- Households' main and three auxiliary/supplementary sources of income were asked, and 93 answers received from 40 households. "Agriculture" is among the four most main sources of income for 89.79% of households. Animal husbandry is among the primary sources of income for 20.5% of households. The second most important source of income for households is pension.
- The four most important expenditures of households were asked, and 126 answers were received from 40 households. "Grocery and nutrition expenses" is among the most important expenditure items of all (100%) households. Agricultural expenses are among the priority expenditure items for 64.1% of households, health, and personal care expenses for 20.5%.
- 35 affected households are engaged in agricultural activities. 20 of the PAH representatives engaged in agricultural activities think that the WPP Project will have a negative impact on agricultural income. The reasons for the impact are:
  - Loss of land,
  - Decrease in efficiency,
  - Decrease in production,
  - Decrease in land value,
  - Damage to facilities such as irrigation system and cold storage.
- As a result of the full census survey and examination of land valuation reports, it was determined that there were affected trees in 35 parcels. It has been determined that most of the trees in question have been compensated in accordance with international standards (at full replacement value). However, the owner of the trees on one parcel were not paid a cutting fee to cut down the trees. These trees will either be cut down by the Project Company or the deductions specified in the RAP will be paid to their owners at the current price. The owner of the trees is identified and given in the RAP. No grievances regarding this issue were received during the RAP preparatory work, but the Project's grievance mechanism will always be open to local community members declaring missing/incorrect compensation calculations for trees.
- According to the expropriation list, there are no pasturelands affected by the Project. Mukhtars of the five villages who know the lands that the Project will use do not expect any impact on pasturelands or access roads to pasturelands. However, if needed, technical and feasible measures will be explored to provide access to pasturelands, and proper passages will be provided to restore access after construction by the Project Company.
- Within the scope of the Project's planned land transactions, there is a cold storage warehouse with parcel number 176/3 in Yapıldak village where a road widening work will take place. According to RAP studies, observations and interviews, there is also a container on the same land. This container where workers are accommodated is outside the expropriation boundaries. However, as the construction site of the Project is very close to the structure, adverse impacts such as dust, noise, vibration and public health and safety are expected. On the other hand, during the construction period, it is important to manage the risks related to community health and safety such as noise or dust, where the local business

located on this parcel is taken into consideration. The Project Company will be contacted during the traffic management and construction planning process in order not to disrupt the economy-based commercial activities of the local business, especially logistics.

- Approximately 460 decares of forest land is affected by the Project. Mukhtars evaluated the impacts on forests or forest access roads and declared that they did not expect forest benefiting activities to be affected by the Project's land acquisition. All household level survey respondents were asked whether they use forests to have products such as wood, medicinal plants and mushrooms, and 30.8% responded as “yes". Five of them think that forest benefiting activities may be affected by the land acquisition of the Project. The activity of benefiting from forests is not among the important sources of income and is aimed at household consumption.
- An estimated 365 seasonal workers come from Konya province to three of the affected settlements. As it is planned to minimize the impacts on agricultural livelihoods within the scope of the RAP, no income/job loss impact on seasonal workers is expected. According to the information received from the mukhtars, the working and accommodation areas of seasonal workers are not affected by the land acquisition of the Project.
- There is no fishing activity in the villages affected by the land acquisition of the Project.

There are no mobile beekeepers in the Project area who will be affected by the Project activities.

- The Project's physical resettlement strategy is to avoid relocation in accordance with PS5 and PR5. There are building on the affected lands but no residential and commercial buildings are affected by the Project.
- The findings of the site visit in February 2024 pointed out that there are two residential buildings on the two parcels affected by the land acquisition of the Project. But the houses are out of expropriation area and physical resettlement has been avoided. Based on field study data, it is anticipated that there will be dust and noise effects due to construction. Measures to mitigate these impacts will be implemented through an Environmental and Social Management Plan (ESMP).
- ESIA studies point out that there are structure owners whose structures are within the turbine setback area of the Project. However, it should be noted that no physical displacement is observed within the scope of the Project’s resettlement field studies. Still, impact assessment studies have not been completed yet. Relevant revisions will be made once the identification and assessment of structures located in proximity to the turbines are completed.
- The Project’s preliminary economic displacement strategy is to avoid or minimise economic displacement in accordance with PS5 and PR5. For this reason, following principles are adopted:
  - Avoiding damage to cultivated crops (waiting for the harvest),
  - Avoiding construction activities or taking precautions against dust emission during crop sensitive periods,
  - Avoiding damage to irrigation systems,
  - Avoiding agricultural access closures,
  - Avoiding animal access closures.

The construction calendar will be shared with the mukhtars of the PASs by the Project, so that the farmers can harvest their crops. Waiting for the standing crops to be harvested will be the priority method. When this is not possible, compensations will be provided for standing crops (details are presented in the following sub-section - Crop payments to crop owners for standing crops).

- Damage to the irrigation systems in the area subject to expropriation affects the irrigation of the remaining areas. For this reason, deteriorated irrigation systems will be fixed. Irrigation systems will be repaired. Necessary measures will be taken to ensure that subcontractors do not damage irrigation systems and will be guaranteed by contracts.
- Efforts will be made to ensure the local communities have access to their agricultural lands, forests, and grazing lands based on their requests. Investigating technical and viable solutions will be key in maintaining access to forests and farmlands, ensuring routes are established or restored. Similarly, strategies will be devised to guarantee access to grazing lands and areas for animal grazing, with appropriate pathways reinstated for both human and animal use.
- Within the context of the RAP field study, researchers examined vulnerabilities among all affected household members. Among the total population of 118 members in directly affected households, 17 individuals were identified as vulnerable. These vulnerabilities were categorized as follows: woman head of household (1 individual, 5.9% of the vulnerable group), elderly people in need of care and social assistance (4 individuals, 23.5% of the vulnerable group), people with disability (mental and physical) (1 individual, 5.9% of the vulnerable group), unemployed individuals actively seeking employment (3 individuals, 17.6% of the vulnerable group), women who lost their spouses or divorced (5 individuals, 29.4% of the vulnerable group), and homebound due to chronic illness (3 individuals, 17.6% of the vulnerable group). No vulnerabilities were recorded for illiterate adults or ethnic minority groups. The grand total of individuals in the study was 118. Identified vulnerable PAPs will be eligible for Vulnerability Assistances that designed in RAP.
- There are no workplaces or commercial buildings affected by the land acquisition of the Project.
- Economic or physical displacement processes will be evaluated separately when ETL construction and pole locations are finalised, parcel information and owner numbers become available. Potential impacts of ETL and problems that may be experienced due to land acquisition have been identified in the RAP. In this context, necessary entitlements have been prepared for potential impacts. After the parcel information is finalised, an impact management process will be carried out within the framework of these entitlements.

PAPs that are eligible in all identified impact categories and the entitlements that will be provided to them within the scope of the RAP are summarized. Since residential and commercial buildings are not affected by the land acquisition of the Project, there are no groups such as the following that need to be addressed in entitlement matrix presented in RAP:

- Owners of the dwellings,
- Residents of the affected houses,
- Owners of the businesses and commercial buildings to be relocated.

If buildings on additional land required for design changes or associated facilities are affected, an Addendum will be issued to the RAP.

Considering all the land acquisition activities, urgent expropriation process and potential economic displacements due to construction of Project components, the sensitivity of the local community members impacts from the Project's land acquisition works is high and the magnitude of the land acquisition impacts is major. Overall, the impact is assessed to be major adverse significance.

13.4.1.4 Local Economy, Livelihood Sources and Employment

The Project's impacts on livelihood will mostly stem from the land acquisition activities, which are assessed in the Section 13.4.1.3. The majority of the Project area (including access roads)

intersects with agricultural lands, which may lead to economic displacement as discussed in Section 13.4.1.3.

In addition, the access roads to be utilized during the construction phase may adversely affect the agricultural products in proximity due to dust generated on the route. The critical periods for cultivating activities in the Project's social AoI should be consulted with the PAPs and considered during the construction activities in order to reduce the risk of dust and loss of livelihood.

Beekeeping activities are not observed in the Project's social AoI. Therefore, no impacts on beekeepers are estimated to occur.

Within the scope of the Project's planned land transactions, there is a cold storage warehouse with parcel number 176/3 in Yapıldak village where a road widening work will take place. During the construction period, it is important to manage the risks related to community health and safety such as noise or dust, where the local business located on this parcel is taken into consideration. The Project Company will be contacted during the traffic management and construction planning process in order not to disrupt the economy-based commercial activities of the local business, especially logistics.

One of the most important possible positive impacts of the Project is local employment creation during the construction phase. As reported by the Project Company representatives, the contractors and subcontractors will employ the local unskilled and semi-skilled workforce. This can contribute to a more positive approach towards the Project by the local communities, a certain reduction in unemployment, and increase in the welfare of the employed workers' families. However, the number of the young people and children are quite low in the Project affected settlements. Therefore, there are no impacts anticipated during construction phase of the Project regarding employment opportunities.

As stated earlier, there are seasonal workers in three of the Project affected neighbourhoods. According to the information received from the mukhtars, the working and accommodation areas of seasonal workers are not affected by the Project. Therefore, no impacts on seasonal workers are estimated to occur.

During the construction phase of the Project, there will be numerous procurement opportunities which may be beneficial for the local business, enterprises and suppliers in terms of income generation and increase.

The magnitude of these positive and negative impacts is moderate and the sensitivity of the receptors in regard to this impact is medium which eventually corresponds to a moderate impact significance.

13.4.1.5 Infrastructure: Health, Transport, Water Supply and Sewerage

Majority of the Project affected settlements do not have a health centre within the settlement. Therefore, some residents go to district centres to access the health care facilities. Construction activities and increased traffic may cause local community members' transportation time to these centres to increase. This may also affect residents' access to local community infrastructures such as schools and mosques. However, there are no schools in the villages within the social AoI. However, it shall be noted that the closest highway (Bursa-Çanakkale) junction to the Project area is located in Central District of Çanakkale Province. Hence, increased traffic volume during the construction phase throughout the access roads to the Project area may result in road traffic safety risks for passengers on Bursa-Çanakkale State Road.

All villages have electricity network and landline telephone. During the construction phase, power outages associated with construction activities may cause disruptions in the daily life of the local communities.

There is usually a water supply network or a spring water in the neighbourhoods. Turbine and road construction activities of the Project may cause disruption in the daily lives of the local community members by causing temporary water shortages or contamination of natural spring water. However, local community members and mukhtar of the villages did not report any concern related to the damage to the natural spring water due to the Project's construction activities during the consultations held by the Consultant. Please see *Chapter 5: Water Quality, Hydrology and Hydrogeology* for detailed information.

Damage to the irrigation systems in the expropriated area may have an impact on irrigation for the remaining land during turbine and road construction activities of the Project. To address this, the deteriorated irrigation systems will be repaired, and necessary precautions will be taken to prevent subcontractors from causing further damage. Additionally, efforts will be made to ensure local communities have access to their agricultural lands, forests, and grazing areas based on their requests. Technical solutions will be explored to maintain access to forests and farmlands, establishing or restoring routes. Strategies will also be developed to guarantee access to grazing lands, with appropriate pathways reinstated for both local community members and animals.

On the other hand, as mentioned in ETL's PID, there is no agricultural infrastructure in the area to be affected by the ETL construction activities. For the agricultural areas within the specified area, approval for non-agricultural use will be acquired in accordance with Article 13 of the Soil Conservation and Land Use Law No. 5403. According to the approval granted by the Ministry of Agriculture and Forestry, there shall be no agricultural infrastructure on the area that would prevent land use.

Should mitigation measures not be followed and implemented in accordance with the scope of construction activities, the impact is assessed as moderate as this will affect the daily lives and agricultural activities of the local residents.

In terms of impact assessment on waste management infrastructure, please see *Chapter 11: Waste and Resources.*

The operation of infrastructure facilities is of great importance for the people living in that region to continue their daily lives. Consideration should be given to ensuring that the infrastructure system is operational throughout the construction period.

The Project's infrastructure-related impacts have minor magnitude during the construction phase of the Project. The sensitivity of social receptors is medium, which corresponds to the minor significance level.

13.4.1.6 Gender Considerations

The Project is not expected to cause any negative impact on gender considerations during the construction phase. Rather, the Project may contribute to the gender equality through local employment of both women and men residing in the Project affected villages.

It should be also taken into account that the land acquisition activities are conducted with the equity and equality perspective, in which all affected people are approached without any discrimination due to their gender and other characteristics.

The potential influx of male workers into villages due to the Project construction activities has various impacts on women's daily lives and livelihood activities, which should be considered when discussing gender and vulnerable groups. Increased congestion and noise are not

expected to disrupt women's daily routines, including household chores, childcare responsibilities, and access to community resources. The fact that the camp sites might be close to the residential areas of the villages and that some of the construction activities within the scope of the Project are carried out on agricultural lands where women also work poses potential risks. However, as only a limited number of women stakeholders in the Project affected villlages could be interviewed due to the lack of participation, the conclusion that as there was a low risk of potential harassment does not necessarily mean that the risk is actually low. Furthermore, economic impacts are not expected to manifest as competition for local employment opportunities, which could be intensified in a way that potentially limits women's access to jobs or income-generating activities. In general, none of the mentioned socio-economic impacts are expected to be realised in this Project due to the limited interaction areas of workers and women.

Within the scope of the gender considerations, GBVH risks take a significant place. Throughout the construction activities, it is necessary to take measures against the GBVH risks. Accordingly, security measures should be taken within the construction sites through the security personnel and the establishment of a surveillance system. The construction phase Project workers should receive trainings on prevention of GBVH risks. In addition, the grievance mechanism of the Project that ensures safety and confidentiality should be established. Both the security measures and the grievance log will be monitored regularly and improvements will be adapted when necessary. Since the Project Company plans to employ local community members to the possible extent and the impacts of labour influx is low, the Project’s gender-related impacts including GBVH have minor magnitude during the construction phase of the Project. The sensitivity of social receptors is negligible, which corresponds to the negligible significance level.

13.4.1.7 Vulnerable Groups

Although there is no major impact on vulnerable groups, all construction activities will be carried out considering the vulnerabilities of existing groups (i.e., the elderly local community members, local community members with chronic health problems like asthma).

The groups specified in the Section 13.3.7 are considered to be vulnerable because their daily life practices and/or access to certain services (i.e., health facilities in the district) might be affected disproportionately and negatively due to Project impacts.

Throughout the construction activities, it is necessary to take measures to prevent vulnerable groups from being exploited in any sense. During the construction phase, increased traffic volumes on the access roads to the Project area may lead to road safety risks. The closest highway (Bursa-Çanakkale) junction to the Project area is located in Central District of Çanakkale Province. Hence, increased traffic volume during the construction phase throughout the access roads to the Project area may result in road traffic safety risks for passengers on Bursa-Çanakkale State Road. Please see Section 15.4.1.4 for impact assessment on traffic safety.

The vulnerable groups should be visited with special attention and their problems should be solved quickly. In addition, the grievance mechanism of the Project that ensures safety and confidentiality should be established. The vulnerable members of affected households are identified and these vulnerable PAPs will be eligible for Vulnerability Assistances which is further assessed in RAP study.

The Project’s vulnerable group related impacts have minor magnitude during the construction phase of the Project. The sensitivity of social receptors is low, which corresponds to the negligible significance level.

13.4.2 Operation

13.4.2.1 Population Influx

With the operation phase of the Project, it will not create a significant change in the local population. Since the operational control and safety of the turbines will continue from the central system without the need for extra local employees, it is not anticipated to change the structure of the regional population or to create a pressure on the population. Therefore, there are no adverse impacts foreseen.

13.4.2.2 Education

There are no impacts anticipated during operation phase of the Project in terms of education.

13.4.2.3 Land Use, Physical and Economic Displacement

There are no impacts foreseen during operation phase of the Project regarding land use, physical and economic displacement.

13.4.2.4 Local Economy, Livelihood Sources and Employment

The Project is not estimated to employ high number of unskilled and/or semi-skilled workforce for the operation phase. However, the number of the young people and children are quite low in the Project affected settlements. Therefore, there are no impacts anticipated during construction phase of the Project regarding employment opportunities.

On the other hand, there are pasture lands where the Project is located. Main concerns reported by the consulted local community members were about the loss of income for the households whose livelihood is based on animal husbandry. As reported by the Project Company representatives, the turbine areas will not be fenced, which will enable the herds to be grazed.

The magnitude of these impacts about employment opportunities and loss of livelihood is minor and the sensitivity of the receptors affected from these impacts is negligible. Overall, the significance of the impacts is assessed to be negligible.

13.4.2.5 Infrastructure: Health, Transport, Water Supply and Sewerage

There are no impacts anticipated during operation phase of the Project in terms of access to or quality of the infrastructural services.

13.4.2.6 Gender Considerations

There are no impacts foreseen during operation phase of the Project regarding gender considerations.

13.4.2.7 Vulnerable Groups

There are no impacts foreseen during operation phase of the Project regarding vulnerable groups.

13.4.3 Summary

Within the scope of ESIA studies, sensitivities of the receptors were identified according to the matrix described below.

Table 13.13: Social environment sensitivity/value criteria for resource/receptors

Subject	High	Medium	Low	Negligible
Population Influx	Dramatic change on the population and sociocultural conflicts due to labour influx	Manageable change on the population and sociocultural conflicts due to increased number of workers coming from outer regions	Small change on the population due to increased number of workers coming from outer regions	No change on the population other than the usual population growth
Land Use and Economic Displacement	Inaccessibility to lands, inability to use lands, physical and economic displacement with no other alternatives	Restrictions on use of and access to lands, physical and economic displacement with limited alternatives	Relatively and temporary negative impacts on the use of and access to lands	No obstacles regarding the use of and access to lands
Local Economy, Livelihood Sources and Employment	Major impacts on loss of livelihood sources with no other alternatives, high rates of unemployment	Temporary instability on local economic activities with limited livelihood alternatives	A few number of livelihood and economic opportunities within the scope of the Project	No impacts in terms of local economic activities, livelihood sources and employment
Infrastructural Services	Inaccessibility to infrastructural services	Restrictions and safety risks when accessing to infrastructural services	Difficulties when accessing to infrastructural services	No obstacles in terms of access to infrastructural services
Gender	GBVH risks, increased gender inequality, discrimination, unequal rights on speak, the lands and inheritance	Increased burden on house-related responsibilities (i.e., more need for cleaning the house due to dust), hesitancy to raise voice during stakeholder engagement activities	More exposure to noise and visual impacts due to house-related responsibilities	No impacts in terms of gender considerations
Vulnerable Groups	Major impacts leading the vulnerable groups to be open to underestimation, inconsideration, abuse and discrimination	The possibility of existing vulnerabilities' increasing due to the Project activities	Temporarily (i.e., daily) and tolerable disturbances	No impacts on vulnerable groups

Table 13.14: Impact significance during construction

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Population Influx	Local community members / Project affected villages	Low	Construction	AoI	Reversible	Unlikely	Negligible	Negligible	Negligible
Land Use and Economic Displacement	Local community members whose lands are acquired-expropriated	High	Pre-Construction / Construction	AoI	Irreversible unless compensated	Definite	Major	High	Major
Local Economy, Livelihood Sources and Employment	Local community members	Medium	Construction	AoI	Reversible	Possible	Moderate	Medium	Moderate
Infrastructural Services	Local community members / Project affected villages	Medium	Construction	AoI	Irreversible under specific conditions	Possible	Minor	Medium	Minor
Gender	Local community members	Medium	Construction	AoI	Irreversible under specific conditions	Possible	Minor	Negligible	Negligible
Vulnerable Groups	Local community members who are in a more disadvantaged position	Medium	Construction	AoI	Irreversible under specific conditions	Possible	Minor	Negligible	Negligible

Table 13.15: Impact significance during operation

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Local Economy, Livelihood Sources and Employment	Local community members	Medium	Operation	AoI	Reversible	Possible	Minor	Negligible	Negligible

13.5 Impact Mitigation & Residual Impact

In order to mitigate the impacts that are identified for the construction and operation phases of the Project, certain measures are identified and listed below:

13.5.1 Construction

13.5.1.1 Population Influx

- The Project workers will receive regular trainings upon the recruitment and throughout the employment on the social sensitivities, prevention and ways to report GBVH, measures to be taken to avoid social unrest and conflicts, and documents to be disclosed to and signed by the Project.
- Potential risks to local communities will be identified by the Project Company and a Code of Conduct (CoC) in local community relations will be prepared.
- Within the scope of the Stakeholder Engagement Plan (SEP) and community grievance mechanism of the Project, grievances of residents regarding the construction, workers or any other issues will be monitored by the Community Liaison Officer (CLO). Similarly, the CLO will continue to organize regular consultation and stakeholder engagement activities as specified in the SEP.

13.5.1.2 Land Use, Physical and Economic Displacement

- Continuous consultation and engagement through an active stakeholder engagement and grievance mechanism
  - The Project-specific SEP and community grievance mechanism will be put in place to consult with the Project affected people and to be able to capture individual grievances related to the land acquisition and expropriation processes.
  - With the community grievance mechanism any request, concern or complaint will be considered, recorded and managed properly. In particular, the grievances of the Project affected people of the villages will be resolved with clear information by following the processes of urgent expropriation.
- Implementation of the measures to allow continued access to affected resources or to provide access to alternative resources with equivalent livelihood earning potential and accessibility
  - In particular, people who may be adversely affected by potential physical or economic displacement (i.e., livelihoods or transportation) as a result of access road construction will be compensated in the most appropriate way possible.
  - For the development and establishment of a systematic way to compensate, the RAP is being prepared and will be implemented once finalized.
- Land Acquisition Procedure of the Project Company and the Project-specific Land Acquisition Plan will be implemented.

13.5.1.3 Local Economy, Livelihood Sources and Employment

- The Project Company will develop a Local Content and Procurement Procedure (LCPP) by defining the potential local economic and livelihood opportunities.
- Through the regular consultation and stakeholder engagement activities as well as community grievance mechanism, residents living in the Project affected villages will have the chance to raise their requests regarding the employment and procurement opportunities as well as the potential negative impacts on the quality of the agricultural products due to dust generation as a result of the Project's construction activities.

13.5.1.4 Infrastructure: Health, Transport, Water Supply and Sewerage

- When infrastructural problems (i.e., for water, road, transportation issues) occur due to the construction phase of the Project, correspondences will be arranged with governmental institutions, if necessary, and further actions will be taken for resolution.
- Within the scope of the SEP and community grievance mechanism of the Project, grievances of residents regarding the infrastructural issues including springs will be monitored by the (CLO. Similarly, the CLO will continue to organize regular consultation and stakeholder engagement activities as specified in the SEP.
- Further investigation on the locations of the springs will be done by CLOs and the Project Company will ensure that the impacts to the local springs used by local communities are duly monitored as part of implementation of Community Health and Safety Plan and Water Quality Management Procedure.
- To ensure women participation during the construction and operation phases of the Project. Bi-monthly women meetings will be held by the female CLO.

13.5.1.5 Gender Considerations

- Potential risks on the local community members on the basis of the gender considerations will be identified by the Project Company and relevant items will be included in the CoC that will be prepared by taking into account the local community relations.
- Awareness raising activities about gender equality and prevention of GBVH will be organized within the Project affected villages to the extent possible.
- The CLO will organize specific meetings with women in the Project affected villages.
- Relevant security measures (i.e., cameras, alarms) will be taken within and around the Project area. These measures will be included in the Community Health, Safety and Security Procedure.
- Within the scope of the SEP and community grievance mechanism of the Project, grievances of residents regarding the gender issues will be monitored by the CLO. Similarly, the CLO will continue to organize regular consultation and stakeholder engagement activities as specified in the SEP.

13.5.1.6 Vulnerable Groups

- Potential risks on the vulnerable groups will be identified by the Project Company and relevant items will be included in the CoC that will be prepared by taking into account the local community structure.
- Relevant security measures (i.e., cameras, alarms) will be taken within and around the Project area. These measures will be included in the Community Health, Safety and Security Procedure.
- Within the scope of the SEP and community grievance mechanism of the Project, vulnerable groups' grievances will be monitored by the CLO with a high prioritization as defined in the SEP. Similarly, the CLO will continue to organize regular consultation and stakeholder engagement activities through the accessible channels for all vulnerable groups as specified in the SEP.

13.5.2 Operation

13.5.2.1 Local Economy, Livelihood Sources and Employment

Through the regular consultation and stakeholder engagement activities as well as community grievance mechanism, residents living in the Project affected villages will have the chance to raise their grievances related to livelihood activities and requests regarding the employment and procurement opportunities.

13.5.3 Summary

Table 13.16: Residual impact during construction

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Population	Local community members / Project affected villages	Negligible	Negligible
Education	Local community members / Project affected villages	Negligible	Negligible
Land Use and Economic Displacement	Local community members whose lands are acquired-expropriated	Major	Moderate
Local Economy, Livelihood Sources and Employment	Local community members	Moderate	Negligible
Infrastructural Services	Local community members / Project affected villages	Minor	Negligible
Gender	Local community members	Negligible	Negligible
Vulnerable Groups	Local community members who are in a more disadvantaged position	Negligible	Negligible

Table 13.17: Residual impact during operation

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Local Economy, Livelihood Sources and Employment	Local community members	Negligible	Negligible

14 Labour and Working Conditions

14.1 Introduction

Potential impacts on labour and working conditions, including the occupational health and safety risks associated with the construction and operation workforce of the Project together with its subcontractors are covered in this Chapter of the Final Draft ESIA Report.

14.2 Methodology

14.2.1 Labour and Working Conditions Methodology

The methodology of the labour and working conditions impact assessment is based on the desktop studies (i.e., the review of Project Company's and main contractor's (Enercon) shared documentation and publicly available data, international standards and best practices) and a site visit to the Project area, which was conducted by Mott MacDonald Social Team on 30 and 31 October 2023.

The impacts are assessed in line with the national labour legislation and international requirements that are relevant to the Project's labour activities. In the assessment process, the impacts that may occur during the Project lifecycle and their possible risks on the workforce are considered by using the assessment criteria of this ESIA study. The significance of the impacts as well as mitigation measures are assigned on the basis of the expert judgement of the ESIA Team.

14.2.2 Occupational Health and Safety Risk Assessment Methodology

Risk assessment is the indispensable first step in provision and establishment of safer workplaces by preventing occupational accidents and ill health at the design stage of a project, prior to start of planning of activities or during operations. A risk assessment is performed in order to;

- determine the hazards that exist in a workplace or that may come from outside,
- identify the factors that cause these hazards to turn into risks,
- analyse and ratify the risks arising from the hazards and
- define control measures to be taken.

This generic health and safety risk assessment methodology is based on the principles set by the Regulation on Occupational Health and Safety Risk Assessment (Regulation on OHSRA), ISO 45001:2018 Occupational Health and Safety, good industry practice examples and the professional judgment of the expert.

Regulation on OHSRA does not define a specific methodology for risk assessments, however, defines the members of a risk assessment team, the main sources of information to define the hazards exist at the workplace, identification and analyses of risks due to the hazards, hierarchy of risk control measures, documentation requirements and renewal periods, in detail.

In this study, health and safety risks are determined by estimating the potential severity of harm and the likelihood of the harm that will occur for a given hazard. To estimate the severity of harm; How severe could the adverse consequence be, taking as reference the worst foreseeable (but plausible) scenario and considering the existing mitigation measures in place? was considered. To estimate the likelihood of harm; How likely is it that the adverse

consequence could occur, considering the existing mitigation measures in place? The scale for severity of harm and likelihood of harm are shown in Table 14.1 and Table 14.2, respectively.

Table 14.1: Harm Severity

Severity	Meaning	Value
Catastrophic	• Equipment destroyed • Multiple deaths	A
Hazardous	• A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely • Serious injury • Major equipment damage	B
Major	• A significant reduction in safety margins, reduction in the ability of the operators to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency • Serious incident • Injury to persons	C
Minor	• Nuisance • Operating limitations • Use of emergency procedures • Minor incident	D
Negligible	• Few consequences	E

Table 14.2: Likelihood of Harm Category

Severity	Meaning	Value
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	**Almost inconceivable that the event will occur**	**1**

The magnitude of risk matrix based on the severity of harm and likelihood of harm is provided Table 14.3, where a hazard's severity is multiplied by its probability. For this purpose, a magnitude of risk matrix of 5x5 was used.

Table 14.3: Risk Level Matrix

Risk Probability		Risk severity				
		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely Probable	1	1A	1B	1C	1D	1E

In Table 14.4, a safety risk tolerability matrix is defined for risk level matrix.

Table 14.4: Safety Risk Tolerability Matrix

Risk Index Range	Description	Recommended Action
5A, 5B, 5C, 4A, 4B, 4C 3A	High risk	Cease or cut back operation promptly if necessary. Perform priority risk mitigation to ensure that additional or enhanced preventive controls are put in place to bring down the risk index to the moderate or low range.

Risk Index Range	Description	Recommended Action
5D, 5E, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	Moderate risk	Schedule performance of a safety assessment to bring down the risk index to the low range if viable.
3E, 2D,2E, 1B, 1C, 1D, 1E	Low risk	**Acceptable as is. No further risk mitigation required.**

Source: Safety Management Systems Handbook, Airports Council International, First Edition 2016.

14.2.3 Applicable Guidelines and Standards

14.2.3.1 National Requirements

The Labour Law No. 4857, Occupational Health and Safety Law No. 6331, and associated laws and regulations are applied in Türkiye for labour management and occupational health and safety issues. These laws and regulations aim at defining the duties, responsibilities, terms and conditions of employment, work-related rights, labour and working practices, and obligations of both the employer and the employees. By this way, proper labour management systems and occupational health and safety measures at work are provided and/or current working conditions as well as health and safety practices are improved. A comprehensive list of national laws and regulations regarding labour and working conditions is provided below.

Table 14.5: National laws and international conventions regarding labour and working conditions and occupational health and safety

Law/Regulation	Official Gazette (OG) date	OG number
Labour Law (4857)	10.06.2003	25134
Occupational Health and Safety Law (6331)	30.06.2012	28339
Regulation on Workplace Opening and Permit	10.08.2005	25902
Law on Public Tenders (4734)	22.01.2002	24648
Regulation on Contractors and Subcontractors	27.09.2008	27010
Law on Trade Union and Collective Bargaining (6356)	07.11.2012	28460
Law on Unions and Collective Bargaining for Public Servants (4688)	12.07.2001	24460
First Aid Regulation	29.07.2015	29429
Law on Social Insurance and General Health Insurance (5510)	16.06.2006	26200
Regulation on Working Duration Related to Labour Law	06.04.2004	25425
Regulation on Excess Work and Work in Excess Periods related to Labour Law	06.04.2004	25425
Regulation on Special Principles in Works Carried out by Employing Workers in Shifts	07.04.2004	25426
Regulation on Minimum Wage	01.08.2004	25540
Regulation on Working Procedures and Principles of Child and Young Workers	06.04.2004	25425
Regulation on Suspension of Work in Workplaces	30.03.2013	28603
Regulation on Annual Paid Leave	03.03.2004	25391

Law/Regulation	Official Gazette (OG) date	OG number
Regulation on Overwork and Overtime	06.04.2004	25425
Law on People with Disabilities (5378)	07.07.2005	25868
Regulation on Occupational Health and Safety Services	29.12.2012	28512
Regulation on Occupational Health and Safety in Construction Works	05.10.2013	28786
Regulation on the Procedures and Principles of the Employee's Health and Safety Trainings	15.05.2013	28648
Regulation on Occupational Health and Safety Committees	18.01.2013	28532
Regulation on Occupational Health and Safety Risk Assessment	29.12.2012	28512
Regulation on Duties, Authority, Responsibilities and Trainings of Occupational Health and Safety Specialists	29.12.2012	28512
Regulation on the Health and Safety Measures to be taken in Workplace Buildings and Additions	17.07.2013	28710
Regulation on Duties, Authority, Responsibilities and Trainings of On-site Doctor and Other Health Personnel	20.07.2013	28713
Regulation on Accessibility Monitoring and Auditing	20.07.2013	28713
Regulation on Occupational Health and Safety in Temporary or Fixed Term Employment	23.08.2013	28744
Regulation on Manual Handling	24.07.2013	28717
Regulation on Road Traffic	18.07.1997	23053
Regulation on Safety and Health Signs	11.09.2013	28762
Regulation on the Works in Which Workers shall Work Maximum Seven and Half Hours or Less in a Day in Terms of Health Rules	16.07.2013	28709
Regulation on Use of Personal Protective Equipment in Workplaces	02.07.2013	28695
Regulation on the Emergency Situations in Workplaces	18.06.2013	28681
Regulation on the Protection of Workers from the Dangers of the Explosive Media	30.04.2013	28633
Regulation on the Control of Dust Emissions	05.11.2013	28812
Exhaust Gas Emission Control Regulation	11.03.2017	30004
Regulation on the Protection of the Workers against Vibration Risks	22.08.2013	28743
Regulation on the Protection of the Workers against Risks Relevant to Noise	28.07.2013	28721
Regulation on Environmental Noise Emission Generated by the Outdoor Equipment Used at Site	30.12.2006	26392
Regulation on Protection of Buildings from Fire	20.11.2021	31665
Türkiye Earthquake Regulation for Buildings	18.03.2018	30364

Source: T.R. Presidential Complex General Directorate of Law and Legislation[172]

14.2.3.2 International Requirements

The following international requirements have been taken into account to assess labour and working conditions during the ESIA process:

- IFC's Performance Standards on Environmental and Social Sustainability (2012)
  - Performance Standard 1 – Assessment and Management of Environmental and Social Risks and Impacts: PS 1 emphasizes on the importance of: (i) an integrated assessment to identify the environmental and social impacts, risks and opportunities of the Project; (ii) effective community and stakeholder engagement through disclosure of project-related

[172] Retrieved from: https://www.mevzuat.gov.tr/ on 21 November 2023

information and consultation with local communities on matters that directly affect them; and (iii) the Client's management of social and environmental performance throughout the life of the Project through management programs, monitoring, and review.

  - Performance Standard 2 - Labour and Working Conditions: PS 2 recognises that a balance between economic growth and workers' fundamental rights is needed. The objectives are: (i) to promote a non-discriminative, equal working environment for workers; (ii) to maintain and improve the worker-management relationship; (iii) to ensure compliance with national labour and employment laws; (iv) to protect vulnerable workers; to promote a safe and healthy working environment and the health of workers; lastly, (v) to protect the workforce by addressing child labour and forced labour.

- EBRD's Environmental and Social Policy & Performance Requirements (2019)
  - Performance Requirement 1 - Assessment and Management of Environmental and Social Risks and Impacts: PR 1 emphasizes on the significance of integrated assessment to identify the environmental and social impacts and issues associated with the Project and the Client's management of environmental and social performance throughout the life cycle of the Project.
  - Performance Requirement 2 - Labour and Working Conditions: PR 2 recognises that workforce is a valuable asset for the Client and its business activities, and that effective human resources management and a reliable worker-management relationship based on respect for workers' rights, including freedom of association and right to collective bargaining, are key pillars for ensuring the sustainability of business activities.
  - Performance Requirement 4 - Health, Safety and Security: PR 4 recognises the significance of managing health, safety, and security risks (including project-related gender-based violence risks of sexual harassment, sexual exploitation and abuse) to workers, project-affected communities and consumers associated with Project activities, by performing a risk control hierarchy.
- Equator Principles IV (2020)
  - Principle 2 - Environmental and Social Assessment: Principle 2 requires performing a process to address the relevant environmental and social risks and scale of impacts of the Project. The assessment is expected to propose measures to minimise, mitigate, and where residual impacts remain, to compensate/offset/remedy for risks and impacts to workers, affected communities, and the environment. Principle 2 also expects that assessments of potential adverse human rights impacts and climate change risks are included as part of the ESIA.

In addition to above-mentioned standards, labour and working conditions impact assessment has been conducted in line with the following standards and guidelines:

- U(DFC's Environmental and Social Policy and Procedures (2020)
- IFC/EBRD's Guidance Note on Workers Accommodation: Processes and Standards (2009)
- IFC's Environmental, Health and Safety (EHS) General Guidelines (2007)
- IFC's Environmental, Health and Safety (EHS) Guidelines for Electric Power Transmission and Distribution (2007)
- IFC's Environmental, Health and Safety (EHS) Guidelines for Wind Energy (2015)
- Applicable International Labour Organisation (ILO) Conventions
- Applicable Environmental, Social, Occupational Health and Safety Directives of the European Union (EU)
- European Commission's Guidance Document on Wind Energy Developments and EU Nature Legislation (2020)

The International Labour Organisation (ILO) of the United Nations is responsible for overseeing the compliance of labour and working conditions with international labour standards. ILO conventions reflect common values and principles on work-related issues and Member States can choose whether to ratify them. The ILO regularly monitors the implementation and the application of the conventions as well as developments in countries generally, whether they have chosen to ratify ILO conventions. The list given below presents the International Labour Organization (ILO) Conventions on labour and working conditions that are ratified by Türkiye.

Table 14.6: ILO Conventions on labour and working conditions ratified by Türkiye

Name	Date	Convention No
Unemployment Convention	1919	C-2
Right of Association (Agriculture) Convention	1921	C-11
Weekly Rest (Industry) Convention	1921	C-14
Minimum Age (Trimmers and Stokers) Convention	1921	C-15
Minimum Wage-Fixing Machinery Convention	1928	C-26
Forced Labour Convention	1930	C-29
Fee-Charging Employment Agencies Convention	1933	C-34
Workmen's Compensation (Occupational Diseases) Convention (Revised)	1934	C-42
Underground Work (Women) Convention	1935	C-45
Officers' Competency Certificates Convention	1936	C-53
Shipowners' Liability (Sick and Injured Seamen) Convention	1936	C-55
Minimum Age (Sea) Convention (Revised)	1936	C-58
Minimum Age (Industry) Convention (Revised)	1937	C-59
Food and Catering (Ships' Crews) Convention	1946	C-68
Certification of Ships' Cooks Convention	1946	C-69
Medical Examination (Seafarers Convention	1946	C-73
Medical Examination of Young Persons (Industry) Convention	1946	C-77
Final Articles Revision Convention	1946	C-80
Labour Inspection Convention	1947	C-81
Freedom of Association and Protection of the Right to Organise Convention	1948	C-87
Employment Service Convention	1948	C-88
Accommodation of Crews Convention (Revised)	1949	C-92
Labour Clauses (Public Contracts) Convention	1949	C-94
Protection of Wages Convention	1949	C-95
Fee-Charging Employment Agencies Convention (Revised)	1949	C-96
Right to Organise and Collective Bargaining Convention	1949	C-98
Minimum Wage Fixing Machinery (Agriculture) Convention	1951	C-99
Equal Remuneration Convention	1951	C-100
Social Security (Minimum Standards) Convention	1952	C-102
Abolition of Forced Labour Convention	1957	C-105
Seafarers' Identity Documents Convention	1958	C-108
Discrimination (Employment and Occupation) Convention	1958	C-111
Radiation Protection Convention	1960	C-115
Final Articles Revision Convention	1961	C-116
Equality of Treatment (Social Security Convention	1962	C-118
Guarding of Machinery Convention	1963	C-119
Employment Policy Convention	1964	C-122
Minimum Age (Underground Work) Convention	1965	C-123
Maximum Weight Convention	1967	C-127

Name	Date	Convention No
Accommodation of Crews (Supplementary Provisions) Convention	1970	C-133
Prevention of Accidents (Seafarers) Convention	1970	C-134
Workers' Representatives Convention	1971	C-135
Minimum Age Convention	1973	C-138
Human Resources Development Convention	1975	C-142
Tripartite Consultation (International Labour Standards) Convention	1976	C-144
Seafarers' Annual Leave with Pay Convention	1976	C-146
Labour Relations (Public Service) Convention	1978	C-151
Occupational Safety and Health (Dock Work) Convention	1979	C-152
Hours of Work and Rest Periods (Road Transport) Convention	1979	C-153
Occupational Safety and Health Convention	1981	C-155
Termination of Employment Convention	1982	C-158
Vocational Rehabilitation and Employment (Disabled Persons) Convention	1983	C-159
Occupational Health Services Convention	1985	C-161
Health Protection and Medical Care (Seafarers) Convention	1987	C-164
Repatriation of Seafarers Convention (Revised)	1987	C-166
Safety and Health in Construction Convention	1988	C-167
Safety and Health in Mines Convention	1995	C-176
Worst Forms of Child Labour Convention	1999	C-182
Promotional Framework for Occupational Safety and Health Convention	2006	C-187

Source: International Labour Organization (ILO) Conventions[173]

Out of these 59 Conventions ratified by Türkiye, 55 are in force, three have been denounced and one has been abrogated. Table given below presents the applicable International Labour Organization (ILO) Conventions on labour and working conditions.

Table 14.7: Applicable ILO Conventions on labour and working conditions

Name	Date	Convention No
Unemployment Convention	1919	C-2
Weekly Rest (Industry) Convention	1921	C-14
Forced Labour Convention	1930	C-29
Minimum Age (Industry Convention)	1937	C-59
Freedom of Association and Protection of the Right to Organise Convention	1948	C-87
Protection of Wages Convention	1949	C-95
Right to Organize Collective Bargaining Convention	1949	C-98
Equal Remuneration Convention	1951	C-100
Abolition of Forced Labour Convention	1957	C-105
Workers' Representative Convention	1971	C-135
Minimum Age Convention	1973	C-138
Occupational Safety and Health Convention	1981	C-155
Termination of Employment Convention	1982	C-158
Worst Forms of Child Labour Convention	1999	C-182

Source: International Labour Organization (ILO) Conventions[174]

[173] Retrived from: Conventions ratified by Türkiye (ILO-Ankara) on 21 November 2023
[174] Retrived from: Conventions ratified by Türkiye (ILO-Ankara) on 21 November 2023

14.2.3.3 Project Standards

The Project Company has a number of corporate policies, which can provide baseline information for the development of labour-related management plans and procedures. Applicable corporate policies of the Project Company are listed and summarized below[175]:

- **Policy on People and Culture:** The Policy recognises the rights of all employees within the Project Company in terms of right to unionization, collective bargaining, and appointing workers' representatives. It also adopts the principles of non-discrimination and equal opportunity as well as "equal pay for equal work". There are some items stating the Project Company's commitment to being against to the use of child labour and forced labour, and taking mitigation measures to prevent all harassment and abuse risks including sexual harassment, bullying, intimidation and violence.
- **Code of Business Ethics:** The Code of Business Ethics covers all relevant stakeholders (i.e., employees, clients, suppliers and communities) to ensure the compliance with the ethical principles at corporate level. The document includes the responsibilities of the Project Company toward each specified stakeholder, particular policies on conflict of interest, accepting gifts, confidential information protection and creating and maintaining a fair working environment, and channels to report in times of ethical violation detections.
- **Code of Compliance:** Similar to the Code of Business Ethics, the Code of Compliance includes the channels to report in times of compliance violation detections. Other than these, it involves a "Compliance Manual", explaining the rules and responsibilities.
- **Equality, Diversity, and Inclusion Regulation:** With this Regulation, the Project Company aims to contribute to the creation of a fair, more socially inclusive world for everyone in line with the United Nations Sustainable Development Goals (UN SDGs) Goal 5 (Gender Equality) and Goal 10 (Reduced Inequalities). The Regulation refers to the non-discrimination principles throughout recruitment and access to job/promotion opportunities, protection of and fair treatment to the vulnerable groups (i.e., women, the disabled workforce), prevention of gender pay gap as well as violence and harassment, and utilization of the internal grievance mechanism channels in times of need.
- **Procedure Against Domestic Violence:** The purpose of the Policy is to raise awareness about domestic violence and to support all staff to embrace the concept of gender equality and distance themselves from all forms of violence by creating a solidarity culture on this issue. It also aims to support the staff suffering from domestic violence by taking the necessary steps to eliminate violence from their lives and creating mechanisms that will ensure that their career is minimally affected by this situation.

The Project Company has also an integrated Quality, Health and Safety, Environment and Energy Management Systems and relevant certifications, which are listed below:

- ISO 9001: 2015 - Quality Management System
- ISO 14001: 2015 - Environmental Management System
- ISO 45001: 2018 - Occupational Health and Safety Management
- ISO 50001: 2018 - Energy Management System
- ISO/IEC 27001: 2013 - Information Security Management System
- ISO 55001 – Asset Management System

Of these management systems, ISO/IEC 27001: 2013 - Information Security Management System Certificate was received on 21 September 2022 and valid until 21 February 2025 whereas the remaining was received on 20 January 2021 and valid until 19 January 2024. In

[175] Retrieved from https://www.enerjisauretim.com.tr/hakkimizda/yonetim/politikalarimiz/ on 15 November 2023.

line with these management systems, the Project Company has an Integrated Management Systems Policy.

As reported by the Project Company representatives, corporate policies of Enerjisa Üretim are applicable to all Project employees including contractors and subcontractors.

In addition to the policies and management systems of the Project Company, Enercon, the main contractor of the Project, has also corporate policies that will be applied within the scope of the Project. These policies are listed as follows:

- **Enercon Code of Conduct:** The document forms the leading regulatory framework for Enercon's actions and is binding on all employees. There are certain items specifying the Enercon's approach in terms of respect for people and the environment. Moreover, Enercon is committed to ensuring a diverse working environment and fair and equal treatment to all employees, regardless of any personal characteristics such as age, gender, disability, ethnic or national origin, religion or belief system. The document also emphasizes the practices on Occupational Health and Safety (OHS), procurement and environmental protection activities as well as Enercon's approach to fight corruption and bribery.
- **Supplier Code of Conduct:** The document sets out the minimum requirements of Enercon to its suppliers regarding the fulfilment of their responsibilities towards Enercon, its stakeholders (especially its employees), society and the environment. In this sense, the Supplier Code of Conduct applies to all suppliers of goods and services to Enercon worldwide. Enercon expects its suppliers to agree to the principles in this Supplier Code of Conduct. These are part of Enercon's supplier selection and evaluation process. Furthermore, suppliers are expected to implement these standards downstream in the supply chain. The document follows the United Nations Guiding Principles for Business and Human Rights, the Ten Principles of the United Nations Global Compact, the Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises, the United Nations Declaration of Human Rights and the Wind Europe Principles for Sustainable Supply Chains, and the ILO Conventions. Accordingly, it mentions labour and human rights particularly Enercon's commitment to the prohibition of child labour, forced labour, modern slavery, discrimination and harassment, and human trafficking. In addition, Enercon expects its suppliers to comply with the applicable regulations on freedom of association, disciplinary measures, OHS applications on the Project area, grievance mechanism, working hours, wages and other benefits. Enercon recommends that its suppliers provide their employees with appropriate training and development opportunities.
- **Rules of Procedure Grievance Mechanism:** The document summarizes the grievance channels (i.e., phone, e-mail, letter) that can be utilized by the stakeholders who may be potentially affected from Enercon's activities. The document also emphasizes the principles of anonymous application and confidentiality as well as the flow of organization for the grievance management process. Enercon's grievance mechanism is available not only to all employees of Enercon but also the Project affected persons (i.e., residents in the neighbourhood of an Enercon site) or organisations (i.e., media representatives, non-governmental organisations).

Enercon will follow the Project Company's HR Policy throughout their work associated with the Project lifecycle**.**

14.2.4 Limitations and Assumptions

The information on the Project's workforce to be employed as well as plans and procedures to be applied during both construction and operation phases is limited at the time of writing this Report. Therefore, labour and working conditions impact assessment remained general in terms of risks, opportunities, and mitigation measures based on the national legislation and international requirements and standards. The impact assessment on labour and working

conditions has been conducted by considering the whole Project workforce including subcontractors and supply chain workers where relevant.

14.3 Baseline Description

14.3.1 Project Employment and Labour Relations

At national context, the wind energy industry provides employment opportunities for approximately 18,000 qualified personnel[176]. The industry creates employment in many business lines such as wind turbine tower manufacturing, spare parts manufacturing, transportation systems, transmission line manufacturing and assembly industry, maintenance and repair services, engineering and consultancy sector, financing, and software.

As reported by the Project Company, the estimated number of workforce may increase up to 106 depending on the scope and timeline of the Project during the construction phase, and six personnel within this workforce will be the Project Company employees. The breakdown of workforce (i.e., national/international, gender) will be monitored and reported during construction phase. Enercon will be the main contractor and one of the primary suppliers of the Project. For the operation phase, the number of workforce is estimated to be five, two of whom will be the subcontractors. As reported by the Project Company, all Project workforce will consist of Turkish citizens for both phases.

14.3.1.1 Human Resources (HR) Management

On the basis of the organizational structure shared by the Project Company, it is understood that the labour and HR management of all Project workforce including contractors will be performed by the People & Culture Department.

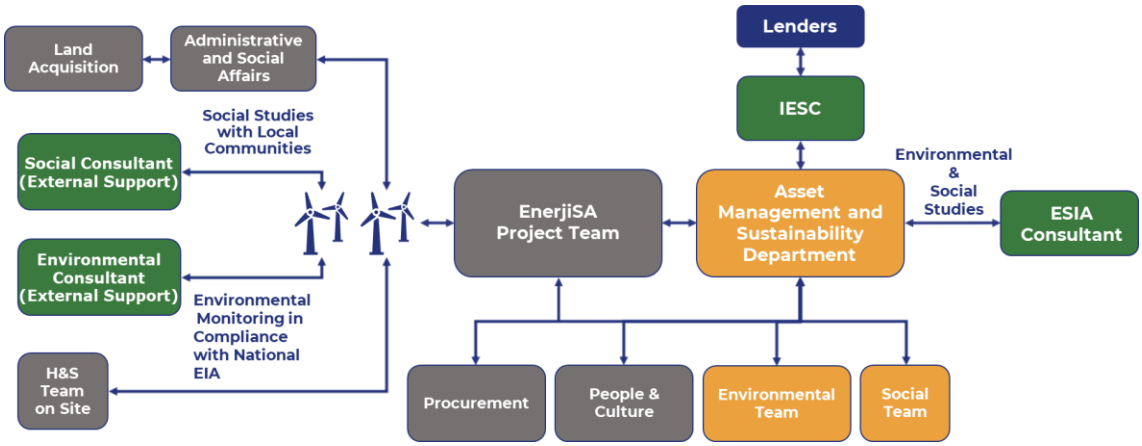

Figure 14.1: The organizational structure of the Project Company for E&S Governance
Source: Enerjisa Üretim

As per the international requirements, an HR Policy describing the way the Project Company will manage its Project workforce (including contractors and subcontractors) needs to be developed. HR policy allows the Project Company to communicate with the workforce, adopt a consistent approach to managing them and demonstrate compliance with international standards and national laws. The HR Policy needs to be understandable with clear statements, accessible to all workers, and in the main language spoken by the workforce.

[176]Retrieved from https://tureb.com.tr/lib/edergi/20/20.pdf on 16 November 2023.

The Project Company does not have an HR Policy. However, the corporate policies of the Project Company that are applicable to the Project (i.e., Policy on Human and Culture, Code of Business Ethics, Code of Compliance) can be utilized when establishing an HR Policy. In addition, an HR & Worker Management Plan will be established within the ESMS of the Project to be applied for all Project workers including subcontractors.

As reported by the Enercon representatives in March 2024, Enercon does not have any HR and worker management procedures covering the processes from recruitment and employment. Enercon will follow the Project Company's HR Policy which covers all Project workers including subcontractors throughout their work associated with the Project lifecycle**.**

The Project Company is responsible for disclosing the corporate policies of both Enerjisa Üretim and Enercon as well as the HR & Worker Management Plan to all Project workers.

14.3.1.2 Terms and Conditions of Employment

According to the international standards, the Project workers will be provided with the reasonable and fair terms and conditions of employment that are clear and understandable. The documentation (namely the contract) on terms and conditions will set out their rights under national labour and employment law (which will include any applicable collective agreements) including their rights related to hours of work, wages, overtime, compensation, and benefits and it will be provided at the beginning of the working relationship and when any material changes to the terms or conditions of employment occur. The workers will sign their contracts that clearly describe terms of employment including the working rights.

There will be adequate periods for rest in a weekly manner for workers. Overtime working hours should not be exceeding 270 hours per year as stipulated in the Labour Law No. 4857. Further, the workers' consent should be received for overtime work in a written way upon the employment, as specified in the law. Overtime work, work on weekends and public holidays will be compensated in accordance with requirements of this law.

Enercon representatives reported that Enercon complies with the legal working hours and break time rules specified in the Labour Law No. 4857. Employees benefit from the compensatory time off scheme when they exceed 45 hours of work per week. Blue-collar or field workers, on the other hand, receive overtime pay.

The Project Company, Enercon and its subcontractors will prioritize local employment and employment from directly affected villages of the Project to the extent possible. At the time of the site visit, the Project Company representatives stated that one in each five Project workers will be locally employed.

14.3.1.3 Facilities

The National EIA Report states that all food, beverage and social needs of the workforce that will work during both the construction and operation phases will be arranged through the facilities in the surrounding settlements. In this regard, there will be no accommodation and refectory within the Project area.

14.3.1.4 Workers' Organisations

Project workers are covered by the Law on Trade Union and Collective Bargaining No. 6356. In line with this law, Turkish Labour Law No. 4857 and the international standards, the Project will recognize workers' rights to form and join workers' organisations of their choosing and to bargain collectively without interference. The Project workers will be informed about their right to unionization.

14.3.1.5 Non-Discrimination and Equal Opportunity

The work-related opportunities offered by the Project for all its potential and existing workforce will be based on the principles of fair treatment, non-discrimination and equal opportunity as per the international standards, Turkish Labour Law No. 4857 and the Project Company's as well as Enercon's corporate policies.

Personal characteristics (i.e., gender, race, nationality, ethnic origin, religion or belief, disability, age, or sexual orientation) of the workers that are unrelated to inherent job requirements will be disregarded to provide them a working environment with equal opportunity and no discrimination.

There will be no discrimination with respect to any aspects of the employment relationship, such as recruitment, compensation, working conditions and terms of employment, access to training, promotion or termination of employment.

14.3.1.6 Gender Considerations

A number of ILO conventions, including the conventions on equal treatment of employees and gender equality, have been ratified by Türkiye. The Turkish Labour Law No. 4857 is in line with the international labour standards and conventions in most aspects such as child labour, forced labour, non-discrimination and equal opportunity, and right to join workers' organisations. However, there are no laws to support the gender equality at work in the Turkish legislation other than the maternity leave.

Ensuring a balance among the number of male and female workers is a key principle to provide gender equality in the workplace. In this respect, the Project will determine a quota for female employment. The conditions of employment within the Project (including occupational trainings, wages, benefits and compensation) will be based on the workers' performances rather than their gender. There should be no pay gap stemming from gender among workers. As reported by the Project Company representatives, the aim is to reach the 50% of female employment within the whole Project workforce (including subcontractors) throughout the operation phase. Also, it was confirmed that all conditions and terms of employment will be the same for male and female workers based on the "equal pay for equal work" principle.

The Project will also ensure that the Project area has appropriate and proportional security measures (i.e., lighting, alarms, separate toilets) and a confidential grievance mechanism for the grievances related to GBVH. Regular outreach and awareness trainings will be conducted to workers in order to address GBVH risks around the Project area.

Project Company is preparing a GBVH Policy at corporate level, which will be implemented at all assets within the portfolio of Enerjisa Üretim including the Project.

14.3.1.7 Grievance Mechanism

Internal grievance mechanism covers the grievances of all employees working under the Project Company, its contractors, subcontractors and suppliers. The Project Company aims at creating a positive working environment based on open and continuous communication. For this purpose, the Project Company has formal employee grievance mechanisms. As specified in the temporary SEP, some of these practices are applied within the Project area.

Internal grievance channels include ethical hotline, e-mail address, and an online form provided by the Project Company, employee committee meetings, reporting grievances to the managers and Human Resources Department representatives verbally or in a written way, eBA Suggestion System of the Project Company, and grievance boxes placed at the Project mobilization areas.

Some improvement areas regarding the grievance mechanism have been notified during the ESIA process of the Project. Improvement areas and the details on the internal grievance mechanism of the Project are provided in detail in Section 18.6.4.

14.3.1.8 Child Labour

There will be no child labour employment in any manner that is economically exploitative, likely to be harmful hazardous to the child's physical and mental health or to interfere with the child's education. As per the IFC PS 2 and EBRD PR 2, the Project will identify the presence of all persons under the age of 18 and those below the age of 18 years will not be employed in hazardous works. In this regard, the Project will follow these international standards and the Turkish Labour Law No. 4857 in order to avoid child labour among its workers, contractors and subcontractors. To prevent the existence of child labour, the records of the dates of birth of all employees will be kept, verified by official documentation, and monitored on a regular basis.

14.3.1.9 Forced Labour

Within the scope of the Project, the Project Company will not employ forced labour[177] covering any kind of involuntary or compulsory labour arrangements.

14.3.1.10 Workers Engaged by Third Parties

For workers engaged through contractors or other intermediaries, the Project will consider the risks associated with the recruitment, engagement, and demobilisation of the Project workers by third parties. Accordingly, the Project will establish commensurate policies and procedures for managing and monitoring the performance of third-party employers in relation to the Project.

In addition, the Project will use reasonable efforts to incorporate these requirements in contractual agreements with such third-party employers and where relevant, will develop and implement a Contractor Selection, Evaluation and Management Procedure and implement the HR & Worker Management Plan that will cover all Project workforce. In the case of subcontracting, the Project will use reasonable efforts for third parties to include equivalent requirements in their contractual agreements with their subcontractors.

According to the information shared by the Project Company, the necessary steps to be taken in order to ensure that subcontractors apply and/or comply with the Project Company's working conditions and management of worker relationship standards are as follows:

- Once the ESMP and sub-management plans are finalized, necessary clauses indicating the contractors' obligations to comply with these documents will be included in the contracts.
- Sub-management plans will be included as appendix to the contracts. They will be advised to either develop their own E&S management plans/procedures or comply with the Project Company's documents.
- On site implementation will be monitored by Enerjisa Üretim Team (i.e., inspections, audits).
- Trainings will be provided to increase the capacity and awareness.

14.3.1.11 Retrenchment

Collective dismissal is regulated in Article 29 of the Labour Law No. 4857 as follows:

"When the employer wants to lay off workers collectively as a result of economic, technological, structural and similar business, workplace or work requirements, the employer notifies this at

[177] According to the IFC Performance Standards on Environmental and Social Sustainability (2012), forced labour consists of work or service involuntarily performed that is exacted from an individual under threat of force or penalty, including through abusive and fraudulent recruitment practices.

least 30 days in advance in writing to the workplace union representatives, the relevant regional directorate and the Turkish Employment Agency (IS-KUR)."

The number of workers employed at the workplace:

- If between 20 and 100 workers, at least 10 workers,
- If between 101 and 300 workers, at least 10% of the workers,
- If 301 or more, at least 30 workers,

termination of employment is regarded as collective dismissal.

In times of the requirement for retrenchment and demobilisation, a retrenchment procedure to minimize the impact of job losses on workers and communities is necessary as per the good international practices as well as Lenders' standards and requirements. Such a procedure, often encapsulated in a retrenchment plan, should be founded on widespread consultation (particularly with workers and their representatives) and should seek to ensure that the selection of workers for dismissal is based on principles that are fair and transparent and do not discriminate against particular groups. During the course of the process, efforts should be made to reduce the number of jobs that have to be lost and to mitigate the impacts of the job losses on individuals, groups, and communities. In line with this requirement, Project Company is preparing a Retrenchment Policy at corporate level and it will be implemented within the scope of the Project once finalized.

14.3.1.12 Supply Chain

Risks associated with labour and working conditions as well as occupational health and safety among suppliers within the scope of the Project can be summarized as follows:

- Existence of forced labour
- Existence of child labour
- Discrimination among workers especially the vulnerable groups
- Improper retrenchment management
- Prohibitions against right to unionization
- Improper conditions at working and accommodation areas
- Risks related to wages and other benefits
- Risks related to working hours and overtime payments
- OHS practices in construction and operation process

Additionally, suppliers are expected to respect human rights and promote gender equality. Human rights considerations should be integrated into policy frameworks, project planning, and supply chain management in order to contribute to positive Project outcomes.

The Project Company will uphold labour rights, monitor and address human rights risks in the Project's supply chain, and establish effective grievance mechanisms to provide access to remedy for any abuses. As stated earlier, internal grievance mechanism covers the grievances of all employees working under the Project Company, its contractors, subcontractors and suppliers. The Project Company has formal employee grievance mechanisms, which will be enabled for the access of the suppliers within the scope of the Project. Further assessment on the risks and mitigation measures associated with the supply chain in terms of human rights is provided in the Human Rights Impact Assessment (HRIA) prepared specific to the Project.

In business relations with the Project's primary suppliers, the Project Company will identify incidents or risky practices such as health and safety violations, child labour, and forced labour, and take proper measures to remedy them in line with the Lenders' requirements and

standards. As reported by the Project Company, Supplier Code of Conduct is being prepared at corporate level and it will be implemented at all assets within the portfolio of Enerjisa Üretim including the Project.

Similarly, Enercon, as both the main contractor and one of the primary suppliers of the Project, has applicable corporate policies. One of these policies, named Supplier Code of Conduct, covers the fulfilment of suppliers' responsibilities towards Enercon, its stakeholders (especially its employees), society and the environment. Enercon expects its suppliers to agree to the principles in this Supplier CoC. These are part of Enercon's supplier selection and evaluation process. It mentions labour and human rights particularly Enercon's commitment to the prohibition of child labour, forced labour, modern slavery, discrimination and harassment, and human trafficking. In addition, Enercon expects its suppliers to comply with the applicable regulations on freedom of association, disciplinary measures, OHS applications on the Project area, grievance mechanism, working hours, wages and other benefits. Enercon recommends that its suppliers provide their employees with appropriate training and development opportunities.

For identification of further risks in addition to the above-mentioned ones and remediation of those risks, the Project Company will need to develop certain strategies (i.e., Procurement Procedure, evaluation forms, contracts, management plans). Where remediation is not possible, the Project Company will change the Project's primary supply chain over time so that suppliers can demonstrate that they need to comply with the Project Company's standards as per the international requirements.

14.4 Impact Assessment

14.4.1 Construction

14.4.1.1 Labour and Working Conditions

Potential impacts on labour and working conditions that may occur during the construction phase of the Project are listed below by considering the whole Project workforce including the main contractor, subcontractors, and supply chain workers.

Working Conditions and Terms of Employment

Not providing reasonable working conditions and terms of employment poses a risk for the Project workforce. The workforce has a medium sensitivity for this impact. The magnitude of the impact is moderate, which corresponds to a moderate level of significance.

Fair Treatment, Non-Discrimination and Equal Opportunity for Workers

There will be no tolerance of discrimination on grounds of gender, religion, political views, nationality or social origin. Policy on People and Culture, which is one of the corporate policies of the Project Company explaining the fair treatment, non-discrimination and equal opportunity, will be implemented and disclosed to all workers including subcontractors. In terms of this impact, the Project workers' sensitivity is medium. This represents a moderate impact magnitude that corresponds to a moderate level of significance.

The presence of the security personnel is assessed in *Chapter 15: Community Health and Safety.* However, presence of the security personnel may lead to labour rights violation (including gender consideration) and conflicts among the workforce. Workers are sensitive to this impact at medium level. The magnitude of the impact is moderate, which corresponds to an impact with a moderate level of significance.

Worker's Organisations

Restricting workers from developing their own organisations and/or unions as well as alternative mechanisms to express their grievances and protect their rights regarding working conditions and terms of employment might be a risk within the scope of the Project. The workforce has a medium sensitivity for this impact. The magnitude of the impact is moderate, which corresponds to a moderate level of significance.

Workers' Grievance Mechanism

Project workers may not be adequately informed about the existing Project grievance mechanism as well as available grievance channels and the terms and conditions of their employment under the Project activities. Workers are sensitive to this impact at a medium level. The magnitude of the impact is moderate, resulting in an impact with a moderate level of significance.

Management of Contractors, Subcontractors and Supply Chain (Including Child and Forced Labour)

Construction works will be performed by the main contractor (Enercon) and its subcontractors. The Project will work with the supplier companies for procurement of certain goods and services related to the construction activities. The contractor, subcontractors and suppliers may not have adequate knowledge of international standards and practices regarding the management of contractors, subcontractors and supply chain. Contracted, subcontracted and supply chain workers have medium sensitivity to this impact. Both the magnitude and the level of significance of the impact are moderate.

Overtime Working without Workers' Consent and/or Compliance with National and International Requirements

Enercon and its subcontractors of the Project may use compulsory overtime to complete the works on time but may not pay for overtime. On the other hand, overtime may exceed 270 hours per year. Workers are sensitive to this impact at medium level. The magnitude of the impact is moderate, which corresponds to an impact with a moderate level of significance.

Gender-Based Violence and Harassment (GBVH) Risks

GBVH risks towards the workers and residents of the Project affected villages may occur unless proper preventive measures are taken. The sensitivity of the receptors to this impact is medium and the magnitude of the impact is moderate. Overall, this results in an impact with a moderate level of significance.

Conditions In Construction Camps and Other Facilities

Construction camp conditions could not be evaluated at the time of the submission of this Report. Therefore, the impact assessment was evaluated based on expert assumptions. Accordingly, the conditions within the workers' camps and/or other facilities (i.e., refectory, toilets) may not meet the international standards (i.e., space per person, number of people per room, hygiene of rooms and other facilities within the camp). The receptors' sensitivity is medium. The magnitude of the impact is moderate, which corresponds to a moderate level of significance.

Retrenchment and Demobilisation Risks

The management of the demobilisation process at the end of the Project's construction phase and retrenchment process in times of necessity may not meet the international standards. The receptors' sensitivity is medium. The magnitude of the impact is moderate, which corresponds to a moderate level of significance.

Increase In Local Employment Rates Through Employment Opportunities Created by The Project

The Project has the potential to employ people from nearby villages. People living in villages close to the Project have medium sensitivity to this impact. The magnitude of the impact is moderate. Overall, this results in an impact with a moderate level of significance.

14.4.1.2 Occupational Health and Safety

Health and safety risk is the chance or probability that a person will be harmed or experience an adverse health effect if exposed to a hazard. It may also apply to situations with property or equipment damage or harmful effects on environment. Considering that there is a limited capacity to estimate the likelihood of the risk within the ESIA scope, health and safety risks during construction are estimated using the methodology provided in Section 14.2.1.2.

Due to the nature of the construction works there are certain hazards which are likely to be in place or are inevitable at a construction site which poses risk of accidents with equipment and tools resulting in adverse health effects to the workers on construction site. The hazards on a construction site can be listed as following; repetitive motion, over-exertion, manual handling, slips and trips, falls from height associated with working in heights, struck by objects, ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities, moving machinery such as vehicle traffic and use of lifting equipment in the movement of machinery, dust emissions, confined space and excavations (silos, hoppers, utility vaults, tanks, sewers, pipes and access shafts, ditches and trenches when access or egress is limited), use of chemicals, hazardous or flammable materials, hazardous wastes, sharp objects, hand tools, electric tools, falling objects, noise, hot works (welding and cutting) etc.

Occupational health and safety impacts of the Project would not be different from that of any other construction project during site preparation and construction. The impacts would be localised and would only affect workers or visitors to the site. However, construction activities could present a number of common hazards to workers or visitors in the Project area such as physical hazards, electrical hazards, fire and explosion hazards.

Working at Height

Working at height is a common occurrence in all phases of wind turbine projects. While the main focus of managing work at height should be the prevention of falls, additional hazards that may need to be considered include: falling objects and adverse weather conditions (wind speed, temperature extremes, humidity and wetness).

Working at Remote Locations

Planning is an essential part of ensuring the safety, health and welfare of employees when working in remote locations, particularly in the offshore site.

Lifting Operations

Lifting operations are an integral part of the construction of any wind turbine. When lifting is required in an offshore environment, it can become a very complex operation involving multiple vessels and cranes.

Hazardous Activities

Construction workers would be actively involved in potentially hazardous activities such as handling and management of hazardous chemical materials, contacting with moving parts of construction machinery, the operation of heavy machinery, excavation and the handling and installation of various building materials, and appropriate personal protective measures (such as

gloves, hard hats, steel-toed boots, eye protection and ear plugs or covers) should therefore be a routine part of construction activities.

Accidents/Incidents

Potential impacts also include near misses, injuries or incidents due to inadequate risk assessment, application of risk control measures and regular monitoring of workplace incidents.

Dust, Noise and Vibration

The generation of dust, noise and vibration during construction activities (i.e., earthmoving, operation of equipment and vehicles, construction traffic) may also have adverse effects on the workers employed in the construction works, unless adequate measures are taken (i.e., health controls, use of Personal Protective Equipment (PPE)).

In addition, the impact due to following risks on construction workers as well as nearby communities are discussed under *Chapter 15: Community Health and Safety, Section 15.4*:

- Traffic safety: Transport of heavy machinery materials, and increased movement of construction vehicles can lead to altered traffic patterns and heightened risks of accidents,
- Life and fire safety: A number of activities collectively increase the vulnerability of the construction site to fire incidents, jeopardizing the safety of both construction workers and nearby communities,
- Explosive use and blasting: During construction, where soil and rocks cannot be excavated with conventional equipment, ammonium nitrate / fuel oil (ANFO), an explosive made of ammonium nitrate and diesel fuel, can be utilized, which will potentially pose risk on workers.
- All relevant OHS risks, including but not limited to, traffic risks, chemical exposure risks, risks related to mechanical hazards, blasting activities (including transportation and storage) and fire (including forest fire) will be described and the ways these risks will be managed throughout the lifetime of the Project will be identified in the OHS Management Plan as part of the ESMS.

14.4.2 Operation

14.4.2.1 Labour and Working Conditions

In terms of labour and working conditions, potential impacts that may occur during the Project's operation phase are listed below.

Working Conditions and Terms of Employment

Not providing reasonable working conditions and terms of employment poses a risk for the Project workforce. The workforce has a medium sensitivity for this impact. The magnitude of the impact is moderate, which corresponds to a moderate level of significance.

Fair Treatment, Non-Discrimination and Equal Opportunity for Workers

There will be no tolerance of discrimination on grounds of gender, religion, political views, nationality or social origin. Policy on People and Culture, which is one of the corporate policies of the Project Company explaining the fair treatment, non-discrimination and equal opportunity, will be implemented and disclosed to all workers including subcontractors. In terms of this impact, the Project workers' sensitivity is medium. This represents a moderate impact magnitude that corresponds to a moderate level of significance.

The presence of the security personnel is assessed in *Chapter 15: Community Health and Safety.* However, presence of the security personnel may lead to labour rights violation (including gender consideration) and conflicts among the workforce. Workers are sensitive to

this impact at medium level. The magnitude of the impact is moderate, which corresponds to an impact with a moderate level of significance.

Worker's Organisations

Restricting workers from developing their own organisations and/or unions as well as alternative mechanisms to express their grievances and protect their rights regarding working conditions and terms of employment might be a risk within the scope of the Project. The workforce has a medium sensitivity for this impact. The magnitude of the impact is moderate, which corresponds to a moderate level of significance.

Workers' Grievance Mechanism

Project workers may not be adequately informed about the grievance mechanism and the terms and conditions of their employment under the Project activities. Workers are sensitive to this impact at a medium level. The magnitude of the impact is moderate, resulting in an impact with a moderate level of significance.

Gender-Based Violence and Harassment (GBVH) Risks

GBVH risks towards the workers and residents of the Project affected villages may occur unless proper preventive measures are taken. The sensitivity of the receptors to this impact is medium and the magnitude of the impact is moderate. This results in an impact with a moderate level of significance.

Increased Number of Experienced Personnel at National Level

The Project is estimated to contribute to the overall human resource capacity that is competent in operation of wind turbine projects at national context. The number of experienced and expert personnel is expected to increase in line with the Project improvements. In this regard, the sensitivity of the people in Türkiye has negligible sensitivity about this impact. The magnitude of the impact is moderate. Overall, this will lead to an impact with negligible significance level.

14.4.2.2 Occupational Health and Safety

Operation activities could present a number of common hazards to workers or visitors in the Project area and all possible hazards and risks during operation will be assessed and mitigated within the corporate OHS and safety management system, local requirements, and sectoral recommendations such as ICAO and IFC.

Working at Height

Working at height is a common occurrence in all phases of wind turbine operation and is particularly relevant for maintenance. While the main focus of managing work at height should be the prevention of falls, additional hazards that may need to be considered include: falling objects and adverse weather conditions (wind speed, temperature extremes, humidity and wetness).

Working at Remote Locations

Planning is an essential part of ensuring the safety, health and welfare of employees when working in remote locations, particularly in the offshore site.

Lifting Operations

Lifting operations are an integral part of the construction of any wind turbine. When lifting is required in an offshore environment, it can become a very complex operation involving multiple vessels and cranes.

In addition, the impact due to following risks on operation workers as well as nearby communities are discussed under *Chapter 15: Community Health and Safety, Section 15.4*:

- Traffic safety: The continuous movement of maintenance vehicles can lead to altered traffic patterns and potential conflicts on local roads,
- Electromagnetic Interference and radiation: The operation of a wind power plant introduces potential risks related to Electromagnetic Interference (EMI), particularly concerning the electricity transmission infrastructure. Moreover, the generation and transmission of electrical power within a wind power plant may also give rise to concerns related to Electromagnetic Radiation (EMR)
- All relevant OHS risks, including but not limited to, risks associated with maintenance (e.g. electrocution, chemical handling and fire risk), EMR risks, forest fire risk, traffic risks will be described and the ways these risks will be managed throughout the lifetime of the Project will be identified in the OHS Management Plan as part of the ESMS.

14.4.3 Summary

Table 14.8: Labour and working conditions sensitivity/value criteria for resource/receptors

Subject	High	Medium	Low	Negligible
Working Conditions and Terms of Employment	Workplace where working conditions and terms of employment do not comply with the Lenders' standards and requirements	Workplace where reasonable working conditions and terms of employment are partially provided in line with the Lenders' standards and requirements	Workplace where reasonable working conditions and terms of employment are provided in line with the Lenders' standards and requirements but in some cases fail to apply properly	Workplace where working conditions and terms of employment comply with the Lenders' standards and requirements
Fair Treatment, Non-Discrimination and Equal Opportunity for Workers	Workplace with high levels of discrimination and unequal/unfair treatment to the workers that are exposed to all Project workers	Workplace with discrimination and unequal/unfair treatment to the workers that are exposed to certain group of workers	Workplace with fair treatment, non-discrimination and equal opportunity strategy but in some cases fails to apply properly	Workplace effectively operating in line with fair treatment, non-discrimination and equal opportunity principles
Workers' Grievance Mechanism	Non-existence of a workers' grievance mechanism/ Resistance to establish a workers' grievance mechanism	Workers' grievance mechanism that is not accessible and transparent and that discourages workers to use properly due to risks of dismissal and retaliation	Effective workers' grievance mechanism, but with limited channels and lack of principles in terms of prioritization, resolution timeline and disclosure of the outcomes	Effectively functioning grievance mechanism
Worker's Organisations	Restricting workers from developing their own organisations and/or unions as well as alternative mechanisms to express their grievances and protect their rights regarding working conditions and terms of employment	Not providing a transparent environment for workers to develop their own organisations and/or unions as well as alternative mechanisms to express their grievances and protect their rights regarding working	Providing a transparent environment for workers to develop their own organisations and/or unions as well as alternative mechanisms to express their grievances and protect their rights regarding working	Enabling and informing workers about their rights in order to encourage them to develop their own organisations and/or unions as well as alternative mechanisms to express their grievances and protect their rights regarding working

Subject	High	Medium	Low	Negligible
		conditions and terms of employment	conditions and terms of employment	conditions and terms of employment
Child and Forced Labour	Existence of child and forced labour under improper working conditions without any ways to remedy	Existence of child and forced labour under improper working conditions with certain ways to remedy	Existence of child and forced labour under proper working conditions with certain ways to remedy	Non-existence of child labour and forced labour
Overtime Working	Forcing the workers to work overtime under improper working conditions and not compensating the overtime worked hours	Performing overtime working with worker's consent but not compensating the overtime worked hours	Performing overtime working with worker's consent but partially compensating the overtime worked hours	Performing overtime working with worker's consent and compensating the overtime worked hours properly
Gender-Based Violence and Harassment (GBVH) Risks	Insecure conditions and lack of security measures that may lead GBVH risks occurring and make Project workers as well as local community members in the nearby neighbourhoods open to abuse	Limited security measures that may not prevent GBVH risks occurring	Adequate conditions with certain security measures and strategies that prevent GBVH risks occurring but, in some cases, fail to apply properly	Optimal conditions that are applied properly with certain security measures and strategies that prevent GBVH risks occurring
Retrenchment and Demobilisation Risks	Retrenchment and demobilisation processes that do not comply with the Lenders' standards and requirements	Retrenchment and demobilisation processes that partially comply with the Lenders' standards and requirements	Retrenchment and demobilisation processes that comply with the Lenders' standards and requirements, but, in some cases, fail to apply properly	Retrenchment and demobilisation processes that comply with the Lenders' standards and requirements
Conditions In Construction Camps and Other Facilities	Construction camps and other facilities with major problems related to sanitation, hygiene, waste, food, which are not compliant with the international standards	Improper conditions in construction camps and other facilities that are partially compliant with the international standards	Improvable conditions with minor problems in construction camps and other facilities that are partially compliant with the international standards	Optimal conditions in construction camps and other facilities in full compliance with international standards

Table 14.9: Impact significance during construction

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Working Conditions and Terms of Employment	All Project workers	High	Construction	Construction area	Reversible	Possible	Moderate	Medium	Moderate
Fair Treatment, Non-Discrimination and Equal Opportunity for Workers	All Project workers	High	Construction	Construction area	Reversible	Occurring under specific conditions	Moderate	Medium	Moderate
Worker's Organisations	All Project workers	High	Construction	Construction area	Reversible	Occurring under specific conditions	Moderate	Medium	Moderate
Workers' Grievance Mechanism	All Project workers	High	Construction	Construction area	Reversible	Possible	Moderate	Medium	Moderate
Management of Contractors, Subcontractors and Supply Chain (Including Child and Forced Labour)	All Project workers	High	Construction	Construction area	Reversible	Possible	Moderate	Medium	Moderate
Overtime Working without Workers' Consent and/or Compliance with National and	All Project workers	Medium	Construction	Construction area	Irreversible unless compensated	Occurring under specific conditions	Moderate	Medium	Moderate

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
International Requirements									
Gender-Based Violence and Harassment (GBVH) Risks	All Project workers/ Local community members residing in the nearby villages	High	Construction	Construction area	Irreversible unless compensated	Possible	Moderate	Medium	Moderate
Conditions In Construction Camps and Other Facilities	All Project workers	High	Construction	Construction area	Reversible	Possible	Moderate	Medium	Moderate
Retrenchment and Demobilisation Risks	All Project workers	High	Construction	Construction area	Reversible	Occurring under specific conditions	Moderate	Medium	Moderate
Increase In Local Employment Rates Through Employment Opportunities Created by The Project	All Project workers/ Local community members residing in the nearby villages	Medium	Construction	Construction area	Reversible	Possible	Moderate	Medium	Moderate

Table 14.10: Occupational Health and Safety Risks During Construction

Receptor	Risk Summary	Receptor Sensitivity	Risk Likelihood	Risk Severity	Risk Rating
Construction workers and visitors	Risk of accidents in result of poor risk management	High	4: Occasional	A: Catastrophic	4A: High Risk
Construction workers	Risk of occupational diseases	High	3: Remote	A: Catastrophic	**3A: High Risk**

Table 14.11: Impact significance during operation

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Working Conditions and Terms of Employment	All Project workers	High	Operation	Construction area	Reversible	Possible	Moderate	Medium	Moderate
Fair Treatment, Non-Discrimination and Equal Opportunity for Workers	All Project workers	High	Operation	Construction area	Reversible	Occurring under specific conditions	Moderate	Medium	Moderate
Worker's Organisations	All Project workers	High	Operation	Construction area	Reversible	Occurring under specific conditions	Moderate	Medium	Moderate
Workers' Grievance Mechanism	All Project workers	High	Operation	Construction area	Reversible	Possible	Moderate	Medium	Moderate
Gender-Based Violence and Harassment (GBVH) Risks	All Project workers/ Local community members residing in the nearby villages	High	Operation	Construction area	Irreversible unless compensated	Possible	Moderate	Medium	Moderate
Increased Number of Experienced Personnel at National Level	All Project workers/ National wind industry workers	Medium	Operation / Post-operation	Construction area and villages	Reversible	Possible	Moderate	Negligible	Negligible

Table 14.12: Occupational Health and Safety Risks During Operation

Receptor	Risk Summary	Receptor Sensitivity	Risk Likelihood	Risk Severity	Risk Rating
Staff and visitors	Risk of accidents in result of poor OHS risk management	High	4: Occasional	A: Catastrophic	4A: High Risk
Staff and visitors	Risk of accidents in result of earthquake and structural failure	High	2: Improbable	A: Catastrophic	2A: Moderate Risk
Staff and visitors	Risk of fire and explosion accidents	High	3: Remote	A: Catastrophic	3A: High Risk

14.5 Impact Mitigation & Residual Impact

To prevent, minimize or offset the adverse labour related impacts, mitigation measures were identified in accordance with the national regulations and laws, international standards and best practices.

14.5.1 Construction

14.5.1.1 Labour and Working Conditions

Regarding the potential impacts of the Project on labour and working conditions during the construction phase, the following mitigation and enhancement measures will be applied:

- HR & Worker Management Plan (covering both the management of contractor and subcontractor labour) will be developed for construction and operation phases of the Project separately.
- HR & Worker Management Plan for the construction phase will include Workers' Accommodation Plan to ensure that necessary camp management actions are applied within the Project's mobilization area in line with the Lenders' standards and requirements. The assessment of environmental and social conditions of all mobilization areas will be undertaken with respect to the specified requirements.
- Enercon will finalize and implement the HR and worker management procedures covering the processes from recruitment and employment.
- HR & Worker Management Plan together with the HR Policy and other relevant corporate policies of the Project Company as well as the HR and worker management procedures and other applicable corporate level policies of Enercon that address non-discrimination and equal opportunity, workers' rights and benefits, right to unionization, grievance mechanism, child and forced labour in line with the national and international requirements will be implemented throughout the Project lifecycle and disclosed to all Project workers including subcontractors.
- There will be a formalized and written Project Grievance Mechanism Procedure that involves the principles of the mechanism (including confidentiality and anonymity), available channels, defined timeframes for acknowledgement of the receipt of complaints and subsequent resolution, and management and resolution process together with the assigned responsible Project staff. The Project Grievance Mechanism Procedure will be disclosed to all Project workers including contractors and subcontractors. Grievance mechanism channels will be enabled for the workers through which they can raise their concerns and suggestions.
- Code of Conduct for workers will be developed together with the items that ensuring appropriate and proportional security (including GBVH risks) measures for workers (i.e., lighting, alarms, separate toilets) are provided. Code of Conduct will be disclosed to all Project workers.
- Corporate level GBVH Policy of the Project Company will be implemented once it is finalized and established.
- The fact that Enercon and its subcontractors follow national laws and regulations as well as international requirements in the employment of construction workers will be ensured through certain strategies (i.e., monitoring the workers' overtime consent forms, enabling the grievance mechanism). Contractor Selection, Evaluation and Management Procedure will be developed and implemented.

- The fact that vulnerable workers (i.e., women, disabled, migrant workers) are included and protected will be ensured through the items specified within the Code of Conduct in line with the Lenders' standards and requirements.
- Corporate level Security Personnel Code of Conduct of the Project Company will be implemented once finalized.
- The use of all forms of child and forced labour will be prevented in contractor, subcontractor and supply chain companies through Contractor Selection, Evaluation and Management Procedure, Procurement Procedure, and HR & Worker Management Plan that are prepared specific to the Project as well as the corporate level Supplier Code of Conduct once it is finalized and established.
- HR & Worker Management Plan as well as Local Content and Procurement Procedure will involve certain items to ensure maximization of employment and procurement opportunities for local people and businesses.
- Quota for the employment of female workers to provide gender equality will be established in line with the Project Company's gender equality objectives.
- Corporate level Retrenchment Policy of the Project Company will be implemented once finalized.
- The Project Company will conduct periodic labour audits that will be taken internally as well as by the external parties to determine the labour management performance and identify the gaps related to the labour management as per the national legislation, Lenders' standards and requirements as well as ILO and other applicable international requirements.

14.5.1.2 Occupational Health and Safety

The mitigation measures that will be applied to reduce or avoid the potential occupational health and safety risks during the construction phase will include but not be limited to the following:

- All national health and safety regulations will be followed by the Project Company and their contractors.
- Good site management practice (training and qualification of staff, appropriate work standards) to reduce occupational health and safety risks will be implemented.
- Occupational Health and Safety Management Plan, which is structured to cover site specific risks and appropriate mitigation and monitoring requirements, will be implemented.
- Risk assessments, covering site and Project specific OHS risks, will be conducted.
- Permit to Work Procedure will be implemented.
- Emergency Preparedness and Response Plan will be implemented.
- Supply and use of appropriate PPE will be ensured in line with international best practice and national legislation.
- Regular trainings on the possible risks regarding the work site and works to be carried out will be provided to all Project workers.
- Accident records (fatalities, lost time incidents, any significant events including spills, fire, outbreak of pandemic or communicable diseases, social unrest, etc.) will be kept in a central log properly.
- Regular inspection of equipment and vehicles will be conducted.
- Relevant monitoring parameters and implementation of regular monitoring of the occupational health and safety performance of main contractor and subcontractors will be properly defined.
- The subcontractors will also be required to follow the requirements of the Project. Contracts to be signed with subcontractors will include health and safety requirements.

- OHS mitigation measures will be designed and implemented following a structured Health and Safety Management System as defined in Occupational Health and Safety Management Plan.
- Health and safety organizational structure will be developed which involves sufficiently qualified health and safety personnel for Project specific risks.

14.5.2 Operation

14.5.2.1 Labour and Working Conditions

To address the potential impacts of the Project on labour and working conditions during operation phase, the following mitigation and enhancement measures will be applied:

- HR & Worker Management Plan (covering both the management of contractor and subcontractor labour) will be developed and implemented.
- HR & Worker Management Plan together with the HR Policy and other relevant corporate policies of the Project Company that address non-discrimination and equal opportunity, workers' rights and benefits, right to unionization, grievance mechanism, child and forced labour in line with the national and international requirements will be implemented throughout the Project lifecycle and disclosed to all Project staff.
- There will be a formalized and written Project Grievance Mechanism Procedure that involves the principles of the mechanism (including confidentiality and anonymity), available channels, defined timeframes for acknowledgement of the receipt of complaints and subsequent resolution, and management and resolution process together with the assigned responsible Project staff. The Project Grievance Mechanism Procedure will be disclosed to all Project staff. Grievance mechanism channels will be enabled for the workers through which they can raise their concerns and suggestions.
- Code of Conduct for the Project staff will be developed together with the items that ensuring appropriate and proportional security (including GBVH risks) measures for workers (i.e., lighting, alarms, separate toilets) are provided. Code of Conduct will be disclosed to all Project staff.
- Corporate level Security Personnel Code of Conduct of the Project Company will be implemented once finalized.
- Corporate level GBVH Policy of the Project Company will be implemented once it is finalized and established.
- The fact that vulnerable workers (i.e., women, disabled, migrant workers) are included and protected will be ensured through the items specified within the Code of Conduct in line with the Lenders' standards and requirements.
- Quota for the employment of female workers to provide gender equality will be established.
- The Project Company will conduct periodic labour audits that will be taken internally as well as by the external parties to determine the labour management performance and identify the gaps related to the labour management as per the national legislation, Lenders' standards and requirements as well as ILO and other applicable international requirements.

14.5.2.2 Occupational Health and Safety

Regarding the potential occupational health and safety risks during the Project activities, risk assessments will be conducted to determine the complete set of measures required. At a minimum, the following mitigation measures will be applied:

- Implementation of the following as part of the ESMS: Emergency Preparedness and Response Plan, Community Health and Safety Plan, Hazardous Materials Management Plan, Waste and Wastewater Management Plan.
- Regular monitoring and reporting of the occupational health and safety conditions within the Project including incidents and near misses.
- Providing a Self-Inspection Checklist for the Project personnel to fill the checklist on a regular basis and keeping the records of the checklist.
- Training workers in the use of the available information, safe work practices, and appropriate use of PPE.

14.5.3 Summary

Labour and working conditions as well as OHS related residual impacts during construction and operation phases of the Project are summarized in below tables.

Table 14.13: Labour and working conditions related residual impacts during construction

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Working Conditions and Terms of Employment	All Project workers	Moderate	Negligible
Fair Treatment, Non-Discrimination and Equal Opportunity for Workers	All Project workers	Moderate	Negligible
Worker's Organisations	All Project workers	Moderate	Negligible
Workers' Grievance Mechanism	All Project workers	Moderate	Negligible
Management of Contractors, Subcontractors and Supply Chain (Including Child and Forced Labour)	All Project workers	Moderate	Negligible
Overtime Working without Workers' Consent and/or Compliance with National and International Requirements	All Project workers	Moderate	Negligible
Gender-Based Violence and Harassment (GBVH) Risks	All Project workers/ Local community members residing in the nearby neighbourhoods	Moderate	Negligible
Conditions In Construction Camps and Other Facilities	All Project workers	Moderate	Negligible
Retrenchment and Demobilisation Risks	All Project workers	Moderate	Negligible
Increase In Local Employment Rates Through Employment Opportunities Created by The Project	All Project workers/ Local community members residing in the nearby neighbourhoods	Moderate	Negligible

Table 14.14: Residual OHS Risks during construction

Receptor	Risk Summary	Receptor Sensitivity	Risk Likelihood	Risk Severity	Risk Rating
Construction Workers	Risk of accidents in result of	High	1: Extremely Improbable	C: Major	1C: Low Risk

Receptor	Risk Summary	Receptor Sensitivity	Risk Likelihood	Risk Severity	Risk Rating
Visitors	poor safety culture				
Construction Workers	Risk of occupational diseases	High	1: Extremely Improbable	C: Major	1C: Low Risk

Table 14.15: Labour and working conditions related residual impact during operation

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Working Conditions and Terms of Employment	All Project workers	Moderate	Negligible
Fair Treatment, Non-Discrimination and Equal Opportunity for Workers	All Project workers	Moderate	Negligible
Worker's Organisations All Project workers	Moderate	Negligible	
Workers' Grievance Mechanism	All Project workers	Moderate	Negligible
Gender-Based Violence and Harassment (GBVH) Risks	All Project workers/ Local community members residing in the nearby neighbourhoods	Moderate	Negligible
Increased Number of Experienced Personnel at National Level	All Project workers/ National wind industry workers	Negligible	Negligible

Table 14.16: Residual OHS Risks during operation

Receptor	Risk Summary	Receptor Sensitivity	Risk Likelihood	Risk Severity	Risk Rating
Staff and visitors	Risk of accidents in result of poor OHS risk management	High	1: Extremely Improbable	D: Minor	1C: Low Risk
Staff and visitors	Risk of accidents in result of earthquake and structural failure	High	2: Improbable	C: Major	1C: Low Risk
Staff and visitors	Risk of fire and explosion accidents	High	2: Improbable	D: Minor	2D: Low Risk

15 Community Health & Safety

15.1 Introduction

The integration of wind power projects into communities results in transformative shifts in energy landscapes, promising sustainable solutions while concurrently giving rise to a spectrum of concerns related to community health and safety. As various aspects of community safety during the development and operation stages of wind power projects are examined, it is clear that maintaining a balance between the development of renewable energy sources and the protection of public health and safety is considered critical. This chapter reveals a complex web of things to think about, where the potential impacts that construction activities, turbine operations, and associated infrastructures may have on the communities that host these renewable energy ventures are examined.

This chapter provides an assessment of the Project health, safety and security aspects that may impact workers and nearby communities during the construction and operation phases and sets out the mitigation measures to avoid or minimize the risks together with the residual impacts that are foreseen to remain. In accordance with the requirements of the IFC PS4: Community Health, Safety and Security, potential risks and significant adverse impacts were assessed.

Commencing with the construction phase, assessment was done to the potential implications on water quality, structural safety, life and fire safety, traffic safety, the transport of hazardous materials, disease prevention, emergency preparedness, ecosystem services, the presence of security personnel, and public access through the deployment of heavy machinery, excavation processes, and transportation activities. Each facet presents unique challenges that require thoughtful assessments and the implementation of mitigation strategies to ensure the preservation of the community's well-being.

Transitioning to the operation phase, the assessment encompasses the persistent impacts on community health and safety, including the risks associated with blade and ice throw incidents, electromagnetic interference and radiation, shadow flicker, traffic safety, abnormal load transportation, and the presence of security personnel. The ongoing dynamic introduced by the operation phase demands a nuanced understanding of risks, ranging from the visual discomfort caused by shadow flicker to the potential distractions posed by the motion of turbine blades impacting traffic safety.

Throughout these discussions, the importance of community engagement, transparent communication, and the implementation of mitigation measures emerges as a recurring theme. Striking a delicate balance between the imperative of sustainable energy generation and the preservation of community health and safety forms the essence of our exploration, emphasizing the need for collaborative efforts among wind power operators, local communities, and regulatory bodies to foster responsible and harmonious development within the renewable energy landscape.

15.2 Methodology

15.2.1 Study Area and Area of Influence

Study Area and AoI is decided to be used as described in *Chapter 13: Social Environment.*

15.2.2 Data Limitations

Available resources and desk research played a role in the preparation of this chapter. The analysis and evaluations were carried out based on the prepared National EIA report and accepting the information therein as accurate and correct.

Due to field and land conditions, it was not possible to visit all the villages within the Project's social AoI. Therefore, the existing reports (i.e. National EIA, General Directorate of Highways data, etc.) were assumed to be accurate.

Even though it has no significant impact on adequacy of the baseline data, impact assessment and generated mitigations, it shall be noted that due to field and land conditions, it was not possible to visit all the villages within the Project's social AoI. Therefore, the existing reports (i.e. National EIA, General Directorate of Highways data, etc.) were used in this regard. The accuracy of EIA was also investigated as part of the ESIA investigations, and appropriate baseline data was gathered from EIA studies. This data limitation was overcome with stakeholder engagement withs local community and the relevant public authorities as well.

15.2.3 Applicable Guidelines and Standards

15.2.3.1 National Requirements

Within the Turkish national legislative framework, specific regulations and guidelines have been established to address community health and safety concerns arising from the development and operation of wind power plants. This chapter provides a detailed examination of the compliance requirements outlined in Turkish legislation, emphasizing the importance of aligning wind power projects with national standards to ensure responsible and sustainable development.

Environmental Impact Assessment (EIA) Regulation

Under Turkish law, the EIA Regulation plays a pivotal role in evaluating the potential impacts of wind power projects on community health and safety. Adherence to this regulation necessitates the completion of a thorough EIA process, where potential risks and mitigation measures are identified. The EIA process involves public participation, ensuring that local communities have the opportunity to voice their concerns and contribute to decision-making. Moreover, opinions from relevant public authorities are also obtained during preparation of National EIA Report. Wind power projects are required to comply with the mitigation measures outlined in the approved EIA report, addressing specific health and safety considerations identified during the assessment.

Motorway Traffic Law (2918)

The purpose of this Law is to ensure traffic order on highways in terms of life and property safety and to determine the measures to be taken in all matters concerning traffic safety. This Law covers traffic-related rules, conditions, rights and obligations, their implementation and supervision, relevant organizations and their duties, powers and responsibilities, working procedures and other provisions.

Regulation On Preventing Major Industrial Accidents and Reducing Their Impacts (OG Date/Number: 02.03.2019/30702)

The Regulation on Preventing Major Industrial Accidents and Reducing Their Impacts, officially published in Official Gazette dated 2 March 2019 numbered 2019/30702, stands as a comprehensive framework within the Turkish legislative landscape. This regulation is a pivotal component of the national commitment to enhancing industrial safety and minimizing the potential consequences of major accidents. It delineates the standards and protocols aimed at preventing, preparing for, and mitigating the impacts of industrial incidents that could pose substantial risks to the environment, public health, and safety. The regulation mandates the

identification of major accident hazards, requiring industries to develop and implement risk management strategies, emergency response plans, and safety measures. Through this legal instrument, Turkish authorities underscore their dedication to fostering a proactive approach to industrial safety, ensuring that industries operating within the country adhere to stringent measures aimed at averting major accidents and safeguarding the well-being of both the environment and the communities in proximity.

Environmental Noise Regulation

Mitigating the impact of noise pollution is a key aspect of compliance with Turkish legislation. The Noise Pollution Control Regulation establishes permissible noise limits for wind power plants, ensuring that operational activities do not exceed levels that may adversely affect the health and well-being of local residents. Compliance involves continuous monitoring of noise emissions and the implementation of measures to mitigate any identified issues. The details are provided in *Chapter 9: Noise and Vibration.*

Regulation on Controlling Industrial Air Pollution (RCIAP)

Within the framework of national legislation, limit values for all kinds of industrial activities are given in the RCIAP. Ambient air limit values are provided in Annex-2 Table 2.2 of RCAPOI and these limit values decrease gradually over the years until 2024. The details are provided in *Chapter 7: Air Quality.*

Legislative Framework regarding Water

Legislative Framework regarding water quality and availability is provided in *Chapter 5: Water Quality, Hydrology and Hydrogeology* in detail.

Compliance with the Turkish National Legislative Framework is essential for wind power projects operating within the country. By aligning with regulations such as the EIA Regulation, OHS legislation, zoning plans and land use regulations, and the Noise Pollution Control Regulation, wind power projects contribute to the responsible and sustainable development of the renewable energy sector in Türkiye. This legislative framework emphasizes the importance of protecting both workers and local communities, fostering a harmonious coexistence between wind power projects and the broader societal context.

15.2.3.2 International Requirements

International financial institutions and development organizations have established a framework of standards to guide the development of wind power projects, emphasizing environmental and social responsibility. Among these standards are the IFC PS 4, IFC General EHS Guidelines: Community Health and Safety, IFC EHS Guidelines: Wind Energy, and EBRD PR 4. Compliance with these standards is imperative for the sustainable development and responsible operation of wind power projects globally.

This section provides an overview of the international regulatory framework and applicable standards for the Project, which include international requirements including the Environmental and Social Framework of the World Bank and relevant European Union (EU) directives.

International Finance Corporation (IFC) Performance Standard 4

IFC PS 4 is a cornerstone in ensuring the community health and safety of the projects. By adhering to this standard, wind power projects commit to identifying and addressing potential health and safety risks to the communities in which they operate. This includes comprehensive risk assessments, community engagement, and the implementation of measures to prevent and mitigate adverse impacts. Compliance with Performance Standard 4 ensures that the project

aligns with international best practices and contributes to the overall well-being of the communities affected.

IFC General EHS Guidelines: Community Health and Safety

The IFC General EHS Guidelines further delve into Community Health and Safety aspects applicable to a broad range of industries, providing a comprehensive reference for wind power projects. The adherence to these guidelines ensures the incorporation of key principles, such as community engagement, risk assessment, and the implementation of measures to prevent accidents and mitigate potential adverse impacts on health and safety. This promotes a holistic approach to community well-being throughout the life cycle of the wind power project.

IFC EHS Guidelines: Wind Energy

Tailored specifically for the wind energy sector, the IFC EHS Guidelines: Wind Energy provide detailed guidance on the environmental and social aspects unique to wind power projects. By aligning with these sector-specific guidelines, projects contribute to the sustainability of the wind energy sector and mitigate potential adverse effects on the environment and local communities. Within this scope, abnormal load transportation during construction, blade and ice throw, aviation related risks, electromagnetic and radiation impacts, shadow flicker shall be assessed within the scope of a WPP Project.

EBRD Performance Requirement 4

The EBRD PR 4 focuses on Community Health, Safety, and Security, mirroring the IFC's commitment to these crucial aspects of project development. Adherence to this requirement reinforces the importance of identifying, preventing, and mitigating potential adverse impacts on community health and safety. Compliance with EBRD standards aligns wind power projects with internationally recognized benchmarks, enhancing their credibility, and contributing to the responsible and sustainable growth of the renewable energy sector.

U.S. International DFC’s Environmental and Social Policy and Procedures (2020)

It requires compliance with the national legal and regulatory framework as well as applicable international standards on community health and safety. Key potential impacts and risks on communities and Project Affected People need to be considered within the scope of the DFC ESPPs and relevant mitigation measures, action plans and corrective actions should be applied.

In conclusion, adherence to international standards such as IFC PS 4, IFC General EHS Guidelines: Community Health and Safety, IFC EHS Guidelines: Wind Energy, and EBRD PR 4 is paramount for wind power projects seeking to operate responsibly on a global scale. Compliance ensures the integration of best practices, fosters community well-being, and contributes to the long-term sustainability of the wind energy sector.

15.3 Baseline Description

15.3.1 Infrastructure

Baseline descriptions regarding the infrastructural conditions (i.e., health services, water supply, sewerage, agricultural infrastructure) in the Project area are described in Section 13.3.5. Approval for non-agricultural use shall be obtained in line with Article 13 of the Soil Conservation and Land Use Law No. 5403. According to the approval provided by the Ministry of Agriculture and Forestry, there would be no agricultural infrastructure on these roads that might impede land usage. The detail regarding agricultural infrastructure is provided in Section 13.4.1.5.

15.3.2 Life and Fire Safety and Emergency Response

Disaster and Emergency Management Authority (AFAD) is an institution working to prevent disasters, minimize disaster-related damages, plan and coordinate post-disaster response, and promote cooperation among various government agencies. In this regard, AFAD introduced a disaster management model which prioritizes Türkiye's transition from crisis management to risk management, which came to be known as the Integrated Disaster Management System. AFAD currently has 81 provincial branches across Türkiye in addition to eleven search and rescue units. Over the past seven years, AFAD successfully coordinated Türkiye's response to a number of devastating earthquakes and floods.

There are operating police departments and hospital, which are located in central and outer districts. The police department, and hospital situated in in Central district, is 17 km from the Project Area. Additionally, there are two different fire watchtowers located in the Project Area.

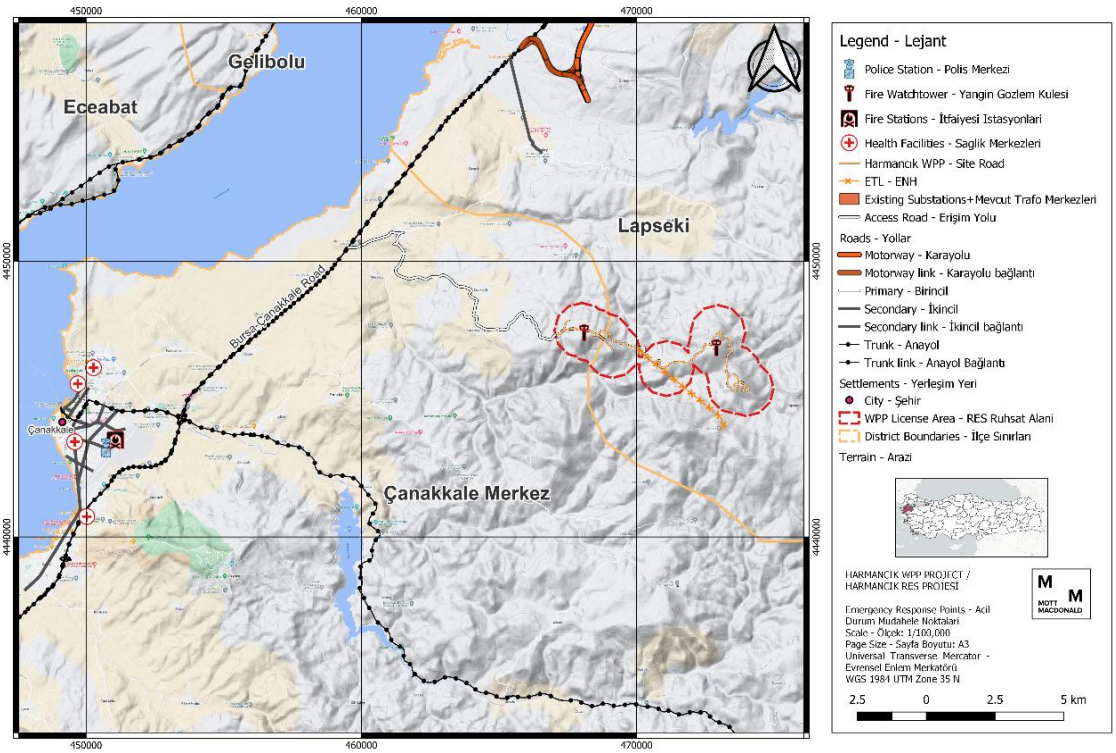

Figure 15.1: Emergency response points

15.3.3 Traffic & Transport

The baseline status of traffic and transport features of Project area and its close vicinity have been examined in order to understand current access to the site and traffic loads. Within this scope, information regarding the baseline status is obtained by examining the below listed documentation:

- Harmancık WPP National EIA Report, 2021, SAVRA
- Open Street Map Geodatabase (https://www.openstreetmap.org/)
- Google Earth Satellite Images
- General Directorate of Highways, 14th Regional Division Traffic Volume Maps

Access to Project area can be provided via E90 Highway (Bursa - Çanakkale Road) Connection and connection roads through Yapıldak, Musaköy, Kızılkeçili and Yukarıokçular villages.

According to the National EIA Report, it is stated that after this point, rehabilitation will be carried out on the existing roads, and new roads will be built in the sections where rehabilitation is not feasible.(see Figure 15.2, Figure 15.3).

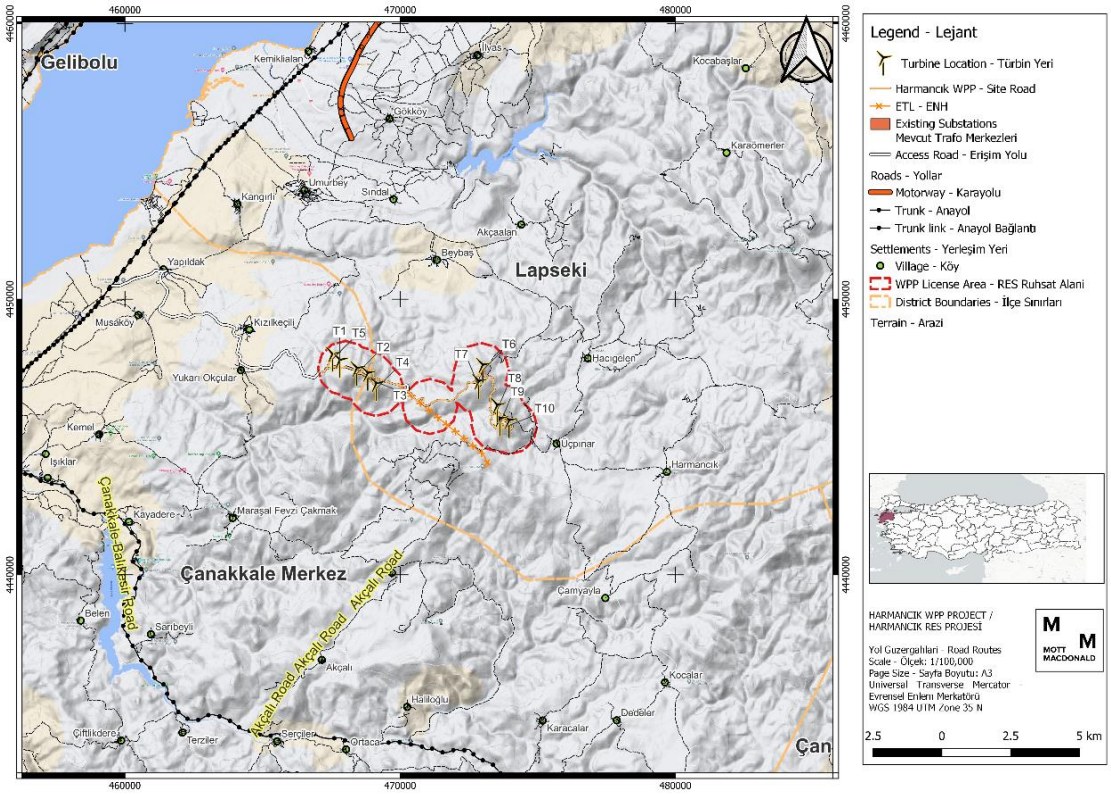

Figure 15.2: Available roads around the project area and planned access roads

The Project area is under the responsibility of the 14th Regional Directorate of Highways. In the opinion letter of the 14th Regional Directorate of Highways dated 14 December 2021, it was stated that the Project area does not constitute a frontage to the routes within the area of responsibility of 14th Regional Directorate of Highways. In addition, the transportations to be carried out within the scope of the Project shall be carried out in accordance with the Highway Traffic Law No. 2918.

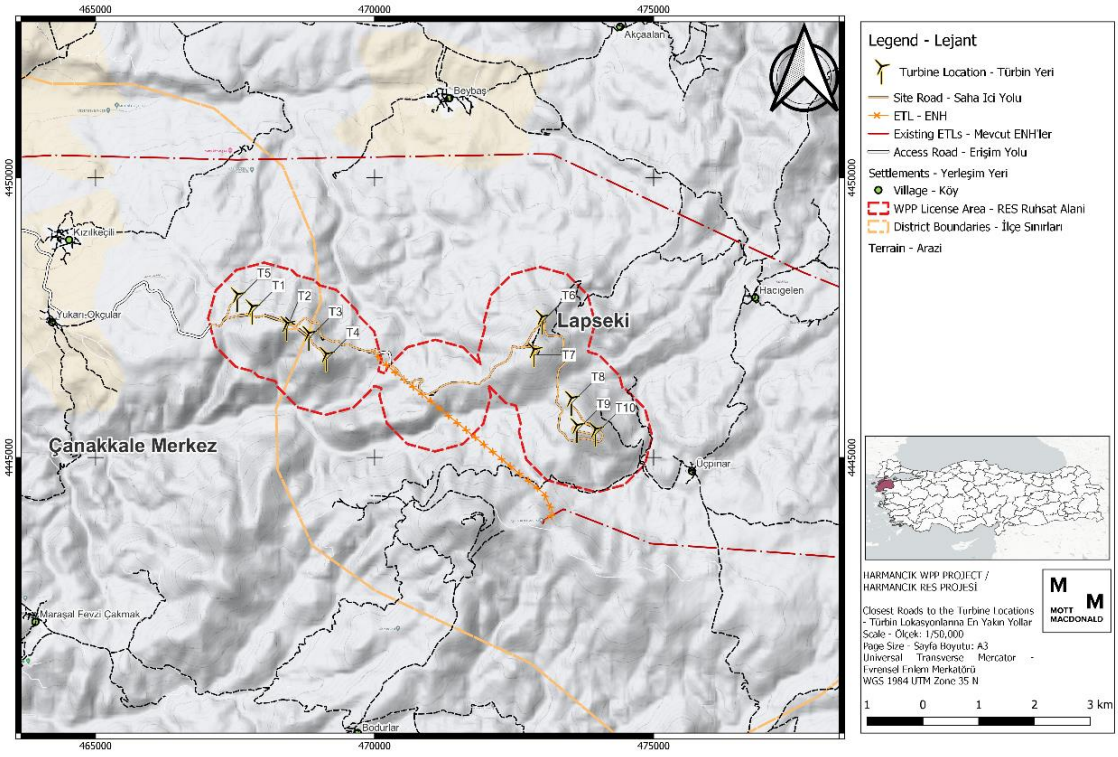

Figure 15.3: Closest roads to the turbine locations

Additionally, the traffic volume of the highways close to the Project area is evaluated as well. As described above, the Project area is located within the jurisdiction of General Directorate of Highways, 14th Regional Division. As such, the traffic volume map of the General Directorate of Highways, 14th Regional Division is assessed under this scoping study. As seen in the below map (Figure 15.4), the closest highway (Bursa Çanakkale) junction to the Project area is located in Central District of Çanakkale Province.

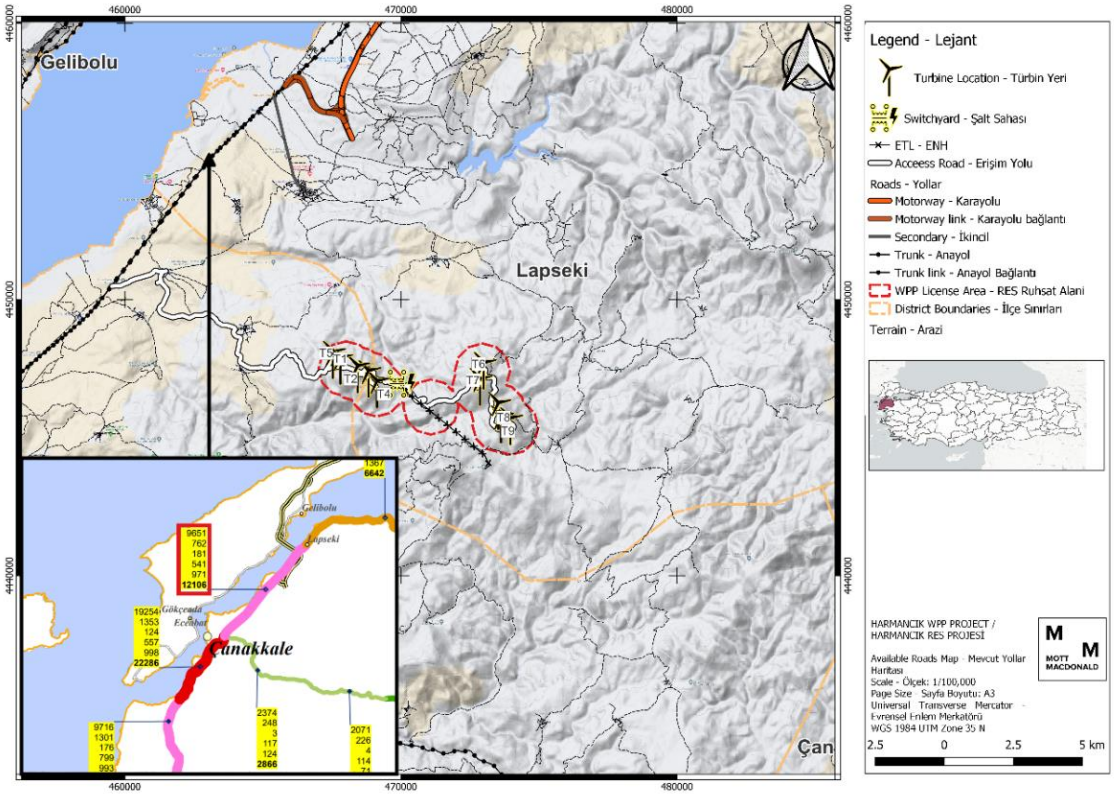

Figure 15.4: General Directorate of Highways, 14th Regional Division Highway traffic volume

In addition, traffic volume estimations of the state roads within the General Directorate of Highways, 14th Regional Division jurisdiction is also evaluated. The closest junction to the Project area is located near the Central district. Accordingly, it is estimated that total of 12,106 vehicles passing through this location (9,651 Automobiles, 762 medium load commercial vehicles, 181 busses, 541 trucks, and 971 trailers, tractors, semi-trailers) (Figure 15.4).

15.3.4 Water, Air Quality, Noise

Baseline descriptions with respect to status of water bodies, ambient air quality and noise conditions in the Project area are described in the relevant chapter of this Final Draft ESIA report, *Chapter 5: Water Quality, Hydrology and Hydrogeology, Chapter 7: Air Quality.* and *Chapter 9: Noise and Vibration*, respectively.

15.3.5 Community Grievances

The Project has an external grievance mechanism in place to receive and manage the grievances reported by community members and all other external stakeholders. The existing grievance mechanism will be revised to comply with international requirements. Details on the external grievance mechanism to be revised and implemented within the scope of the Project are given in the Section 18.6.

Other than this, the Project Company has been organizing stakeholder engagement and consultation activities together with the support of the appointed social consultancy company. As per the documents provided by the Project Company, a number of concerns which were raised by the local community members with regards to community health and safety were noted and similar concerns were observed during the site visit consultations in October 2023.

Accordingly, consulted local community members have some concerns about the potential adverse impacts, including noise, damage on the natural water resources, road access and traffic safety, change in the current climate (i.e., less rain), and loss of trees, agricultural products, and animals due to the Project together with the climate change.As stated in the PID of ETL, Regarding the parts remaining in Agricultural Areas, permission for non-agricultural use will be obtained according to Article 13 of the Soil Conservation and Land Use Law No. 5403.

15.4 Impact Assessment

15.4.1 Construction

In the context of the assessment of impacts on community health and safety, it is imperative to thoroughly examine the potential impacts on community health and safety arising from the construction activities associated with the installation of wind turbines, the development of access roads, and the establishment of electricity transmission lines. This comprehensive evaluation encompasses various dimensions, ranging from water quality and traffic safety to disease prevention and the safeguarding of ecosystem services. The unique topographical challenges of a mountainous and rocky terrain add layers of complexity to these considerations, demanding a nuanced understanding of the potential impacts on the surrounding communities and environments.

The construction phase is a dynamic and transformative period, shaping not only the physical landscape but also the social and environmental fabric of the areas involved. It is during this phase that the intricate balance between energy development and the well-being of local communities must be carefully examined. The interaction between the construction activities and the geographical characteristics of the site, including blasting in mountainous terrain, introduces specific challenges that necessitate a meticulous examination of potential consequences. This exploration delves into the foreseen impacts across various domains, offering insights into the potential risks and considerations that must be taken into account for a responsible and sustainable execution of wind power projects.

Recognizing and understanding the potential impacts on community health and safety during the construction phase is pivotal for ensuring that the benefits of renewable energy are achieved without compromising the well-being of the communities involved. This chapter assesses the multifaceted impacts, acknowledging the complexities and interconnectedness of factors that must be navigated to strike a balance between renewable energy development and the preservation of community health and safety.

15.4.1.1 Water, Noise and Air Quality

The construction phase of the Project brings forth potential impacts on water quality and availability that warrant careful consideration. The mountainous and rocky terrain poses challenges, particularly concerning blasting activities. Excavation and blasting processes have the potential to dislodge sediment, leading to increased sedimentation in nearby water bodies. This sedimentation can compromise the quality of water by altering its clarity and introducing particulate matter. Moreover, the intensified demand for water during construction, for purposes like dust suppression and concrete mixing, may strain existing water sources. The heightened demand has the potential to disrupt the natural flow and availability of water, affecting both local communities and ecosystems dependent on these water resources.

Within the scope of the impact assessment studies' the impacts listed below were assessed within the *Chapter 5: Water Quality, Hydrology and Hydrogeology* in detail.

- Runoff from construction of temporary and permanent impermeable hard surfaces
- Stormwater runoff resulting from precipitation and drainage.

- Groundwater contamination

Accordingly, minor risks were foreseen for the impacts on water sources, as the surface water bodies area located away from the Project area; there will be limited activities to adversely affect groundwater due to the nature of the Project. There is no agricultural infrastructure on the footprint of the Project Area. As stated in the PID of ETL, Regarding the parts remaining in Agricultural Areas, permission for non-agricultural use will be obtained according to Article 13 of the Soil Conservation and Land Use Law No. 5403. The detail regarding agricultural infrastructure is provided in Section 13.3.5.

During the construction phase, air emissions from heavy machinery, transportation vehicles, and dust stirred up during earthworks can temporarily degrade local air quality. Additionally, wind power plant construction introduces temporary noise disturbances to the surrounding environment. Construction equipment, and foundation work generate noise that can affect nearby communities. As described before, no significant residential areas are in question on and around Project Area. Nevertheless, people carrying out livestock activities, and passengers using roads nearby the construction may be subject to these emissions and noise generation. Additionally, impacts regarding air quality and noise were described in *Chapter 7: Air Quality* and *Chapter 9: Noise and Vibration*, respectively, and no significant impact has been foreseen.

15.4.1.2 Structural Safety of Project Infrastructure

The alteration of the mountainous landscape during the construction of the Project introduces significant impacts on the structural safety of project infrastructure. Blasting and excavation activities can modify the stability of the terrain, increasing the risk of geological hazards such as landslides. These hazards pose a direct threat to the structural integrity of newly constructed components, including wind turbines and access roads. Additionally, the changes to the landscape may indirectly impact nearby buildings and structures, if there were any as alterations in the terrain dynamics could compromise the stability of the surrounding area. As stated in the EIA Report of the project, according to the Landslide Inventory Map of Turkey, many passive slides are observed around the EIA Study Area. The nearest passive slide has occurred 1056 m from the T4 turbine. Hence, necessary precautions in case of natural disasters such as possible landslides, rock falls, avalanches, floods, etc. (stability studies, planting studies, first aid trainings, protective equipment etc.) will be taken and the provisions of the Law No. 7269 on the “Law on Measures to be Taken and Assistance to be Provided in Case of Disasters Affecting Public Life” will be complied with.

It should be also noted that There is no ‘Disaster Exposed Zone Decision’ previously taken in the EIA Area. All kinds of structures to be constructed within the scope of the Project shall comply with the "provisions of the Regulation on Structures to be Built in Disaster Zones", (Official Gazette dated 14.07.2007 and numbered 26582), and the "Turkish Building Earthquake Regulation", (Official Gazette dated 18.03.2018 and numbered 30364).

It shall be noted that, the erosion risk of to the existing structure was estimated in National EIA study. As a result, it was determined that the Turbine and Switchyard locations were in regions with low or very low erosion risk, with the exception of T4, which has a medium risk of erosion. Hence, as described in *Chapter 6: Land Use, Soil and Geology,* after taking necessary mitigation measures defined in *Erosion Control Management Plan Including Drainage and Sediment Management Procedure,* it is foreseen that, minor risk regarding Stability of Structures after Soil Erosion will be in question.

15.4.1.3 Life and Fire Safety

Life and fire safety considerations become paramount during the construction phase of the Project, particularly in the context of the mountainous and rocky environment. Blasting activities introduce heightened risks of fire incidents, as the process may lead to the ignition of flammable

materials in the surrounding terrain. The installation of wind turbines and associated electrical infrastructure adds another layer of fire risk, with potential electrical malfunctions during construction. These activities collectively increase the vulnerability of the construction site to fire incidents, jeopardizing the safety of both construction workers and nearby communities. The dynamic nature of construction, involving heavy machinery and equipment, underscores the importance of robust life and fire safety measures to prevent accidents and ensure a swift and effective response to emergencies.

Additionally, there are two fire watchtowers inside the WPP License Area as shown in Figure 15.1; thus, construction activities to be carried out near these watchtowers, might have an impact on their efficiency as well.

15.4.1.4 Traffic Safety

The construction-related activities associated with the Project introduce noteworthy impacts on traffic safety. The transportation of heavy machinery, materials, and increased movement of construction vehicles can lead to altered traffic patterns and heightened risks of accidents. The presence of large construction vehicles poses challenges to the safety of both construction workers and local residents. The changed traffic dynamics may create unfamiliar conditions for local drivers and pedestrians, increasing the likelihood of accidents and necessitating careful management of traffic flow to minimize potential hazards. The traffic load due to WPP Construction can be calculated as below.

Table 15.1: Number of Vehicles required WPP Construction

Type of Vehicle	Number of Vehicles
Concrete mixer	18
loader	2
Caterpillar Bulldozer	2
Excavator	12
Truck	6
Crane	4
Generator	1
Water Truck	2
Grader	1
Rock Drill	1
Stone crusher	1
TOTAL	**50**

As described in Section 15.3.3, it is estimated that total of 12,106 vehicles are passing through location near the access road (Figure 15.4). Thus, it can be stated that the additional traffic load to be triggered by the construction phase of the Project can be estimated as below.

$$\%\ Impact\ on\ Traffic\ Load = {Project's\ Traffic\ load}\Big/{(Project's\ Traffic\ load + Exisiting\ Traffic\ Load)}$$

$$\%\ Impact\ on\ Traffic\ Load = {50}\Big/{(50 + 12{,}106)} = \mathbf{0.04}\ \%$$

As it can be seen from the calculation, the impact of the Project construction on the existing traffic load is not significant. It also shall be noted that, as described in Chapter 13: Social Environment, majority of the people living nearby settlements are carrying out livestock activities. Thus, interaction between the local agricultural activities and project construction

activities can be considered as negligible. Moreover, the traffic load of ETL construction can be calculated as below:

Table 15.2: Number of Vehicles required ETL Construction

Type of Vehicle	Number of Vehicles
Truck	2
Excavator	1
Concrete Pump	1
Concrete Mixer	1
Water Truck	1
Crane	1
Wire Drawing Machine	1
TOTAL	**8**

Accordingly:

$$\%\ Impact\ on\ Traffic\ Load = {}^{8}/_{(8+12{,}106)} = \mathbf{0.07}\ \%$$

There are no schools in the neighbourhoods within the social AoI. However, it shall be noted that the closest highway (Bursa-Çanakkale) junction to the Project area is located in Central District of Çanakkale Province. Hence, increased traffic volume during the construction phase throughout the access roads to the Project area may result in road traffic safety risks for passengers on Bursa-Çanakkale State Road.

Moreover, according to the Traffic Management Plan, during the construction phase of the Project, the existing road network will experience additional traffic load due to the transportation of materials, waste, and excavation materials. The daily commute of personnel will also be affected. Main and local roads will be utilized as needed, but no concrete batching plant will be established in the Project area. Instead, a mobile crushing and screening plant will be constructed for aggregate production and recycling. The maximum daily heavy vehicle operation is estimated to be local roads will be utilized as needed, but no concrete batching plant will be established in the Project area. Instead, a mobile crushing and screening plant will be constructed for aggregate production and recycling. The maximum daily heavy vehicle operation is estimated to be 6.

There will also be additional traffic load due to daily commute of construction workers to and from the Project site. It is estimated that there will be around 100 workers at peak during the construction phase of the Project.

Although, there is no school in the neighbourhoods within the social AoI and expected maximum daily heavy vehicle load is 6, due to the distance to the roads of the Project area and the number of the workers, the receptor sensitivity of the passengers is considered to be medium while for the students it is considered to be low. Moreover, the magnitude of impact is evaluated as minor for both receptors. Hence, the overall impact significance is for passengers on state road is minor and negligible for students.

According to the Traffic Management Plan, the Project's goal is to adopt reduced speed restrictions and traffic control measures both within the Project area and along external transportation routes to mitigate the impact of traffic on passengers and students. Route planning, speed restrictions, vehicle safety standards, travel times, and training requirements will all be adopted. Traffic and transit strategies will adhere to national and international criteria. Emergency crews will be trained to handle traffic-related crises. Information signs will be put at entrances, lobbies, and plant sites to facilitate access. Drivers and transport workers will have a

safe working environment, and all vehicles will be maintained on a regular basis. It also shall be noted that only Project Vehicles will use the designated access roads. This will minimize the impact on the additional traffic load and its adverse impacts. In addition, within the scope of security management issues, only Project Vehicles and vehicles with necessary permit to be obtained from the HSE teams of the site will be allowed to enter Project Area. In addition, HSE Teams will make sure necessary signs are in place for speed limits. In addition, ad-hoc audits on the access roads will take place to make sure the relevant traffic management mitigation measures are being complied by the staff.

15.4.1.5 Abnormal Load Transportation

The transportation of oversized and heavy components, often termed as abnormal load transportation, is a critical aspect during the construction and maintenance phases of a wind power plant. Specialized vehicles are required to transport large components such as wind turbine blades, tower sections, and nacelles. The transportation of these oversized loads poses unique challenges to traffic safety and infrastructure. The sheer size and weight of these components demand careful route planning to avoid obstacles, narrow passages, and areas with weight restrictions. The presence of abnormal load convoys can temporarily disrupt regular traffic patterns, leading to potential delays and congestion. However, no residential area will be impacted by the route of turbine blades. Wind power operators must coordinate closely with local transportation authorities to obtain necessary permits, plan optimal routes, and communicate effectively with the community to minimize the impact of abnormal load transportation on local traffic and infrastructure.

The turbine blades and towers will be transferred to the project area. In order to ensure the safe transfer of these large and delicate components, lowbed trucks are used, which feature low decks, allowing them to transport heavy and bulky goods. The use of lowbed trucks reduces the risk of damage during travel as the components are firmly mounted to the truck bed. The transfer method follows state roads (Figure 15.5) until the materials reach the access roads within the Project area, which is ideal for well-maintained transportation of large items across settlement areas (Table 15.3). Hence, any possible risk for passengers and drivers within these settlement areas is avoided. Moreover, the transport activity will be declared to the General Directorate of Highways. The table below shows the settlement areas through which the state road passes. It should also be emphasized that the Traffic Management Plan, which includes recommendations regarding managing traffic, dealing with junctions, and resolving any possible issues, will be complied with during the transfer of these components.

Table 15.3. Settlement areas across the turbine routes

Blade			Tower		
Province	**District**	**Road**	**Province**	**District**	**Road**
İzmir	Menemen	İzmir-Çanakkale Road	**İzmir**	Bergama	İzmir-Çanakkale Road
	Aliağa			Dikili	
	Bergama		**Balıkesir**	Ayvalık	
	Dikili			Gömeç	
Balıkesir	Ayvalık			Burhaniye	
	Gömeç			Edremit	
	Burhaniye		**Çanakkale**	Ayvacık	
	Edremit			Ezine	
Çanakkale	Ayvacık			Merkez	İzmir-Çanakkale Road Çanakkale-Bandırma Road Bursa-Çanakkale Road
	Ezine				
	Merkez	İzmir-Çanakkale Road Çanakkale-Bandırma Road Bursa-Çanakkale Road			

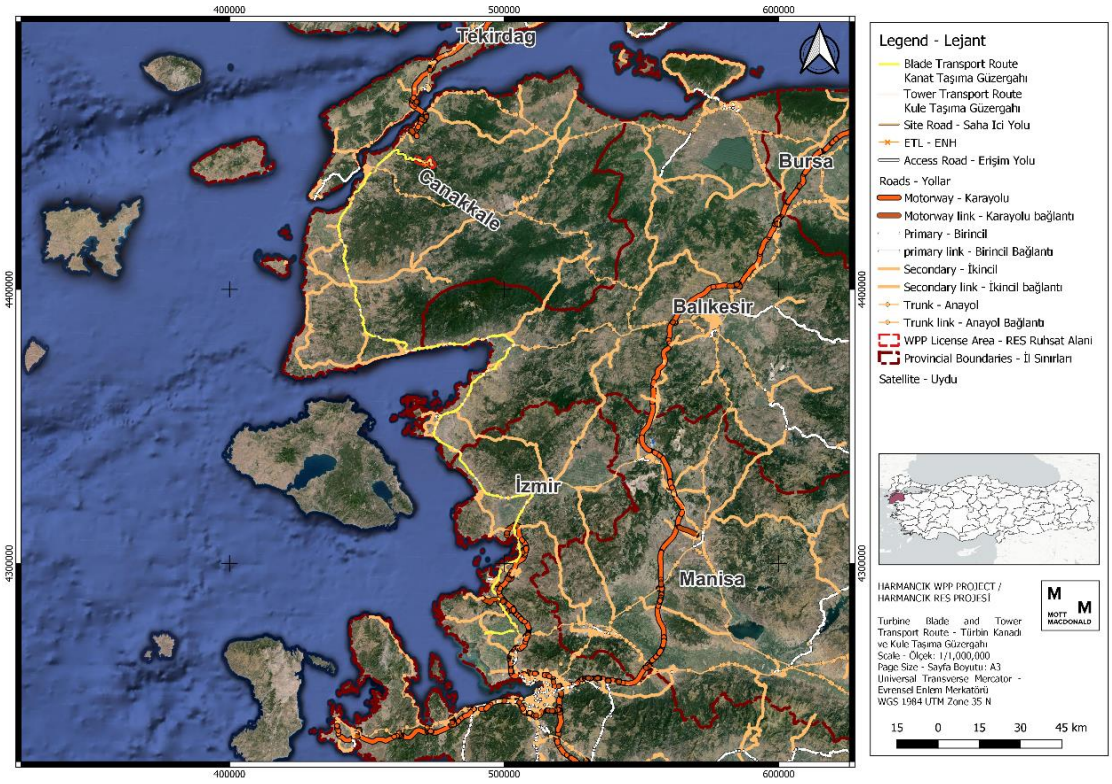

Figure 15.5: Route of Transfer for Turbine Blade and Tower

15.4.1.6 Transport and Storage of Hazardous Materials

The transportation and storage of hazardous materials during the construction phase pose distinct impacts on community health and safety. Materials critical to construction activities, such as fuels, lubricants, and construction substances, may present risks if not handled with the utmost care. The movement of these hazardous materials through local areas heightens the potential for accidental spills or leaks, endangering both the immediate environment and community health. The proper management of transportation routes and secure storage facilities becomes crucial to mitigating the risks associated with the transport and handling of these potentially harmful substances. The chemical material to be transported and stored within the camp site can be generally identified as below.

- Sodiumhypochlorite (desalination)
- Best pad cleaner
- Akfix 840 fire resistant B2 foam
- Soudal silicone
- Berner liquid grease 500 ml
- Loctite 243 sealant
- Sibax NS-66 foam
- WD-40 lubricant spray
- Henkel tankite adhesive
- Loctite 542 pipe sealant
- Air conditioner aluminum cleaner (ws-newac eco)
- Maple spray synthetic paint
- Dyo 036
- Dyo plastic paint
- Polisan natura cati
- Neotect kansa altan
- Water based road marking paint
- Betakril_tr_3d6966
- Unleaded gasoline
- Ecoclean vpci-423
- Glysantin® G05
- Betek Wood varnish
- Ox 221
- Optigear synthetic A 320
- Sikaflex 221
- Würth hhs 2000 oil 500ml
- Zinc 300 - 500 ML
- Akfix 705 MDF Kit Activator
- Castrol 1
- Ceplattyn bl
- Ecoclean vpci

- Loctite 7200 gasket remover
- Bally bolco super glue
- Loctite 7803 rust protection spray
- Loctite 510 flange sealant
- Tufan pass paint remover
- Loctite 7063 cleaner
- soudal foam
- Selsil normal foam B3
- isopropyl alcohol
- Akfix mdf kit adhesive
- Alcon brake pad spray
- Ethyl alcohol
- GLYthermin
- Rope lubrication spray
- Henkel loctite 243
- Kuberalpha xz3.1
- macrotamin zn
- Mankıewıcz alexıt zusatz
- mobile dte 25
- Mobile gear 220
- Mobile gear 320
- mobile shc 460
- Molykote metal proctetor plus spray
- Fag arcanol load400
- Gleitmo 585K_gres
- Gleitmo 585K lubricant
- Hm classico
- Klüberplex bem 41-132
- Mersen premium
- Mobile dte
- Mobile shc grease
- Stable eos e 2
- Tectly 506
- Weicon anti size

The above list of chemicals shows that majority of the chemicals in question of transportation and storage is related with painting, cleaning, fuelling and small construction works. The materials are planned to be stored in small quantities and procured as frequently as possible. Thus, the storage area is not expected to be occupying a large area. Also, as described in Section 15.4.1.5, the main route to the Project Area is not planned to pass through settlements nearby so, the chemical transportation is not expected to pose a major threat to local communities.

In addition, as described in *Chapter 6: Land Use, Soil and Geology,* limited impact is foreseen about soil contamination, as the no significant chemical and hazardous management is expected.

15.4.1.7 Disease Prevention

Construction activities of the Project introduce impacts on disease prevention within the community. The movement of construction workers, along with the introduction of construction-related activities (dust emission, exposure to chemical material), may create environments conducive to the spread of diseases. Increased human mobility can facilitate the transmission of infectious agents within the community, especially if proper health and safety measures are not in place. Additionally, changes in the local environment due to construction and air emissions, may attract disease vectors, further heightening the risk of disease transmission via waterborne (due to water contamination) and airborne (due to dust emission). Adequate measures for sanitation, hygiene, and health monitoring are essential to minimize the potential impact on community health during the construction phase. Nevertheless, it shall be noted that due to the scale and timeframe of the planned construction activities, and minimized risk of air emission and groundwater contamination, the disease spread risk for the communities located in Social AoI (especially for those closest to accommodation camps) will be insignificant.

15.4.1.8 Emergency Preparedness and Response

The construction phase necessitates a comprehensive examination of emergency preparedness and response. The dynamic nature of construction activities, coupled with the presence of heavy machinery and the potential for accidents, underscores the importance of effective emergency protocols. Inadequate emergency preparedness could lead to delays in response times, increasing the severity of incidents.

During the construction phase of the Project, various activities such as site preparation, foundation installation, and turbine erection can pose risks to the local community's safety. These activities may involve heavy machinery, increased traffic, and construction materials, which can lead to accidents, air and noise pollution, and disruption of local infrastructure. Additionally, the influx of construction workers and equipment may strain existing emergency response capabilities, thereby heightening the potential for incidents and emergencies.

The construction of the project can exacerbate existing risks to local communities' safety associated with emergencies. For instance, the installation of turbines and transmission lines may increase the likelihood of electrical hazards, such as electrocution or fire, especially in areas prone to extreme weather events like storms or wildfires. Moreover, the transportation of large turbine components through local roads can escalate traffic accidents and road closures, impeding emergency services' access to affected areas during crises.

Furthermore, the construction phase of the project may contribute to community health concerns due to dust emissions, noise pollution, and disruption of ecosystems. Dust generated from construction activities can exacerbate respiratory problems and other health issues among vulnerable populations, while continuous noise from machinery and transportation can affect residents' quality of life and sleep patterns. Additionally, disturbances to local habitats and ecosystems may indirectly impact community health by altering air and water quality, further underscoring the need for comprehensive health and safety measures.

To address these potential impacts and risks, robust emergency preparedness and response plans must be implemented throughout the construction phase of the wind power plant project. This includes conducting thorough risk assessments, establishing clear communication channels with local authorities and residents, and providing adequate training for construction personnel on emergency procedures. Moreover, the development of evacuation routes, emergency shelters, and medical facilities can enhance the community's resilience and capacity to respond effectively to emergencies, ensuring their safety and well-being throughout the project's lifecycle.

The presence of multiple risk factors, including blasting activities and the installation of electrical infrastructure, necessitates a tailored and well-coordinated emergency response plan. Regular drills and training for construction personnel are imperative to ensure a prompt and efficient response to emergencies, safeguarding both workers and the surrounding community. Earthquake risk, erosion risk and potential structural stability risks associated with engineering structures are assessed in *Chapter 6: Land Use, Soil and Geology.*

15.4.1.9 Explosive Use and Blasting

In the Project area, where soil and rocks cannot be excavated with conventional equipment, ANFO, an explosive made of ammonium nitrate and diesel fuel, can be utilized. No explosive will be stored within the camp site; the explosives will be transported to the site on the day of blasting.

During explosive use and blasting activities in the construction of a wind power plant project, several risks related to community health and safety come into question:

Explosive use and blasting can release dust particles and other airborne pollutants into the surrounding environment. Inhalation of these particles can exacerbate respiratory conditions such as asthma and cause respiratory irritation among local residents. Prolonged exposure to dust and pollutants may also increase the risk of long-term health issues.

Blasting activities generate high levels of noise, which can disturb nearby residents and potentially cause hearing damage if exposure is prolonged or frequent.

Blasting can cause ground vibrations that may lead to structural damage to nearby buildings, homes, and infrastructure. Cracks in foundations, walls, and roads can compromise the safety of structures and pose risks to residents' well-being. Ensuring proper monitoring and mitigation measures are in place is crucial to minimize the potential for structural damage.

Blasting involves handling explosives, which inherently poses safety risks to workers and nearby communities. Accidental detonations, improper handling of explosives, and inadequate safety measures can result in injuries or fatalities among workers and nearby residents. Implementing strict safety protocols, training programs, and emergency response plans is crucial to minimizing the risk of accidents and ensuring the safety of all individuals involved.

The location where blasting will be necessary on the Project area has not been identified in the design stage conducted as part of the Project. However, given the possibility of a blasting need, this section discusses the dangers to the community's health and safety as well as the mitigation strategies that must be considered during the blasting process.

Apart from the air quality assessment delineated in *Chapter 7: Air Quality and the* noise assessment delineated in *Chapter 9: Noise and Vibration*, a comprehensive study including all the aspects associated with potential blasting will be conducted before any blasting operation, and any associated management plans will be updated as needed.

15.4.1.10 Ecosystem Services

The Project's direct impacts on priority ecosystem services may result in adverse health and safety risks and impacts to local community members. Ecosystem services can be described as the benefits that people, including businesses, derive from ecosystems. Ecosystem services are organized into four types:

- provisioning services, which are the products people obtain from ecosystems;
- regulating services, which are the benefits people obtain from the regulation of ecosystem processes;
- cultural services, which are the nonmaterial benefits people obtain from ecosystems; and
- supporting services, which are the natural processes that maintain the other services.

Within the scope of the Project, it is expected to use water sources to be supplied from local authorities and there is a risk to have an impact on livestock and agricultural activities. Thus, the local authorities relevant to the ecosystem services can be determined as below:

- General Directorate of Forestry
- Çanakkale Regional Directorate of Forestry
- Directorate of State Hydraulic Works
- Ministry of Environment, Urbanization and Climate Change
- General Directorate of Nature Conservation and National Parks
- Ministry of Agriculture and Forestry
  - Balıkesir Provincial Directorate Agriculture and Forestry
  - Çanakkale Provincial Directorate Agriculture and Forestry
  - Çanakkale Special Provincial Administration Water and Canal Services Directorate
  - General Directorate for The Protection of Natural Assets

Within the scope of the assessment of ecosystem services, the official correspondences conducted within the scope of National EIA Studies which were provided to consultant was reviewed as well. With this regard, the roles of each ecosystem service and their opinion on the Project is given in table provided below. Moreover, within the scope of the Resettlement RAP

field studies of the Project, informal user identification has been also made. Accordingly, there are no informal users identified within the social AoI.

Table 15.4: Description of each Ecosystem Service and their opinion on the Project

Ecosystem Service in question	The job description of the Authority	Official letter No / Doc. No and Issue Date / Signature Date	Content
Ministry of Agriculture and Forestry	To conduct research on crop and animal production, aquaculture, and agricultural policies; to protect forests, combat desertification, and develop policies for nature protection; to manages national parks, nature parks, and conservation areas; to study water resource protection and sustainable use and to coordinate national water management.	E-22549675-611.02-2484189 18.07.2022	Indicated concerns related to the Project's impact on water sources and riverbeds. They emphasize the importance of preserving structures and maintaining minimum distances between the turbines and riverbeds.: • T1 has changed and it is not located close to any stream bed on the 500 m northwest slope of Laz Hill. • 85 m southwest of T2, there is the beginning of a dry bed of Karakaya Stream with seasonal flow. • 120 m west of T3, there is the beginning of a dry bed of Karakaya Stream with seasonal flow. • T4 is located on the summit of Kuşkemik Hill and is not close to any stream bed. • T5 has changed and it is not close to any stream bed on the 850 m northwest slope of Laz Hill. • 190 m northwest of T6, there is the beginning of the bed of Göller Stream with seasonal flow. • T7 is located on the summit of Şap Mountain and is not close to any stream bed. • 180 m southwest of T8, there is a bed section of the seasonal flowing Şapdağı Stream. • 190 m north of T9, there is beginning of the bed of Şapdağı Stream with seasonal flow. • T10 is located on the summit of Apdal Mountain and is not close to any stream bed. • The location of the switchyard has changed, it is located on Otlucak Hill and is not close to any stream bed. Also, • In case of permission for excavation areas to be authorised • In case of groundwater usage • In case of any interaction with a water body, the DSİ will be consulted.
General Directorate of State Hydraulic Works (DSİ)	To drill or have drilled wells for groundwater surveys and research; to allocate groundwater; to protect and register groundwater; to issue certificates of exploration, utilisation and reclamation-amendment		

Ministry of Environment, Urbanization and Climate Change	To monitor and supervise the implementation of legislation on settlement, environment, and construction; to develop standards and criteria for environmental protection and pollution prevention; to assess the environmental impacts of facilities and activities that cause or are likely to cause pollution, and to determine plans and policies for global climate change and take necessary measures.	E-18711759-805.02.02.02-78381	The Ministry of Environment, Urbanization and Climate Change in Çanakkale has been tasked with managing excavated soil in neighboring provinces of Bursa, Balıkesir, and Tekirdağ. The total number of disposal areas is 21, 4, and 19, respectively. However, there is a lack of information on the locations and capacities of these disposal areas, except for those in Bursa. The National Waste Management and Action Plan for 2016-2023 plans capacity expansions in municipal waste management facilities for Balıkesir, Bilecik, Bursa, Yalova, and Çanakkale provinces. These plans include a total capacity increase to 340 tonne per day for biological processes for separately collected municipal waste and a mechanical biological process facility with a daily capacity of 1,000 tonne for mixed municipal waste.
Ministry of Agriculture and Forestry	To conduct research on crop and animal production, aquaculture, and agricultural policies; to protect forests, combat desertification, and develop policies for nature protection; to manages national parks, nature parks, and conservation areas; to study water resource protection and sustainable use and coordinates national water management.	E-62865314-611.02-7174711 30.09.2022	A commitment from the Project Company is required regarding measures to eliminate or minimize the potential negative impacts included in the ecosystem assessment report, ornithological assessment report and bat monitoring report. In addition, during operational phase of the Project, the effects of the Project on birds shall be monitored, evaluated, and reported by an ornithology expert for a period of 3 years. The work should be carried out in the field for a maximum of 3 consecutive days, representing the migration period, between 15 August and 15 October for the autumn migration period, and 30 days each between 15 March and 15 June for the spring migration period. Furthermore, during operational phase of the Project, the effects of the Project on bats shall be monitored, evaluated, and reported by a bat expert for 5 days/night every month, from end of March to October. Also, the Ministry emphasize the importance of preserving structures and maintaining minimum distances between the turbines and riverbeds.
General Directorate of Nature Conservation and National Parks	To protect wetlands and wild animals		
Çanakkale Special Provincial Administration Water and Canal Services Directorate	To carry out infrastructure planning and project works in villages and affiliated settlements in rural areas in general, and planning, project and manufacturing works of construction activities for investment in drinking water, sewerage and water research within the framework of the Law No. 5302 on Special Provincial Administration and Law No. 3202 on Services for Villages within the framework of applicable laws and regulations.	E-50472007-750-23860 25.01.2022	Notes that there are drinking water transmission lines belonging to the villages in the Project license area. The damaged units, needs to be repaired by the Project Company in case any damage occurs as a result of Project activities.
General Directorate For The Protection Of Natural Assets	To protect biological diversity, to manage natural areas such as national parks, nature parks, natural monuments and special environmental protection zones and to organise sustainable tourism and educational activities in these areas.	E-48331039-220.01-2254074 19.11.2021	It has been determined that the Harmancık Wind Power Plant (10 Units-55 MWm/33 MWe) Project' area is not within the boundaries of the Special Environmental Protection Area, and it has been reported by Çanakkale Governorship (Provincial Directorate of Environment, Urbanisation and Climate Change) that there are no natural protected areas and natural assets in the project area.

Çanakkale Provincial Directorate Agriculture and Forestry Balıkesir Provincial Directorate Agriculture and Forestry	To conduct research on crop and animal production, aquaculture, and agricultural policies; to protect forests, combat desertification, and develop policies for nature protection; to manages national parks, nature parks, and conservation areas; to study water resource protection and sustainable use and coordinates national water management.	-	Currently, No correspondence is available in EIA for Çanakkale and Balıkesir Provincial Directorate Agriculture and Forestry. However, In case of excavation waste is planned to be stored within the agricultural area Çanakkale and Balıkesir Provincial Directorate Agriculture and Forestry will be consulted as stated in *Chapter 11: Waste and Resources*.
General Directorate of Forestry Çanakkale Regional Directorate of Forestry	To conduct research on crop and animal production, aquaculture, and agricultural policies; to protect forests, combat desertification, and develop policies for nature protection; to manages national parks, nature parks, and conservation areas; to study water resource protection and sustainable use and to coordinate national water management.	-	Currently, No correspondence is available in EIA for Çanakkale Regional Directorate of Forestry. However, In case of excavation waste is planned to be stored within the forest area, Çanakkale Regional Directorate of Forestry will be consulted as stated in *Chapter 11: Waste and Resources.*

15.4.1.11 Public Access

Construction activities may limit public access to certain areas, impacting the daily lives of local residents. Restrictions on traditional access routes and public spaces could lead to disruptions in community activities and potential conflicts. It shall be noted that project footprint is not located on any route which is often used by residents of nearby settlements. Nevertheless, it shall be noted that due to construction activities some routes may be affected temporarily for livestock activities. Clear communication and community engagement are vital to mitigating potential tensions and addressing the concerns of residents affected by restricted access. Thus, Mukhtars of the villages located within the Social AoI will be engaged and relevant information will be given.

It shall be noted that, as the locations of the wind turbines and switchyard are on the areas where limited built area in question. However, animal husbandry activities are performed near the locations of the wind turbines and switchyard construction areas. Therefore, public access risk is foreseen.

15.4.1.12 Security Personnel

The deployment of security personnel during the construction phase raises considerations regarding community safety. While their presence is essential for safeguarding the Project area potential impacts may arise concerning the interaction between security personnel and the local community. Mismanagement or perceived threats could lead to tensions, affecting community well-being. Striking a balance between ensuring project security and maintaining positive community relations is crucial to minimizing potential negative impacts associated with the presence and actions of security personnel. Security personnel will be employed from licensed companies and only competent and trained staff will be employed. Details of the security personnel and general security planning is outlined in *Security Management Plan.*

15.4.2 Operation

15.4.2.1 Blade and Ice Throw

During the operation phase of a wind power plant, one of the notable risks to community health and safety is associated with blade throw incidents. The rotating blades of wind turbines, often spanning considerable lengths, pose a potential hazard if a malfunction or extreme weather conditions lead to the detachment of a blade. The force generated by a rotating blade can result in the throwing of debris over a significant distance, posing a risk to both on-site personnel and nearby communities. Blade throw incidents may occur due to factors such as material fatigue, manufacturing defects, or adverse weather conditions. The potential for thrown debris requires careful consideration and risk mitigation measures to safeguard the well-being of those in proximity to the wind turbines.

Moreover, in colder climates, the operation of wind turbines introduces an additional risk in the form of ice throw. As the turbine blades rotate, they may accumulate ice during freezing conditions. Subsequent dislodgment of this ice, either through natural thawing or other factors, can result in the release of ice fragments. These fragments can be thrown considerable distances, posing a risk to individuals, structures, and vehicles in the vicinity. The unpredictable nature of ice throw incidents necessitates comprehensive risk assessments and mitigation strategies to minimize potential harm. Awareness of local weather conditions and the implementation of de-icing technologies become crucial components of addressing the ice throw risk during the operational phase of a wind power plant.

Throwing distances are calculated using with hub height and rotor diameter for each wind turbine. Throwing distances at which ice can fall or be thrown from turbine varies between 300m

– 400m. As a result of the calculations made for each turbine, the highest throwing distance was accepted as the critical distance.

Considering these distances; impact zone that assumed a circular area from the turbine centres, was examined. Accordingly, the throw distance will be assessed according to the formulation described below.

Critical Throw distance: $B = 1.5\ x\ (H + L)$

B: Distance,

H: Tower Height (m) and,

L: Wing Length (m).

As it is described in *Chapter 2: Project Description*, the maximum (H) Tower Height is 111 m and (L) Wing Length is 138.6 m. Thus, (B) Distance is calculated as follows:

$$B = 1.50\ x\ (111\ m + 138.6\ m) = 312m$$

The number of receivers likely to be affected are presented in below Table 15.5 and Table 15.6.

Table 15.5: Calculation summary for ice throw

Critical Distance (m)	Total Number of Receivers within Critical Distance (m)
374	0

Table 15.6: Impact assessment for ice throw

Turbine No	Hub Height (m)	Rotor Diameter (m)	Throwing Distance, (m)	Number of Building in Throwing Distance	Assessment
1	111	138.6	374	-	No Impact
2	111	138.6	374	-	No Impact
3	111	138.6	374	-	No Impact
4	111	138.6	374	-	No Impact
5	111	138.6	374	-	No Impact
6	111	138.6	374	-	No Impact
7	111	138.6	374	-	No Impact
8	111	138.6	374	-	No Impact
9	111	138.6	374	-	No Impact
10	111	138.6	374	-	No Impact

Ice throwing distances are calculated with supplied design parameters and found out to be 374m. As a result of the calculations, investigations were carried out in a circular area with a radius of 374m, the centre point of which is the foundation of the wind turbine. The below figure shows there is only one structure (General Directorate of Forestry unused building)within the ice throw distance. Hence, ice throw related impacts are not foreseen for any of the receptors.

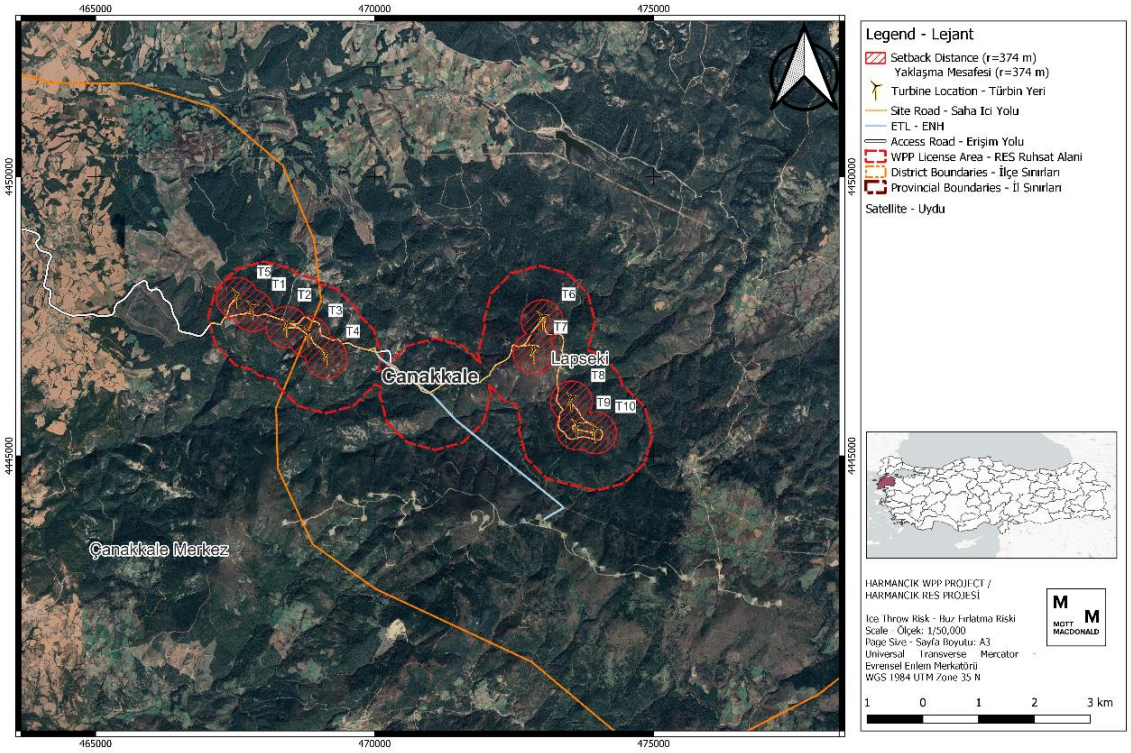

Figure 15.6: Ice Throw Risk Zones

In addition to ice throw risk, wind turbines are known to carry a risk known as "blade throw," in which a blade separates from the rotor and is propelled far off. Even though the blade throw risk can be considered extremely low according to IFC's EEHS Guidelines for Wind Energy[178]; this could endanger both the general safety of wind farms and the residents close by. Blade failures in wind turbines can be caused by mechanical stress, exposure to harsh weather, and high-speed rotation. Thus, in this regard, blade throw risk was assessed as well.

Table 15.7: Frequencies of occurrence of scenarios relevant for risk analysis. The recommended values correspond to the 95% upper limits

shows that, the blade throw risk can occur in different scenarios, and it may have different probabilities.

Table 15.7: Frequencies of occurrence of scenarios relevant for risk analysis. The recommended values correspond to the 95% upper limits[179]

Scenario	Expected value [1/yr]	Recommended value [1/yr]
Loss of entire blade	$6.3 \cdot 10^{-4}$	$8.4 \cdot 10^{-4}$
Loss at rated speed		4.2×10^{-4}
Loss at 1.25*rated speed		4.2×10^{-4}
Loss at 2*rated speed		5.0×10^{-6}
Loss of blade tip	$1.2 \cdot 10^{-4}$	2.6×10^{-4}
Collapse of entire turbine at tower foot	$2.0 \cdot 10^{-4}$	3.2×10^{-4}
Collapse of rotor and/or nacelle	$5.8 \cdot 10^{-5}$	1.3×10^{-4}

[178] Environmental, Health, And Safety Guidelines For Wind Energy, IFC, 2015

[179] Guidelines on The Environmental Risk of Wind Turbines In The Netherlands, H. Braam, L.W.M.M. Rademakers, ECN Wind Energy. 2004

Scenario	Expected value [1/yr]	Recommended value [1/yr]
Falling down of small parts from nacelle and hub	$1.2 \cdot 10^{-3}$	1.7×10^{-3}

To be able to assess the throw distance during average and maximum wind speed occurrences, loss of blade tip scenario was considered so that it can be possible to assess the worst case scenario (As smaller portion of the blade is expected to be thrown further due to its small volume and mass). With this regard, probability of loss of blade tip is assumed as 2.6×10^{-4} (the recommended value in Table 15.7). Throw distances are calculates as follows:

1. Set-back Distance

Set-back distance $X = 1.5\ x\ (H + L)$

H: Tower Height (m) and,

L: Wing Length (m).

$$\mathrm{X} = 1.50\ \mathrm{x}\ (111\ \mathrm{m} + 138.6\ \mathrm{m}) = 374\ \mathrm{m}$$

2. Average and Maximum Distance

A simple projectile motion is assumed to calculate the throw distances. For the throw distance of a blade, a ruptured piece of a blade is taken into consideration. For this event, wind speed and the following forces are taken into account:

a) Centrifugal Force by the blade rotation at its average rotational speed; 10.8 rpm (technical datasheet)
b) Drag Force by the air resistance towards the object.
c) Projectile Kinetic Motion which is drifted by the wind (It is assumed that the wind speed has the drifting effect on the X-axis)
d) Moreover, the wind is assumed to have an x-axis force and a 45°-degree throw effect

As described in *Chapter 2: Project Description*, according to the official wind measurement data specific to the Project area, it has been reported that the annual average wind speed of the Project Area is approximately 6-7 m/s. The maximum observed wind speed 38.7 m/sec for Çanakkale which was observed on 15.02.1991 according to the General Directorate of Meteorology[180].

For the average wind speed,

$X = 837.67\ m$

For the maximum wind speed, (Çanakkale Wind Speed)

$X = 1189.29m$

To assess the risks regarding blade throw, according to Guidelines on The Environmental Risk of Wind Turbines in The Netherlands, H. Braam, L.W.M.M. Rademakers, ECN Wind Energy. 2004, there are ten main categories of receptors to be considered, which are Houses and buildings, (ii) Roads, (iii) Waterways, (iv) Railways, (v) Industrial areas, (vi) Underground pipelines, (vii) Overhead pipelines, (viii) High tension lines, (ix) Dikes and dams, (x) Paths for communication rays. Accordingly:

[180] Meteoroloji Genel Müdürlüğü (mgm.gov.tr)

Table 15.8: Status of the Receptors regarding Blade Throw Risk

Receptor	Status
Houses and buildings*	There is one structure in the setback zone (General Directorate of Forestry unused building) There are no structures in the Risk Zone (avg. wind speed) There are no structures in the Risk Zone (max. wind speed)
Roads	There are no state roads. There are only some sections of unstablised roads
Waterways	There are no wet creeks or waterways
Railways	There are no railways
Industrial areas	There are no industrial pipelines
Underground pipelines	There are no Underground pipelines
Overhead pipelines	There are no Overhead pipelines
High tension lines	There are no High tension lines
Dikes and dams	There are no Dikes and dams
Paths for communication rays	There are no Paths for communication rays

*These identified structures do not necessarily mean that these are residential areas etc as these were identified via google earth satellite images. The status of these structures will be determined during construction (whether they are houses, barns, summer houses etc.) by CLOs of Enerjisa Uretim and owner of these structures will be informed about construction and operation activities and associated impacts.

Thus, only receptors which are in question are the structures and the unstabilised roads.

Thus, it can be assumed that, even during more extreme weather conditions resulting in higher wind speed, the maximum throw distance can be expected to be less. In addition, as stated in Table 15.7, the probability of a blade throw risk is significantly small. As described before, the recommended expected value to observe a loss of a blade tip once a year is $2.6x10^{-4}$. This means that probability of this impact is significantly low which results in very low impact and thus the impact magnitude for blade throw is considered to be negligible.

Although, the receptor sensitivity of the blade throw can be assumed to be low as there is only one unused structures[181] within the throw distances; thanks to the very low probability of the occurrence for a blade throw, impact significance is foreseen as negligible. Moreover, according to the Best Practice Project Description (Section: 2.3) the turbines shall be stopped working if the wind speed is 28 m/s to avoid any blade and ice throw risk. In addition to that, Enercon has a SCADA system to monitor any risk of blade and ice throw in the case of exceeding pre-set speed limits and especially during storms, that enables wind energy converter operation to reduce the speed or completely stop the blades. Hence, the maximum wind speed is not a matter of concern during the operation of the WPP. Thus, no physical displacement is in question as no significant blade throw risk is in place.

15.4.2.2 Aviation

The operation phase of a wind power plant introduces unique challenges and potential risks related to aviation safety. One of the primary concerns revolves around the proximity of wind turbines to established flight paths or airfields. The towering height of wind turbines and their rotating blades can pose a hazard to low-flying aircraft, including small planes and helicopters. Pilots navigating these areas face the risk of collision with turbine blades or turbulence generated by the wind farm. This underscores the importance of robust communication and coordination between wind farm operators and aviation authorities to delineate clear no-fly

[181] These identified structures do not necessarily mean that these are residential areas etc as these were identified via google earth satellite images. The status of these structures will be determined during construction (whether they are houses, barns, summer houses etc.) by CLOs of Enerjisa Uretim and owner of these structures will be informed about construction and operation activities and associated impacts.

zones and implement safety measures that minimize the risk of aviation-related incidents. Closest airport is Çanakkale Airport which approximately 16 km away from the Project Area.

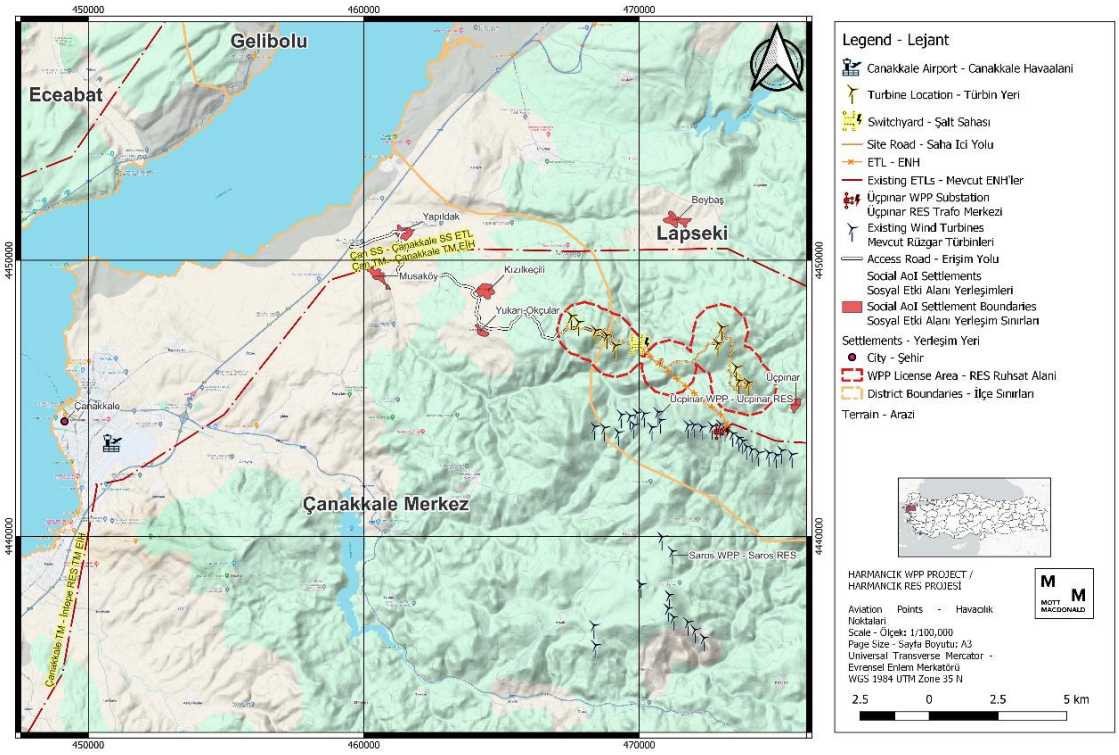

Figure 15.7: Nearest aviation areas

In general, impacts of wind turbines on areas related with aviation can be summarised as below:

- ***Radar Interference:*** Wind turbines can cause radar interference, where their rotating blades appear as “clutter” on radar screens. This interference can sometimes be mistaken for aircraft, potentially affecting air traffic control and navigation systems[182].
- ***Turbulence:*** Wind farms generate turbulence due to the movement of their blades. This turbulence can affect nearby aircraft during takeoff, landing, or low-altitude flight. Pilots need to be aware of these conditions when operating near wind farms.
- ***Visual Impact:*** The sheer size and number of wind turbines can alter the visual landscape for pilots. This impact may not directly affect safety but can be a consideration for aviation stakeholders (See *Chapter 10: Landscape and Visual* for more detailed assesment).
- ***Obstruction and Height Hazards:*** If placed too close to aerodromes or flight routes, wind turbines can become physical obstacles that pose hazards to low-flying aircraft[183].

As it can be understood by the foreseeable impacts of the wind turbines on aviation, the severity of the impact is related with the design (hub height and rotor diameter) and site selection. The severity of this impact can be assessed according to the **International Civil Aviation Federal Aviation Administration (FAA)’s** established guidelines to ensure aviation safety.

- ***FAA Guidelines (70/7460-1L)***

The FAA assesses structures proposed to be built or altered at **200 feet (≈60 meters) above ground level (AGL) or higher** or near an airport. The height threshold for identifying an

[182] Aviation and wind farms: working together for a safer future (airport-technology.com)

[183] https://www.airsight.de/projects/item/wind-energy-and-aviation/

obstruction has been identified as **499 feet (≈152 meters)** AGL. Within this scope, the adequacy of the wind turbines with regard to aviation security needs to be assessed.

The lighting recommendations are specified for **wind turbines** at various heights, considering the unique characteristics of wind turbine farms. Accordingly:

- Horizontal detection coverage should provide for obstruction lighting to be activated and illuminated prior to aircraft penetrating the perimeter of the volume, which is a minimum **5.5 km** away from the obstruction or the perimeter of a group of obstructions. Considering the fact that the Canakkale Airport in question is **17 km away from the nearest turbine**, the lighting can be considered as proper conditions.
- Vertical detection coverage should provide for obstruction lighting to be activated and illuminated prior to aircraft penetrating the volume, which extends from the ground up to 304 m above the highest part of the obstruction or group of obstructions, for all areas within the 5.5 km perimeter.

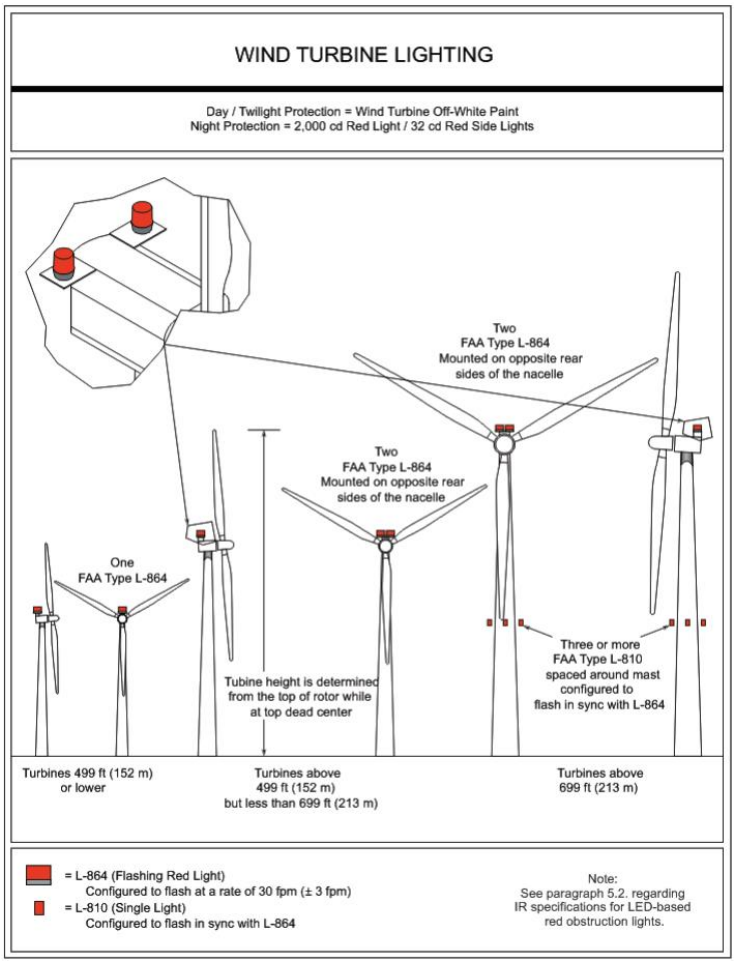

Figure 15.8: Wind Turbine Lighting Standards

15.4.2.3 Electromagnetic Interference and Radiation

The operation of a wind power plant introduces potential risks related to Electromagnetic Interference (EMI), particularly concerning the electricity transmission infrastructure. The vast network of electrical cables, transformers, and other components within the wind power system can emit electromagnetic fields. These fields have the potential to interfere with nearby electronic equipment, communication systems, and sensitive instruments. The risk of EMI is

especially pertinent in areas where critical infrastructure, such as hospitals or telecommunication facilities, coexists with the wind power plant. Effective mitigation strategies involve implementing shielding measures for sensitive equipment, maintaining appropriate distances between power lines and electronic devices, and adhering to established electromagnetic compatibility standards. By addressing the potential for EMI, wind power operators can ensure the uninterrupted functioning of essential electronic systems in the vicinity of the plant.

The generation and transmission of electrical power within a wind power plant may also give rise to concerns related to Electromagnetic Radiation (EMR). The movement of electricity through cables and components can produce electromagnetic fields, and at certain frequencies, these fields may emit radiation. While wind turbines typically emit low-frequency EMR, the cumulative impact of multiple turbines and associated infrastructure warrants careful consideration. Potential health risks associated with prolonged exposure to electromagnetic radiation, as well as impacts on electronic equipment, must be thoroughly examined. Mitigation measures may include maintaining safe distances between residential areas and power lines, implementing screening techniques, and adhering to regulatory guidelines regarding permissible levels of electromagnetic radiation.

The possible impacts of EMI and EMR was also assessed within the scope of the national EIA studies. Accordingly, electromagnetic radiations include various types such as radio waves, microwaves, infrared rays, visible light, ultraviolet rays, x-rays, gamma rays, and cosmic rays, depending on their wavelengths, frequencies, and energies. The main types of radiation are categorized into two groups: **ionizing radiation** and **non-ionizing radiation**.

Ionizing radiation directly or indirectly ionizes atoms in the environment by transferring its energy while passing through matter. Non-ionizing radiation, such as radio waves, microwaves, infrared light, ultraviolet light, and visible light, are not ionizing due to their lack of sufficient energy. Non-ionizing radiation from sources such as fixed telecommunication devices, radio and television transmitters, electric transmission lines, transformer stations, and electric household appliances (microwave ovens, electric shavers, hair dryers, etc.) is categorized as electromagnetic radiation that is non-ionizing.

Despite the presence of both electric and magnetic fields around electric appliances and energy transmission and distribution lines, recent research has focused on the potential health impacts of magnetic fields.

The impacts of low-frequency (0 Hz-10 kHz) electromagnetic radiation on human health: Low-frequency fields cause superficial impacts on the human body, such as hair being raised. Restrictions are imposed to minimize exposure to harmful impacts of electromagnetic radiation.

The impacts of high-frequency (10 kHz-300 GHz) electromagnetic radiation on human health: The human body is sensitive to high-frequency fields, and the energy absorbed by the body is converted into heat. High-frequency fields generate heat throughout the body or in specific areas. Standards have been developed to limit the electromagnetic radiation to specific values to reduce harmful impacts. When electromagnetic radiation reaches a living organism, it is absorbed by that organism.

Specific Absorption Rate (SAR): The rate at which electromagnetic energy is absorbed by body tissues (W/kg). For a one-degree temperature increase in the human body, 4 W of energy must be absorbed per kilogram of tissue. ***A SAR limit of 0.08 W/kg has been accepted for general living areas of humans***.

Easily measurable and/or observable parameters are used to determine limit values. These parameters include **electric field intensity, magnetic field intensity**, and **power density**.

Electromagnetic Fields and Bio-interaction: The main sources of extremely low-frequency (ELF) fields are high-voltage power lines, building electrical installations, transformers, and electrical devices such as hair dryers and washing machines used in homes. It is important to distinguish between which ELF sources are specifically magnetic field sources and which are specifically electric field sources when measuring electromagnetic fields. While magnetic fields are formed due to the passage of electric current, electric fields are formed by the accumulation of electric charges (this accumulation is expressed with electrical potential difference). Most devices used in homes are magnetic field sources, while power grids are primarily electric field sources, but they also become magnetic field sources due to the influx of current.

The electric and magnetic fields occurring in houses have a frequency of 50 Hz and a wavelength of 6000 km. Near to ELF fields, the human body can disrupt electric fields but not magnetic fields. However, both fields create different electric field and current inductions in different regions of the body. Therefore, the electromagnetic impact of wind turbines is not significant. Research has shown that electromagnetic interference affects TV and radio broadcasts, aviation, and maritime communications negatively. However, it has been observed that many frequencies are not affected as long as radio and television antennas are not near the turbines.

The electromagnetic interference impact of turbines varies depending on the size and material of the blades. The noise and electromagnetic interference rate are high in turbines using metal materials. This problem has been significantly mitigated by using polyester-based materials. When ELF fields are sufficiently intense, electric fields and currents induced in tissues of the human body can cause impacts such as nerve and muscle stimulation and numbness in hands. No impacts are observed from surrounding electric and magnetic fields if they are very low. Non-ionizing EM fields emitted by electric power systems and electrical devices can cause adverse health impacts depending on their intensity and exposure duration. Therefore, to protect people from non-ionizing radiation, countries prepare regulations to protect the public from involuntary exposure to EMR and the potential adverse impacts that may arise.

National and international EMR exposure limits play an important role in controlling risks for individuals and avoiding situations that could be harmful to human health. Commonly accepted and applied limit values exist in many countries around the world, including European Union countries and the United States, determined by an international commission known as *International Commission on Non-Ionizing Radiation Protection (ICNIRP*). These limit values vary depending on the frequency of the emitted electromagnetic radiation.

Within the scope of the National EIA Report studies, the impact assessment of electromagnetic pollution that may occur around the power plant and turbines was carried out between 9.00-17.00 on 27.03.2022-28.03.2022. Electromagnetic field measurements of the environments were made by going to the platform locations where the project will be located. Phase-1 and Phase-2 measurement values were interpreted by comparing them with each other and with the limits applied in our country.

In both cases, the highest electric and magnetic field measurements for Phase-1 obtained around the species are 1.97 V/m and 0.07 µT were found, respectively. When the WPP became operational in Phase-2, the corresponding measurement values were 3.8 V/m and 0.13 µT, respectively, by using the data obtained from the previously active wind power plants and making a simulation. These values remain at a very low level (0.8 % of the limit for the electric field and 0.65% of the limit for the magnetic field) compared to the ELF band electric field limit value of 5000 V/m and the magnetic field limit value of 200 µT.

In Türkiye, the electricity generated in power plants is transmitted to the main substations via 380 kV 154 kV voltage while in residential spaces the electricity used (220 V) is provided by distribution lines at 34.5 kV voltage. The research carried out by TEİAŞ and TÜBİTAK under

154 kV electric power transmission lines the magnetic field is found to be between 9-14 mG and the electric field is observed to be between 300-1000 V/m. In the measurements, both electric field and magnetic field It was observed that the effect decreases as you move away from the source.

Type of facility	Electric field (kV/m)	Magnetic field (mG)
154 kV Electricity Transition L–ne	0.3 - 1	9-14
154 kV transfer station	0.1-2	30-140

Studies on electromagnetic fields over the last 40 years have proven that there are no health effects. However, this is not a definite effect of electromagnetic fields and it does not mean that the impact does not exist.

All in all, within the social AoI, which encompasses Kızılkeçili and Yukarıokçular Villages in Central District of Çanakkale Province and Üçpınar and Hacıgelen Villages in Lapseki District, there will be no significant impact to the electromagnetic environment surrounding the Harmancık Wind Power Plant (WPP) turbines while they are operating. Moreover, during the transfer of the produced energy from standard heights to the Collection Center via transportation lines, it is much below the limits accepted by the World Health Organization (WHO) and the ICNIRP, an international standard-preparing organization, and by our country. It is envisaged that it will remain and therefore the natural electromagnetic environment will be protected. With this regard, it can be said that the foreseen EMI and EMR impact of the project can be considered as negligible.

15.4.2.4 Traffic Safety

The impact on traffic safety during the operation phase is intimately tied to the daily lives of local residents. The continuous movement of construction and maintenance vehicles can lead to altered traffic patterns and potential conflicts on local roads. The community's experience of these changes is influenced by factors such as the frequency of vehicle movements, the adequacy of road infrastructure, and the awareness of local residents. Nevertheless, no significant frequency of vehicle movement for operation and maintenance activities are expected; thus, additional traffic load to be created by the Project can be considered as negligible.

In addition, the operation of wind turbines introduces a unique aspect of traffic safety concerns related to the motion of the turbine blades. The expansive size and rotating nature of these blades can create a distinctive visual element that may draw the attention of drivers passing by wind farms. This distraction impact is particularly relevant on roads in close proximity to wind farms, where drivers may be navigating the visual and dynamic presence of the turbines.

It is necessary to comply with the minimum distances that WPPs must have to the highway boundary line as specified in the Internal Circular of the General Directorate of Highways on WPPs dated 04 July 2014 and numbered 223836. Accordingly, the compliance to the existing traffic system will be assessed according to the formulation described below.

Highways: $B = 1.5\ x\ (H + L)$

State and Provincial Roads: $B = 1.25\ x\ (H + L)$ where;

B: Distance,

H: Tower Height (m) and,

L: Wing Length (m).

As it is described in *Chapter 2: Project Description*, (H) Tower Height is 111 m and (L) Wing Length is 138.6 m. As mentioned in Section 15.3.3, nearest roads are state roads. Thus, (B) Distance is calculated as follows:

$$\boldsymbol{B = 1.25\ x\ (111\ m + 138.6\ m) = 312\ m}$$

As it can be seen from Figure 15.9, locations of the wind turbine comply with the provisions of Internal Circular of the General Directorate of Highways on WPPs dated 04 July 2014 and numbered 223836. As it can be seen from Figure 15.9, nearest state road is is far away from the nearest WPP License Area, as access to the site is being done via village roads.

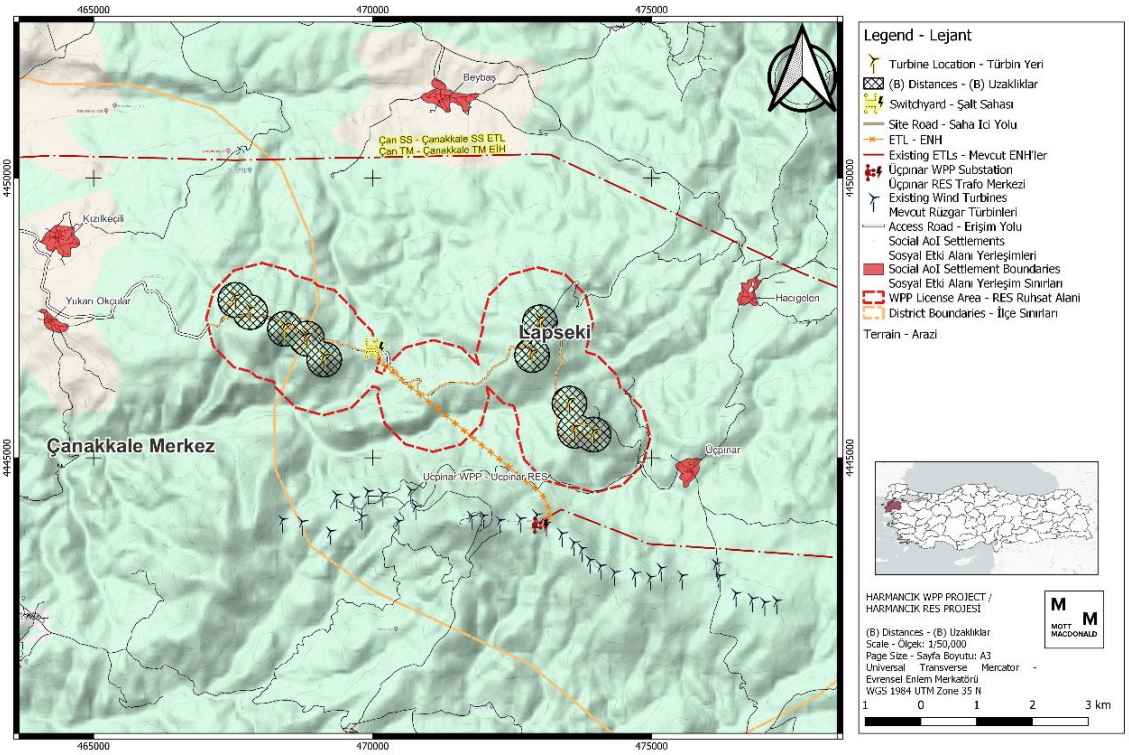

Figure 15.9: (B) Distances

It also shall be noted that only Project Vehicles will use the designated access roads. This will minimize the impact on the additional traffic load and its adverse impacts. In addition, within the scope of security management issues, only Project Vehicles and vehicles with necessary permit to be obtained from the HSE teams of the site will be allowed to enter Project area. In addition, HSE Teams will make sure necessary signs are in place for speed limits. In addition, ad-hoc audits on the access roads will take place to make sure the relevant traffic managmeent mitigation measures are being complied by the staff.

15.4.2.5 Shadow Flicker

During the operation of a wind power plant, one of the visual impacts that can affect nearby residents is shadow flicker. Shadow flicker occurs when the rotating blades of a wind turbine cast shadows that intermittently pass over nearby structures or residences as the sun changes position. The repetitive nature of this flickering effect, particularly during sunrise and sunset, has the potential to cause visual discomfort and annoyance for those living in the proximity of the wind turbines. The duration and frequency of shadow flicker depend on factors such as the turbine's rotor size, blade length, and the distance between the turbines and nearby structures. Managing the impact of shadow flicker involves conducting thorough assessments to predict its occurrence, establishing setback distances that minimize its impact on inhabited areas, and

employing technological solutions such as automatic shadow flicker controls that adjust the turbine's operation to reduce the occurrence of flicker during sensitive times. The detailed assessment regarding Shadow Flicker is presented in *Chapter 10: Landscape and Visual*. Within the scope of this assessment no impact has been identified. on any permanent residence within the defined AoI.

15.4.2.6 Public Access

The operation phase of a wind power project can have notable impacts on public access to certain areas, influencing the daily lives of local residents. Access restrictions may be necessary to ensure the ongoing safety and security of the wind farm, limiting entry to areas where maintenance activities are being conducted or where potential hazards exist. The implementation of such restrictions can, however, disrupt community activities, leading to potential conflicts. It is essential for wind power operators to engage in transparent communication with the local community, providing clear information about access limitations, the reasons behind them, and potential alternative routes or spaces for community activities. Striking a balance between ensuring the safety and security of the wind power infrastructure and minimizing disruptions to the community's routine activities is crucial for fostering positive relationships during the operation phase. As described before there are no significant built area in question nearby the Project Area, additionally no significant livestock activities observed around the project area. In addition, there are no other land users that may be potentially affected by public access restrictions. Thus, the impact related with public access to the Project area is minimum.

15.4.2.7 Security Personnel

The presence of security personnel during the operation phase of a wind power project is essential for safeguarding the Project area and ensuring its continued functionality. Security personnel play a crucial role in deterring trespassing, theft, or vandalism, thereby protecting the integrity of the wind farm.. Security personnel at a wind power plant play a crucial role in ensuring community health and safety for several reasons:

- Wind power plants often have restricted access areas and critical infrastructure that need protection from unauthorized access. Security personnel are responsible for monitoring and controlling access to these areas to prevent trespassing, vandalism, theft, and potential sabotage, which could endanger the local community.
- In the event of emergencies such as fires, accidents, or natural disasters, security personnel are often the first responders on-site. Their training in emergency protocols and procedures enables them to act swiftly to mitigate risks and coordinate with local emergency services to ensure a rapid and effective response, thus safeguarding the surrounding community.
- Security personnel will serve as a visible presence within the wind power plant premises, promoting awareness of safety protocols and regulations among visitors, employees, and contractors. Their presence reinforces the importance of adhering to safety guidelines, such as wearing personal protective equipment (PPE) and following designated pathways, which helps prevent accidents and injuries that could impact the local community.
- Security personnel will be trained to de-escalate conflicts and resolve disputes effectively. By maintaining order and resolving conflicts peacefully, they contribute to a safer environment within the wind power plant and its vicinity, reducing the likelihood of incidents that could escalate and pose risks to the community.

However, the impact of security personnel on the local community is an important consideration. Their interactions with residents will be managed carefully to avoid tensions or negative perceptions. The presence of security personnel at a wind power plant can potentially affect in various ways:

Companies typically face challenging circumstances with limited guidance on how to respect their human rights obligations. The Voluntary Principles help businesses understand their working environment, identify security-related human rights concerns, and take decisive action to solve them. Ineffective security management has a significant influence on community rights, as well as serious implications for the company's social licence to operate. The human rights-compliant security measures specified in the Security and Human Rights Toolkit shall be implemented without exception. As a result, it will serve as a standard for evaluating a company's progress towards establishing human rights-compliant security measures. On a more practical level, security managers and field people will benefit from the best practices to assist them in solving specific difficulties during construction and operation phase of the project[184].

- The visible presence of security personnel may be interpreted by some members of the local community as a form of surveillance or control, leading to feelings of mistrust or resentment. This perception can exacerbate existing social tensions and fuel resentment towards the wind power plant and its operators.
- In situations where tensions between the wind power plant operators and the local community are already high, the presence of security personnel may escalate conflicts. Interactions between security personnel and community members, particularly if perceived as confrontational or heavy-handed, can escalate tensions and lead to confrontations or protests.
- Security measures such as fencing, restricted access areas, and surveillance cameras can create a perception of exclusion among some members of the local community. They may feel marginalized or excluded from decision-making processes regarding the wind power plant's operation and development, leading to feelings of alienation and frustration.
- The presence of security personnel can reinforce power dynamics between the wind power plant operators and the local community. Community members may perceive security measures as a demonstration of the operators' authority and control over the local area, further intensifying feelings of powerlessness and disenfranchisement.
- Conversely, security personnel trained in conflict resolution techniques can play a positive role in de-escalating tensions and resolving conflicts between the wind power plant operators and the local community. By effectively communicating with community members, addressing concerns, and facilitating dialogue, security personnel can help foster understanding and cooperation, mitigating the risk of social conflicts.

According providing competent and well-trained security personnel is essential to avoid any kind of social conflict during the operation phase of the Project. Overall, while security personnel are essential for maintaining safety and protecting critical infrastructure, their presence can also impact social conflicts within the local community. Effective communication, community engagement, and conflict resolution skills are crucial for security personnel to navigate these challenges and contribute to positive relationships between the wind power plant and the local community.

Nevertheless, establishing an adequate security management system is essential for the Project. With this regard, security operating procedures; namely, boundary security, access-point operations, security patrols, materials storage and control, information and communication, firearms security will be in place. detailed mitigation measures for the security personnel and security management area outlined in the Security Management Plan.

15.4.2.8 Noise

During the operation phase, the turbines will produce noise from their mechanical and electrical

[184] Addressing Security and Human Rights Challenges in Complex Environments (voluntaryprinciples.org)

components, as well as from the aerodynamic effects of the blades. However, there are no receptors identified in terms of this impact and the sensitivity of the receptors regarding this impact is low and the magnitude is minor. The significance level of the impact is assessed as minor. No significant land users located in vicinity to the Project which will be subject to noise impacts.

15.4.3 Summary

Within the scope of Impact Assessment studies, sensitivities of the receptors were identified according to the matrix described below.

Table 15.9: Community health and safety sensitivity/value criteria for resource/ receptors

Subject	High	Medium	Low	Negligible
Local community members to be affected from Community Health and Safety related concerns, / nearby settlements	Local community members are located near the Project Area where can easily, inside WPP License Area	Local community members are located near the Project Area where can easily, close to WPP License Area	Local community members are identified away from WPP License Area (>10 km)	No local community member is identified nearby
Water Quality and Availability / Groundwater bodies	Project Area is located within groundwater protection zone	Groundwater is being used as major water source by local communities	Limited groundwater is available, city network for water supply is available	No groundwater source is available, groundwater table is too high
Structural Safety of Project Infrastructure	Very severe erosion risk	Severe erosion risk	Moderate erosion risk	None or very low level of erosion risk
Life and Fire Safety	The area subject to fire is protected zone such as national park etc.	The area subject to fire is forest area.	There is limited area to be subject to a fire	There is no area to be subject to a fire
Traffic Safety & Load Transportation	Main traffic route is located within residential areas where pedestrian safety is in consideration	Main traffic route is located within settlements which is used by daily commute	Main traffic route is located on state roads where heavy vehicles can be present	Main traffic route is located on motorways
Community safety / Ice Throw	There are intense residential areas within the setback distance B=1.5 x (H+L), Motorways are in question	There are settlements within the setback distance B=1.5 x (H+L), State roads are in question	There are few, scattered structures within the setback distance B=1.5 x (H+L) Only stabilised roads available	There are no settlements within the setback distance B=1.5 x (H+L) No road available
Community safety / Blade Throw	There are intense residential areas within the setback distance B=1.5 x (H+L), Motorways are in question	There are structures within the setback distance B=1.5 x (H+L)/settlement in average throw distance, State roads are in question	There are few, scattered structures within the average velocity throw distance Only stabilised roads available	There are either no or few settlements within the maximum velocity throw distance No road available
Aviation	There is an aviation area <1 km	There is an aviation area <5 km	There is an aviation area <20 km	There is an aviation area <50 km
Ecosystem Services	Ecosystem services are local community members' major livelihood.	Local community members are benefiting from essential ecosystem services	Limited access to ecosystem service is in question	No ecosystem service is in question

As described before, local community members were identified near WPP License Area nearby the villages around thus, sensitivity of the local community members were identified as medium. Also, it was determined that nearby local community members are using groundwater as a water source the groundwater bodies was also determined as medium as well. As described in *Chapter 6: Land Use, Soil and Geology*, the Project Area is located on moderate erosion risk area where the structural safety of project infrastructure sensitivity is low. WPP License Area has sections of forest areas this makes sensitivity of Life and Fire Safety related receptors medium. Furthermore, the main access to the Project Area will be done via Bursa-Çanakkale State Roads thus the relevant sensitivity is low. Finally, it is known that public has access to ecosystem services, and they are benefiting from water, forestry etc. thus, the relevant sensitivity was determined as medium.

Table 15.10: Impact significance during construction

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Water quality and availability	Groundwater bodies	Low	Construction	AoI	Reversible	Unlikely	Minor	Medium	Minor
Air Quality	Local community members / nearby settlements	Low to High	Construction	AoI	Reversible	Possible	Minor	Low to High	Minor
Noise	Local community members / nearby settlements	Medium	Construction	AoI	Reversible	Possible	Minor to Major	Medium	Minor to Major
Structural safety of Project Infrastructure	Project Area / Components	Medium	Construction	AoI	Reversible	Possible	Moderate	Low	Minor
Life and Fire Safety	Forest Area	Medium	Construction	AoI	Reversible	Possible	Moderate	Medium	Moderate
Traffic Safety	Passengers on Bursa-Çanakkale State Road	High	Construction	AoI	Irreversible in case of fatal accident	Occurring regularly under typical conditions	Minor	Medium	Minor
	Students	Medium	Construction	Access roads and highways	Irreversible in case of fatal accident	Occurring regularly under typical conditions	Minor	Low	Negligible
Abnormal Load Transportation	Passengers on Bursa-Çanakkale State Road	Low	Construction / Tower transportation	AoI	Irreversible in case of fatal accident	Occurring regularly under typical conditions	Minor	Low	Negligible

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Transport and Storage of Hazardous Material	Local community members / nearby settlements	Low	Construction	AoI	Reversible	Unlikely	Minor	Medium	Minor
Disease Prevention	Local community members / nearby settlements	Low	Construction	AoI	Reversible	Possible	Minor	Medium	Minor
Emergency Preparedness and Response	Local community members / nearby settlements	Medium	Construction	AoI	Reversible	Possible	Moderate	Medium	Moderate
Explosive Use and Blasting	Local community members / nearby settlements	Low	Construction / Land Preparation	AoI	Reversible	Occurring regularly under typical conditions	Minor	Medium	Minor
Ecosystem Services	Local community members benefiting from ecosystem services	Low	Construction	AoI	Reversible	Occurring regularly under typical conditions	Minor	Medium	Minor
Public Access	Local community members / nearby settlements	Low	Construction	AoI	Reversible	Possible	Minor	Medium	Minor
Security Personnel	Local community members / nearby settlements	Low	Construction	AoI	Reversible	Occurring regularly under typical conditions	Minor	Medium	Minor

Table 15.11: Impact significance during operation

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Ice Throw	Local community members / nearby settlements and roads	Major	One time	Setback Distance	Irreversible	Unlikely	Negligible	Low	Negligible
Blade Thro	Local community members / nearby settlements and roads	Major	One time	Avg. and Throw Distance	Irreversible	Unlikely	Negligible	Low	Negligible
		Major	One time	Max. Throw Distance	Irreversible	Unlikely	Minor	Low	Negligible
Aviation	Çanakkale Airport	Low	Operation	AoI	Reversible	Occurring regularly under typical conditions	Minor	Medium	Minor
Electromagnetic Interference and Radiation	Local community members / nearby settlements	Low	Operation	AoI	Reversible	Possible	Minor	Medium	Minor
Traffic Safety	Local community members / nearby settlements	Low	Operation	AoI	Reversible	Unlikely	Negligible	Medium	Negligible
Shadow Flicker	Local community members / nearby settlements	Low	Operation	AoI	Reversible	Unlikely	Negligible	Medium	Negligible
Public Access	Local community members / nearby settlements	Low	Operation	AoI	Reversible	Unlikely	Negligible	Medium	Negligible

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Security Personnel	Local community members / nearby settlements	Low	Operation	AoI	Reversible	Unlikely	Negligible	Medium	Negligible
Noise	Local community members	Medium	Operation	AoI	Reversible	Possible	Minor	Medium	Minor

15.5 Impact Mitigation & Residual Impact

15.5.1 Construction

During the construction phase of a wind power plant, proactive measures are essential to mitigate potential impacts on various aspects of community health and safety. The proposed mitigation measures are listed below.

15.5.1.1 Water, Noise and Air Quality

Mitigation measures regarding water, noise and air quality management are provided *Chapter 5: Water Quality, Hydrology and Hydrogeology, Chapter 7: Air Quality,* and *Chapter 9: Noise and Vibration* in detail respectively.

15.5.1.2 Structural Safety of Project Infrastructure

Mitigation measures regarding erosion and natural hazard management which are described in *Chapter 6: Land Use, Soil and Geology* will be complied with.

15.5.1.3 Life and Fire Safety

Mitigating life and fire safety risks involves the implementation of strict safety protocols, including fire prevention measures, emergency evacuation plans, and the provision of adequate firefighting equipment. Regular safety drills and training sessions for construction personnel contribute to a prepared and responsive environment, ensuring the well-being of workers and preventing fire incidents. Furthermore, the CHS Plan and Emergency Preparedness and Response Plan, which include the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures. In addition, local community shall be aware of the life and fires safety related risks to be triggered by the Project and regular consultation shall be carried out with local people.

In case of an emergency collaboration with local authorities will be done and maintained.

15.5.1.4 Traffic Safety

Ensuring traffic safety during construction requires the development of comprehensive traffic management plans. This includes clearly marked construction zones, strategically placed signage, and designated routes for heavy construction vehicles. Regular communication with local authorities, ongoing traffic monitoring, and collaboration with the community help minimize disruptions and maintain a safe traffic environment. Provisions of the Motorway Traffic Law (OG Date/Number: 18.07.1997/2918) will be complied with. Furthermore, the CHS Plan, which includes the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

The Project-specific Traffic Management Plan will be established and implemented throughout the construction phase. The content of the Plan will define sensitive receptors, and relevant mitigation measures including regular consultations and awareness raising activities for sensitive receptors on road traffic safety, trainings to the drivers in terms of road safety, traffic regulations and speed limit will be identified in the Plan.

According to the Traffic Management Plan, best practices will be applied to prevent congestion and traffic accidents during peak and off-peak hours. The project company will comply with national legislation and ensure proper security and regulation of construction-related traffic. Vehicles will enter and exit the site in a forward direction, with temporary direction signs at strategic locations. Pre-defined access routes will be used for long, wide, and heavy load vehicles transporting construction materials. Excavated material will be recycled and reused on

the project site, reducing vehicle movements, and avoiding earth-moving heavy equipment movements. Good site visibility will be ensured, and disruption to road users will be minimized by using the project area for storage and providing on-site parking.

Special specialized vehicles will be used for oversized components transportation, and weight restrictions will be followed. The project will also implement the Air Quality Management Plan (AQMP) and Noise Management Plan (NMP) to mitigate environmental and noise impacts. Stakeholder consultation will be ongoing, and traffic movement surveys will be conducted to determine the scale of impact on transportation routes through sensitive areas.

Pedestrian safety is a high priority, with separate pedestrian walkway routes and safe passages provided. Traffic management staff will be available at locations where pedestrians are most likely to be present. Drivers will receive induction and regular updates to promote safety and awareness.

15.5.1.5 Abnormal Load Transportation

Mitigating the impact of abnormal load transportation involves meticulous route planning, obtaining necessary permits, and implementing safety measures during the transportation of oversized components. Utilizing specialized vehicles with proper signage, escort vehicles for guidance, and adherence to weight restrictions ensure the safe transport of large components, minimizing potential risks to both construction workers and the public. Engagement with local authorities regarding abnormal load transportation will be performed as well as part of the stakeholder engagement activities. Furthermore, the CHS Plan, which includes the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

15.5.1.6 Transport and Storage of Hazardous Materials

Mitigation measures regarding soil quality management which are described in *Chapter 6: Land Use, Soil and Geology* will be complied with.

15.5.1.7 Disease Prevention

Implementing measures to prevent the spread of diseases during construction includes maintaining hygiene practices among construction workers, providing sanitation facilities, and adhering to health and safety guidelines. Regular health screenings, vaccinations, and awareness campaigns contribute to disease prevention within the construction site, safeguarding the well-being of both workers and nearby communities. Furthermore, the CHS Plan and Emergency Preparedness and Response Plan, which include the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures. In addition, a code of conduct will be in place to identify the rules to avoid any disease spread risk.

15.5.1.8 Emergency Preparedness and Response

A robust emergency preparedness and response plan is crucial during construction. This involves the establishment of emergency response teams, communication protocols, and evacuation procedures. Regular drills and scenario-based training sessions prepare construction personnel to respond effectively to unforeseen incidents, ensuring a swift and organized response to emergencies. An emergency Preparedness and Response Plan (EPRP) prepared with necessary engagement of local relevant authorities which includes the key measures will be prepared and implemented for all stages of the Project. The EPRP will be shared with the relevant local authorities to increase their level of awareness of potential Project risks and mitigations. Furthermore, the CHS and Emergency Response Plan, which include the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

15.5.1.9 Explosive Use and Blasting

When explosive use and blasting are required, compliance involves conducting thorough risk assessments, implementing blast management plans, and adhering to safety standards. Controlled blasting techniques, advanced warning systems, and coordination with local authorities contribute to minimizing the impact on nearby structures and ensuring the safety of both construction personnel and the surrounding community. Furthermore, the CHS Plan and Emergency Preparedness and Response Plan, which include the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

15.5.1.10 Ecosystem Services

Mitigating impacts on ecosystem services requires careful planning to minimize disruption to natural processes. This involves implementing erosion control measures, habitat restoration programs, and sustainable construction practices. Regular environmental monitoring ensures that construction activities align with ecological conservation goals, preserving vital ecosystem services. Within this scope, continuous and regular engagement with relevant local authorities will be implemented. Furthermore, the CHS Plan, which includes the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

15.5.1.11 Public Access

Mitigating impacts on public access during construction includes clear communication about access restrictions, providing alternative routes, and minimizing disruptions to community activities. Regular updates through community engagement programs foster understanding and cooperation, ensuring that construction-related limitations are conveyed transparently to the public. In addition, requirements specified in the Security Management Plan will be complied with. Furthermore, the CHS Plan, which includes the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

15.5.1.12 Security Personnel

Managing the presence of security personnel during construction involves establishing protocols for positive interactions with the local community, minimizing tensions. Effective communication channels, community liaison officers, and regular feedback mechanisms contribute to a positive relationship between security personnel and the community, fostering a safe and secure construction environment. Furthermore, the Security Management Procedure, which includes the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures. It shall be noted that the SMP also include the necessary provisions to respect human rights as well.

15.5.2 Operation

The operation phase of a wind power plant demands attention to community health and safety, necessitating a comprehensive approach to mitigate potential impacts.

15.5.2.1 Blade and Ice Throw

Mitigating the risks associated with blade and ice throw incidents involves the implementation of advanced technologies and operational controls. Utilizing sensors and monitoring systems enables real-time tracking of ice accumulation on turbine blades, allowing for timely intervention to prevent ice throw. Adjusting operational parameters during icy conditions and employing technologies like de-icing systems contribute to minimizing the risks associated with blade and ice throw incidents. Furthermore, the CHS Plan and Emergency Preparedness and Response

Plan, which include the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

In addition, to mitigate blade throw risk, periodic inspections and maintenance of wind turbine blades will be carried out to detect potential issues such as cracks, material deterioration, or fatigue. By addressing these concerns proactively, the risk of blade failures can be significantly reduced. Moreover, according to the Best Practice Project Description (Section: 2.3) the turbines shall be stopped working if the wind speed is 28 m/s to avoid any blade and ice throw risk.

Local people will be warned during cold weather and extreme windy days to inform about possible risks. Furthermore, warning signs will be placed nearby the turbines to state the risk of ice & blade throw.

15.5.2.2 Aviation

Addressing aviation-related risks requires close collaboration with aviation authorities. Implementing radar systems to detect incoming aircraft and establishing clear communication channels with air traffic control contribute to airspace safety. Placing warning lights and markings on wind turbines enhances visibility for pilots, reducing the risk of collisions. Ongoing engagement with aviation stakeholders ensures continuous adherence to safety protocols during the wind power plant's operation. Furthermore, the CHS Plan, which includes the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

15.5.2.3 Electromagnetic Interference and Radiation

To mitigate electromagnetic interference and radiation risks, compliance involves employing electromagnetic shielding for sensitive equipment and maintaining safe distances between power lines and electronic devices. Implementing advanced monitoring systems allows for continuous assessment of electromagnetic fields, ensuring compliance with established safety standards and minimizing potential impacts on community health. Furthermore, the CHS Plan, which includes the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

15.5.2.4 Traffic Safety

Effective traffic safety measures during the operation phase encompass the development of comprehensive traffic management plans. This involves coordinating with local authorities to establish safe routes for construction and maintenance vehicles, implementing clear signage, and conducting regular safety training for project personnel. Collaboration with the community to establish communication channels regarding traffic patterns and potential disruptions further enhances overall traffic safety. Within the scope of the Project, the provisions of Motorway Traffic Law (OG Date/Number: 18.07.1997/2918) will be complied with. Furthermore, the CHS Plan and Traffic Management Plan, which include the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

According to the Traffic Management Plan the project will aim to implement lower speed limits and traffic control measures within the project area and external transport routes. Route planning, speed limits, vehicle safety standards, transportation timing, and training requirements will also be implemented. Emergency preparedness and response plans will be included in the project's Emergency Preparedness and Response Plan. Traffic and transport procedures will follow national and international guidelines. Emergency teams will be trained to respond to traffic-related emergencies. Information signs will be placed at entrances, lobbies, and plant locations for easy access. A safe working environment will be provided for drivers and transportation staff, and all vehicles will receive regular maintenance. Communication and

collaborations with local authorities, Non-governmental Organisations (NGOs), neighbouring facilities, and commercial organizations will be undertaken for traffic and transport management.

15.5.2.5 Shadow Flicker

The detailed mitigation measures regarding Shadow Flicker are presented in *Chapter 10: Landscape and Visual*. Within the scope of this assessment no significant impact was identified.

15.5.2.6 Public Access

Mitigating impacts on public access involves transparent communication and engagement with the community. Clearly defining access restrictions, providing advance notice of operation and maintenance activities, and possible malfunctions contribute to minimizing disruptions. In addition, warning signs will be in place near the turbines to identify the risk of ice and blade throw as well. Regular updates and community outreach programs foster understanding and cooperation, ensuring that public access limitations are implemented with minimal inconvenience. Furthermore, the CHS Plan, which includes the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

15.5.2.7 Security Personnel

To manage the presence of security personnel, measures include providing comprehensive training on community engagement, conflict resolution, and cultural sensitivity. Establishing protocols for positive interactions between security personnel and the local community minimizes tensions. Regular communication and feedback mechanisms enable continuous improvement in the management of security personnel, ensuring their role aligns with community well-being during the operation phase. Furthermore, the Security Management Plan (SMP) Plan, which includes the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures. It shall be noted that the SMP also include the necessary provisions to respect human rights as well.

15.5.2.8 Noise

A Project-specific Noise Management Plan will be in place. The content of the Plan will define sensitive receptors and relevant mitigation measures including regular consultations with sensitive receptors will be identified in the Plan. Furthermore, the CHS Plan, which includes the necessary protocol for responding to any occurrences, will be followed as part of the mitigating measures.

Within the scope of the SEP the CLO will continue to organize regular consultation and stakeholder engagement activities. Project's community grievance mechanism will be established which will provide easy access for sensitive receptors to raise their grievances.

15.5.3 Summary

A brief summary for the impact mitigation and residual impacts for construction and operation were briefly summarised in

Table **15.12** and Table 15.13 respectively.

Table 15.12: Residual impact during construction

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Water quality and availability	Groundwater bodies	Minor	Negligible
Air Quality	Local community members / nearby settlements	Negligible	Negligible

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Noise	Local community members / nearby settlements	Minor to Major	Negligible
Structural safety of Project Infrastructure	Project Area / Components	Minor	Negligible
Life and Fire Safety	Forest Area	Moderate	Minor
Traffic Safety	Passengers on Bursa-Çanakkale State Road	Negligible	Negligible
	Students	Negligible	Negligible
Abnormal Load Transportation	Passengers on Bursa-Çanakkale State Road	Negligible	Negligible
Transport and Storage of Hazardous Materials	Local community members / nearby settlements Groundwater bodies	Minor	Negligible
Disease Prevention	Local community members / nearby settlements	Minor	Negligible
Emergency Preparedness and Response	Local community members / nearby settlements	Moderate	Minor
Explosive Use and Blasting	Local community members / nearby settlements	Minor	Negligible
Ecosystem Services	Local community members benefiting from ecosystem services	Minor	Negligible
Public Access	Local community members / nearby settlements	Minor	Negligible
Security Personnel	Local community members / nearby settlements	Minor	Negligible

Table 15.13: Residual impact during operation

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Ice Throw	Local community members / nearby settlements	Negligible	Negligible
Blade Throw	Local community members / nearby settlements and roads in max vel. throw range	Negligible	Negligible
	Local community members / nearby settlements and roads in avg vel. throw range	Negligible	Negligible
Aviation	Çanakkale Airport	Minor	Negligible
Electromagnetic Interference and Radiation	Local community members / nearby settlements	Minor	Negligible
Traffic Safety	Local community members / nearby settlements	Negligible	Negligible
Shadow Flicker	Local community members / nearby settlements	Negligible	Negligible
Public Access	Local community members / nearby settlements	Negligible	Negligible
Security Personnel	Local community members / nearby settlements	Negligible	Negligible
Noise	Local community members	Minor	Negligible

16 Cultural Heritage

16.1 Introduction

This Chapter is to identify the potential tangible and intangible cultural heritage within the Cultural Heritage Impact Assessment (CHIA) boundaries of the Harmancık Wind Power Plant Project (the Project) and to evaluate the potential effects of construction and operation activities of the Project on these assets.

This Chapter is prepared in line with the IFC PS8 and EBRD PR8. In this Chapter, the results of desktop studies and field research on tangible and intangible cultural heritage assets are evaluated.

16.1.1 Overview

The main objectives of the CHIA are as follows:

- Determination of the current status and geographical distribution of the intangible and tangible cultural heritage assets that may be affected by the Project activities,
- Identification of the negative effects that may occur due to the Project activities on intangible and tangible cultural heritage,
- Determination of the necessary mitigation measures and suggestions to minimize the negative effects on intangible and tangible cultural heritage.

The cultural heritage studies performed for the Project comprised a desk study of the data available for the study area as well as archaeological field surveys conducted at the Project area by the senior archaeologists. The main objectives of the cultural heritage studies are summarized below:

- Identifying the exact location and properties of registered and unregistered[185] cultural heritage sites and assets located within the cultural heritage study area (as specified below in Section 16.1.2) of the ESIA based on desk study and field surveys.
- Defining the adverse effects on the tangible and intangible cultural heritage assets which may occur as a result of Project related activities (including all Project activities covered in Section 2.4).
- Developing mitigation measures for the management of registered and unregistered cultural heritage within the Project area, consistent with the requirements and procedures set by the Law on the Conservation of Cultural and Natural Assets No. 2863 (OG Date/Number: 23.07.1983/18113) and related secondary legislation as well as decisions of the related Regional Councils for the Conservation of Cultural Property for the registered sites or sites that are in the process of registration by the Ministry of Culture and Tourism (MoCT).
- Providing upfront information on the cultural heritage sites and assets located within Project area to the related cultural heritage authorities to ensure timely evaluation of the sites by the authorities within the framework of the Law on the Conservation of Cultural and Natural Assets and identify the management measures to be required by the authorities for those sites (e.g. measures to be taken by the Project Company prior to site entry).

[185] Unregistered sites may include: (i) sites in the process of registration by the related cultural heritage authorities, or sites with archaeological potential as identified/discovered by the cultural heritage team as part of the ESIA field surveys; or (ii) other sites including the remains of a historic bridge, a grave/graveyard, fountain, civilian architecture samples etc.

- Providing upfront information on the cultural heritage sites and assets located within Project's area of influence to relevant Project departments to ensure timely planning and progress of the activities, in alignment with the evaluation and decision processes of the cultural heritage authorities.
- Contributing to the archaeological and cultural inventory of Türkiye by sharing the information on the cultural heritage sites and assets located within the Project area (collected through scientific methods) with related Regional Councils for the Conservation of Cultural Property.

The scoping of the tangible and intangible cultural heritage studies, including the baseline, impact assessment and management, has been done as summarised in Table 16.1.

16.1.2 Study Area and Area of Influence

The determined Area of Influence (AoI) of the Cultural Heritage Impact Assessment for tangible and intangible cultural heritage assets are as described in Table 16.1 and presented in Figure 16.1.

Table 16.1: CHIA Borders[186]

Impact Assessment AoI	Tangible Cultural Heritage	Intangible Cultural Heritage
	All Project Area[187] • Project License Area, • Access and Site Roads, • Switchyard, ETL (Including ETL Pole Locations)[188] and • Turbine Locations.	Çanakkale/ Merkez - Yukarıokçular Village, Çanakkale/ Lapseki - Üçpınar Village.

186 The impact area (AoI) for tangible cultural heritage was limited by the area where Project activities to be conducted, i.e., the Project licence boundaries. The boundaries for intangible cultural heritage were determined by taking into consideration the settlements where cultural elements can be found around the Project area.

187 The "archaeological walkover survey" to identify the possible cultural heritage assets within the Project license area was carried out in accordance with the 2 different digital datasets ("YEKA RES-2.kmz" - "Phase-1 Construction Projects.kmz" and "Energy Transmission Line.kmz" - "Access Roads.kmz"). The Project Company has provided these datasets on 14 September 2023 and 18 September 2023, respectively. The conducted walkover surveys only focused on turbine locations, access and site roads, switchyard, the Energy Transmission Line (ETL) and other Project components in accordance with the provided datasets. The remaining project license area has been observed and the data collected. The updated Project digital dataset (labelled as 01_DESIGN) was provided by the Project Company on 1 November 2023. According to the updated Project data, it is understood that some turbine locations have been changed and new site roads have been added to the Project. Therefore, detailed walkover surveys could not be carried out in the newly added areas to the Project by the archaeological team. The general observation and obtained data for the Project license area were taken into account for these revised locations when preparing this CHIA for the Project.

188 The ETL line and ETL Pole locations are presented in the "Harmancık WPP ETL Project EIA Project Introduction File which was prepared in 2023. Hence, while conducting the cultural heritage impact assessment studies, the ETL line and ETL Pole locations were examined based on the provided data within the Project Introduction File. No service road is shown in the layout and drawings within the content of the EIA Project introduction file.

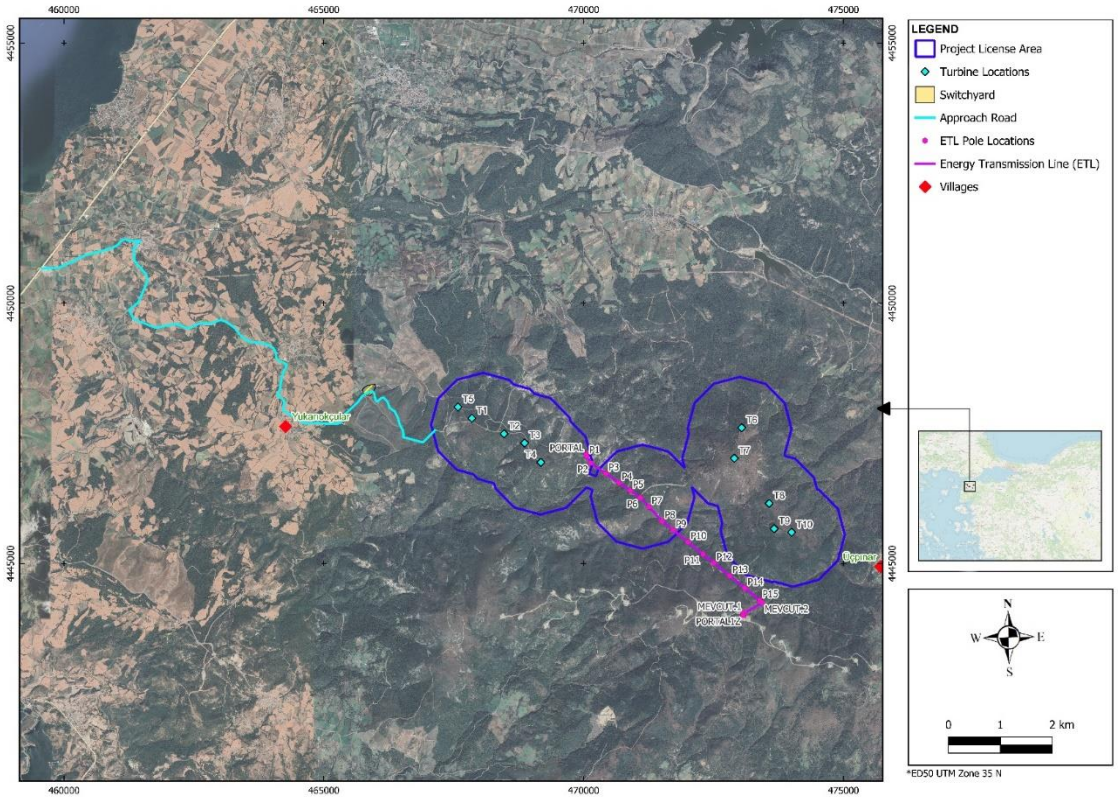

Figure 16.1: CHIA Study Area of the Project

16.2 National and International Requirements

16.2.1 National Requirements

16.2.1.1 National Requirements for Tangible Cultural Heritage

In Türkiye, the movable and immovable cultural and natural assets are under protection as dictated by the Law on Preservation of Cultural and Natural Assets No: 2863, published in the Official Gazette dated 23 July 1983 and numbered 18113. The cultural and natural heritage, which is protected by the Law, is identified as:

- Natural properties which require protection, and immovable assets which were built before the end of the 19th century.
- Any immovable cultural asset constructed after the end of the 19th century but categorized as "a significant asset which requires preservation" by the Ministry of Culture and Tourism.
- Immovable cultural assets located within the boundaries of Protection Sites; structures, buildings or places that have witnessed significant historical events during the Turkish Independence War or the foundation of Republic of Türkiye, regardless of their period and registration status; and all dwellings and buildings that have been used by Mustafa Kemal ATATURK without considering their period of construction or registration status.

The most relevant articles for the project impact assessment studies of the Law on Preservation of Cultural and Natural Assets (Law No: 2863) are provided in Table 16.2.

Table 16.2: Law on the Conservation of Cultural and Natural Property (Law No: 2863)

Article	Explanation
Article 4 – Obligation to Notify	Persons that discover movable and immovable cultural and natural property, owners, proprietors or occupants that know or have recently found out about the existence of cultural and natural property on the land which they own or use shall be obliged to notify the nearest museum directorship or the village headman or the local administrators of other places within at the latest three days. If such property is in military garrisons and restricted areas, the relevant command levels shall be notified in line with the relevant procedure. The village headman, the local administrator receiving such notification or the relevant authorities that are directly notified of such property shall take the necessary measures to protect and secure such property. The village headman shall notify the nearest local administrator as of the situation and the measures taken on the same day. The local administrator and other authorities shall notify in writing the MoCT and the nearest museum directorship within ten days. Upon receiving this notification, the Ministry and Museum Director shall instigate due proceedings as soon as possible in line with the provisions of this law.
Article 5 – Quality of State Property	Immovable property belonging to the state, public institutions and organizations and movable and immovable cultural and natural property to be protected that is known to exist or will be discovered on an immovable property owned by real and legal persons subject to civil law shall have the quality of state property. Registered and annexed foundation property subject to a separate status due to its special qualities shall not be covered by this provision.

Article	Explanation
Article 25 – Transfer to Museums	MoCT shall classify and register based on scientific principles movable cultural and natural property declared to the MoCT according to Article 4 and movable cultural and natural property to be protected as specified in Article 23. Antiquities that need to be conserved in state museums shall be duly transferred to museums. The criteria, procedures and principles for classification, registration and transfer to museums of movable cultural and natural property to be protected shall be specified in a regulation. The historical features of all kinds of weapons and materials concerning Turkish military history shall be surveyed, examined and evaluated by the General Staff at the location they are found or are reported to be found. Antiquities excluded from the classification and registration and not needed to be placed in museums shall be returned with a document to their owners. The cultural property that has been returned with a document shall be at the discretion of their owner. Antiquities not taken back within one year by their owners can be kept at the museum or sold duly by the State.

In addition to Law No: 2863 on Preservation of Cultural and Natural Assets, there are several regulations and principal decisions governing the management of cultural and natural assets. According to the Principal Decision on Archaeological Sites, Conditions of Protection and Use No: 658 dated 5 November 1999, the archaeological sites are classified into three main categories:

- **1st Degree Archaeological Sites:** Areas requiring highest level of protection, with the exception of scientific excavations aiming their protection. Neither construction nor development are allowed in these sites. All kinds of construction, excavation, and modification activities are prohibited within the boundaries of these sites. However, for exceptional cases such as the necessity for infrastructure construction, Regional Council for the Conservation of Cultural Property may permit such activities based on the approval of the relevant museum directorate and the head of the scientific excavation team.
- **2nd Degree Archaeological Sites:** Sites that require medium level of protection. They should be preserved based on the conditions of protection and utilisation set by the Regional Council for the Conservation of Cultural Property. Additional construction is prohibited. Similar to the 1st Degree Sites, for exceptional cases such as necessity for infrastructure construction among others, Regional Council for the Conservation of Cultural Property may permit such activities based on the approval of the relevant museum directorate and the head of the scientific excavation team.
- **3rd Degree Archaeological Sites:** Construction is permitted based on the decisions of Regional Council for the Conservation of Cultural Property. Before applying for a construction permit, test pit excavations should be conducted under the supervision of the local museum, and the outcomes of these excavations should be reviewed by the museum and, if present, the head of the scientific excavation team. Reviews should be submitted to Regional Council for the Conservation of Cultural Property. The Council may ask for extension of the scope of test pits before taking any decision.

Furthermore, Directive on Conducting Field Research, Test Pits and Excavation Works on Cultural and Natural Heritage (published upon MoCT approval dated 13.03.2013 and numbered 94949537-160.99-51264) define the procedures for salvage excavations, archaeological test pits and other relevant studies.

16.2.1.2 National Requirements for Intangible Cultural Heritage

The United Nations Educational, Scientific and Cultural Organization (UNESCO) put into effect the "Convention for the Safeguarding of the Intangible Cultural Heritage" in the 32nd General Conference held in Paris between 29 September and 17 October 2003. The convention was officially accepted by the Republic of Türkiye with the "Law No. 5448 Regarding the Approval of the Convention of Safeguarding of Intangible Cultural Heritage on 19 January 2006". The intangible cultural heritage legally safeguarded by the relevant law was defined as follows:

"Cultural products and production processes such as oral narratives and oral traditions created by the folk in oral culture environments and included in folklore studies, performance arts, social practices, rituals and festivals, folklore, practices related to the universe and nature, handcraft traditions."

16.2.2 International Conventions and Guidelines

Türkiye has ratified the following key international conventions regarding the cultural heritage, which are applicable to the Project:

- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention on the Protection and Promotion of the Diversity of Cultural Expressions, Paris, 20 October 2005 (Türkiye made the ratification accession on 02 November 2017).
- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention for the Safeguarding of the Intangible Cultural Heritage, Paris, 17 October 2003 (Türkiye made the ratification accession on 27 March 2006).
- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention on the Protection of World Cultural and Natural Heritage, Paris, 16 November 1972 (Türkiye made the ratification accession on 16 March 1983).
- United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property, Paris, 14 November 1970 (Türkiye made the ratification accession on 21 April 1981).
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, ICOMOS 2011.

16.2.3 International Standards

16.2.3.1 International Finance Corporation (IFC)

In the field of cultural heritage, IFC Performance Standard 8[189] (PS8) mentions the necessity of preserving cultural heritage for today and for the future. This Performance Standard aims to protect cultural heritage from the negative impacts that may arise from activities at every stage of the project and to ensure equal use of existing cultural heritage.

According to PS8, cultural heritage refers to: "(i) tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values; (ii) unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and (iii) certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles".

[189] International Finance Corporation. (2012). *Performance Standards on Environmental and Social Sustainability*. https://www.ifc.org/content/dam/ifc/doc/2010/2012-ifc-performance-standards-en.pdf

16.2.3.2 European Bank for Reconstruction and Development (EBRD)

The European Bank for Reconstruction and Development (EBRD) specifies the implementation of Performance Requirement 8 (PR8) in order to understand the conservation and importance of cultural heritage[190]. The EBRD emphasizes that cultural heritage, both tangible and intangible, is important for economic and social development and is an integral part of the continuity of cultural identity and practices (including traditions, beliefs and/or languages).

The PR8 requirement states that in case the project activities, the relevant laws and regulations and the obligations arising from the relevant international agreements affect any cultural heritage in the region and agreements approved by the project owner countries must be followed.

The main objectives of PR 8 are as follows:

- To support the protection and conservation of cultural heritage,
- To adopt the mitigation hierarchy approach to protecting cultural heritage from adverse impacts arising from the project,
- To promote the equitable sharing of benefits from the use of cultural heritage in business activities; and
- Where significant elements of cultural heritage are identified, promote the awareness, appreciation and enhancement of cultural heritage as well as potential socioeconomic benefits for local communities.

According to the EBRD PR8, the term cultural heritage defines it as a resource group that does not belong to people (that is not their own property), and that is accepted as a reflection of their developing values, beliefs, knowledge, and traditions from the past to the present. It covers all tangible (physical) and intangible cultural heritage recognized locally, regionally, or nationally or in the international community.

Physical cultural heritage refers to mobile or immovable objects, sites, groups of buildings and associated cultural or sacred sites, and natural features and landscapes of archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance.

16.2.3.3 Environmental Impact Assessment Directive (2014/52/EU) of the European Union, 2014

According to Article 16 of the Directive, for the protection and promotion of cultural heritage comprising urban historical sites and landscapes, which are an integral part of the cultural diversity that the Union is committed to respecting and promoting in accordance with Article 167(4) TFEU, the definitions and principles developed in relevant Council of Europe Conventions, in particular the European Convention for the Protection of the Archaeological Heritage dated 6 May 1969, the Convention for the Protection of the Architectural Heritage of Europe dated 3 October 1985, the European Landscape Convention dated 20 October 2000, and the Framework Convention on the Value of Cultural Heritage for Society dated 27 October 2005 can be useful. In order to better preserve historical and cultural heritage and the landscape, it is critical to address the visual impact of projects, namely the change in the appearance or view of the built or natural landscape and urban areas, in environmental impact assessments.

[190] The European Bank for Reconstruction and Development. (2023). Guidance Note – EBRD Performance Requirement 8: Cultural Heritage. https://www.ebrd.com/cultural-heritage.pdf

16.3 Methodology and Assessment Criteria

16.3.1 Methodology for Baseline Studies

Four phases have been undertaken in evaluating the present status of the tangible and intangible cultural heritage assets for the Project under CHIA. These phases are as follows:

- Desktop Research Study Phase
- Field Research Phase
- Impact Assessment Phase
- Reporting Phase

16.3.1.1 Desktop Research Study Phase

Publications on archaeological and historical cultural heritage related to the field of study and its immediate surroundings have been compiled in order to determine the cultural heritage potential of the Project area. Existence of the recorded archaeological or cultural heritage within the Project area and in the vicinity of Project area have been researched. Resources used during the desktop study were as follows:

- Inventory records of Çanakkale Regional Council for the Conservation of Cultural Property
- Academic publications
- Historic/ topographic and digital maps
- Google Earth Satellite Images
- Previous reports on the cultural heritage studies conducted in the area (published by other parties/academia, studies conducted by the cultural heritage team, etc.)
- UNESCO Türkiye World Heritage Site List

In addition to the abovementioned documents, the opinion letter of Çanakkale Regional Council for the Conservation of Cultural Property was reviewed in regard with tangible and intangible cultural heritage assets. It was stated in the letter that a technical site survey was performed by experts of the Council upon the application of Project Company to the Regional Council. In the prepared technical report, it was stated that as a result of the file/archive examination, there were no protected areas or registration records approved by the Councils in terms of cultural heritage assets within the Project area, and that no tangible or intangible cultural heritage assets were found during the site survey of authority experts. Within the scope of Article 4 of Law on Preservation of Cultural and Natural Assets[191] (Law No. 2863), it has been stated that there is no harm in carrying out the Project within the scope of Law No. 286. However, in case any tangible cultural property is found during Project activities, the works are to be stopped and the nearest Museum Directorate and under the local administrative authority is informed.

16.3.1.2 Field Research Phase

Field research was conducted by the team of qualified experts between 06 October 2023 and 08 October 2023. The field research included research on both tangible and intangible cultural heritage assets.

[191] Published in the Official Gazette dated 23 July 1983 and numbered 18113.

Field Research on Tangible Cultural Heritage

The cultural heritage team of three (3) senior archaeologists[192] has conducted an archaeological walkover survey to all areas indicated in Table 16.1 in order to gather field data on the location and features of the tangible cultural heritage elements within the Project area.

During the archaeological walkover surveys, the archaeological findings that could be observed on the surface were recorded on field survey forms by taking Geographical Positioning System (GPS) coordinates (WGS 1984, 6 degree) together with detailed photographs of the findings from various angles to form a Project archive.

Based on the field survey findings, daily reports were prepared by the cultural heritage team throughout the entire field survey program.

During the walkover survey, the team walked within the Project License Area, using a GPS device. The instant communication between the members of the field team, who scanned the field surface in parallel was provided by walkie-talkie devices. During the walkover surveys, all archaeological traces (such as ceramic shards spread on the surface, architectural elements or traces etc.) observed on the surface of the study area were recorded on the Field Surveys Forms (kept within the CHIA database) and relevant findings were incorporated to the Project Archaeological Baseline.

Field Research on Intangible Cultural Heritage

Field studies for intangible cultural heritage have been carried out using the "qualitative interview technique" with individuals who is knowledgeable about the history and geography of the region, who value those areas, and who know, live, sustain and transfer the intangible cultural elements in those areas. In this research method, face-to-face interviews have been conducted with representatives of the local people and data on intangible cultural heritage elements have been collected. The details of the interviews are provided in Table 16.3.

Table 16.3: Details of Interviews (Note that the photographs are blurred in the publicly disclosed version of this document in compliance with personal data protection regulations)

Neighbourhood	Interview Topics	Number of Interviewed People	The Photos from the Interviews
Çanakkale/ Merkez - Yukarıokçular Village	• Introduction • Briefing participants about the project and the purpose of the interview • Questioning whether International Intangible Cultural Heritage Elements exist in the participant's neighbourhood	3	

[192] Senior Archaeologist and Intangible Cultural Heritage Expert Serkan Akdemir, Senior Archaeologist and Intangible Cultural Heritage Expert Halim Özatay and Senior Archaeologist and Intangible Cultural Heritage Expert Yunus Ekim.

Neighbourhood	Interview Topics	Number of Interviewed People	The Photos from the Interviews
Çanakkale/ Lapseki – Üçpınar Village	• Questioning whether National Intangible Cultural Heritage Elements exist in the participant's neighbourhood • Questioning whether Local Intangible Cultural Heritage Elements exist in the participant's neighbourhood	4	

16.3.1.3 Impact Assessment Phase

Impact assessment studies for cultural heritage, which were carried out in line with the "Guidance on Heritage Impact Assessments for Cultural World Heritage Properties" of International Council on Monuments and Sites (ICOMOS), are provided in Section 16.5.

16.3.2 Determining Magnitude, Sensitivity, and Impact Significance

The impact of Project construction and operation activities on the cultural assets are evaluated based on "Guidance on Heritage Impact Assessments for Cultural World Heritage Properties" document prepared by ICOMOS and adopted by the MoCT for its use to properly assess the impact of construction activities on cultural sites. Accordingly, the cultural heritage assets within the scope of Project identified in the area are classified based on their level of importance as provided in Table 16.4.

Table 16.4: Example Guide for Assessing Value of Heritage Assets (ICOMOS CHIA Guidance – Appendix 3A)

Grading	Archaeology	Built heritage or Historic Urban Landscape	Historic Landscape	Intangible Cultural Heritage or Associations
Very High	Sites of acknowledged international importance inscribed as World Heritage (WH) property.	Sites or structures of acknowledged international importance inscribed as of universal importance as WH property.	Landscapes of acknowledged international importance inscribed as WH property.	Areas associated with Intangible Cultural heritage activities as evidenced by the national register
	Individual attributes that convey Outstanding Universal Value (OUV) of the WH property.	Individual attributes that convey OUV of the WH property	Individual attributes that convey OUV of the WH property.	Associations with particular innovations, technical or scientific developments or movements of global significance.
	Assets that can contribute significantly to acknowledged international research objectives.	Other buildings or urban landscapes of recognised international importance.	Historic landscapes of international value, whether designated or not	Associations with particular individuals of global importance
			Extremely well-preserved historic landscapes with exceptional coherence, time depth, or other critical factors.	
High	Nationally designated Archaeological Monuments protected	Nationally designated structures with standing remains.	Nationally designated historic landscape of outstanding interest.	Nationally - designated areas or activities associated with globally - important Intangible

Grading	Archaeology	Built heritage or Historic Urban Landscape	Historic Landscape	Intangible Cultural Heritage or Associations
	by the State Party's laws			Cultural Heritage activities
	Undesignated sites of the quality and importance to be designated.	Other buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade.	Undesignated landscapes of outstanding interest.	Associations with particular innovations, technical or scientific developments or movements of national significance
	Assets that can contribute significantly to acknowledged national research objectives.	Conservation Areas containing very Important buildings.	Undesignated landscapes of high quality and importance, and of demonstrable national value	Associations with particular individuals of national importance
		Undesignated structures of clear national importance.	Well preserved historic landscapes, exhibiting considerable coherence, time depth or other critical factors.	
Medium	Designated or undesignated assets that can contribute significantly to regional research objectives.	Designated buildings. Historic (unlisted) buildings that can be shown to have exceptional qualities or historical associations.	Designated special historic landscapes.	Areas associated with Intangible Cultural heritage activities as evidenced by local registers.
		Conservation Areas containing buildings that contribute significantly to its historic character.	Undesignated historic landscapes that would justify special historic landscape designation.	Associations with particular innovations or developments of regional or local significance.
		Historic townscapes or built-up areas with important historic integrity in their buildings or built settings.	Landscapes of regional value.	Associations with particular individuals of regional importance
			Averagely well- preserved historic landscapes with reasonable coherence, time depth or other critical factors.	
Low	Designated or undesignated assets of local importance.	"Locally Listed" buildings.	Robust undesignated historic landscapes.	Intangible Cultural heritage activities of local significance
	Assets compromised by poor preservation and/or poor survival of contextual associations.	Historic (unlisted) buildings of modest quality in their fabric or historical associations	Historic landscapes with importance to local interest groups	Associations with particular individuals of local importance
	Assets of limited value, but with potential to contribute to local research objectives.	Historic Townscape or built-up areas of limited historic integrity in their buildings or built settings.	Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations.	Poor survival of physical areas in which activities occur or are associated
Negligible	Assets with little or no surviving archaeological interest.	Buildings or urban landscapes of no architectural or historical merit; buildings of an intrusive character.	Landscapes little or no significant historical interest.	Few associations or ICH vestiges surviving

Grading	Archaeology	Built heritage or Historic Urban Landscape	Historic Landscape	Intangible Cultural Heritage or Associations
Unknown Potential	The importance of the asset has not been ascertained.	Buildings with some hidden (i.e. inaccessible) potential for historic significance.	N/A	Little is known or recorded about ICH of the area

A 5-stage classification method was used in order to evaluate not only the impacts on the tangible and intangible cultural heritage assets within the Project area from the Project activities but also the magnitude of the impacts as described in Table 16.5.

Table 16.5: Criteria for Evaluating the Magnitude of Impact (ICOMOS CHIA Appendix 3B)

Impact Grading	Archaeological attributes	Built heritage or Historic Urban Landscape attributes	Historic landscape attributes	Intangible
Major Change	Changes to attributes that convey OUV of WH properties.	Change to key historic building elements that contribute to OUV, such that the resource is totally altered	Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to historic landscape character unit and loss of OUV.	Major changes to area that affect the ICH activities or associations or visual links and cultural appreciation.
	Most or all key archaeological materials, including those that contribute to OUV such that the resource is totally altered.	Comprehensive changes to the setting.		
	Comprehensive changes to setting.			
Moderate Change	Changes to many key archaeological materials, such that the resource is clearly modified.	Changes to many key historic building elements, such that the resource is significantly modified.	Change to many key historic landscape elements, parcels or components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; considerable changes to use or access; resulting in moderate changes to historic landscape character.	Considerable changes to area that affect the ICH activities or associations or visual links and cultural appreciation.
	Considerable changes to setting that affect the character of the asset.	Changes to the setting of an historic building, such that it is significantly modified.		
Minor Change	Changes to key archaeological materials, such that the resource is slightly altered.	Change to key historic building elements, such that the asset is slightly different.	Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; limited changes to noise levels or sound quality; slight changes to use or access; resulting in	Changes to area that affect the ICH activities or associations or visual links and cultural appreciation.

Impact Grading	Archaeological attributes	Built heritage or Historic Urban Landscape attributes	Historic landscape attributes	Intangible
			limited change to historic landscape character.	
	Slight changes to setting.	Change to setting of an historic building, such that it is noticeably changed.		
Negligible Change	Very minor changes to key archaeological materials, or setting	Slight changes to historic building elements or setting that hardly affect it.	Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes in noise levels or sound quality; very slight changes to use or access; resulting in a very small change to historic landscape character.	Very minor changes to area that affect the ICH activities or associations or visual links and cultural appreciation.
No Change	No change.	No change to fabric or setting.	No change to elements, parcels or components; no visual or audible changes; no changes in amenity or community factors.	No change

While determining the general impact of the Project activities on the cultural heritage assets within the Project Area and its vicinity, a general impact assessment was performed taking into account the "scale/severity of the impact" and "the importance of the cultural heritage asset" as described in Table 16.6.

Table 16.6: General Impact Assessment Matrix

Value of Heritage Asset	Scale & Severity of Change / Impact				
	No Change	Negligible Change	Minor Change	Moderate Change	Major Change
For Word Heritage List Properties VERY HIGH – Attributes Which Convey Outstanding Universal Value	**The Significance of The Impact Change or The General Impact (Either Adverse or Beneficial)**				
	Neutral	Slight	Moderate/ Large	Large	Very Large
For Other Cultural Heritage Assets	**The Significance of The Impact Change (Either Adverse or Beneficial)**				
Very High	Neutral	Slight	Moderate/ Large	Large/very Large	Very Large
High	Neutral	Slight	Moderate/ Slight	Moderate/ Large	Large/Very Large
Medium	Neutral	Neutral/Slight	Slight	Moderate	Moderate/ Large
Low	Neutral	Neutral/Slight	Neutral/Slight	Slight	Slight/ Moderate
Negligible	Neutral	Neutral	Neutral/Slight	Neutral/Slight	Slight

As part of the impact assessment, appropriate mitigation measures are reviewed and included to minimise any potential adverse impacts of the Project. The residual impacts are then determined.

16.3.2.1 Reporting Phase

During all studies, all data collected for tangible and intangible cultural assets were evaluated in different mapping and analysis platforms, and the reporting was completed by considering

geographical positioning of archaeological and cultural assets and by developing mitigatory actions for protection/salvation of these assets.

16.3.3 Limitations and Assumptions

The site conditions, including weather conditions, terrain, etc., was sufficient at the time of the field surveys. Therefore no limitations has been identified while conducting the cultural heritage assessment study.

16.4 Baseline Conditions

16.4.1 Desktop Studies Findings

16.4.1.1 Tangible Cultural Heritage

The Project area is located in a region called Troad in Antiquity, which has been home for many settlements throughout history due to its natural resources, its climate and its proximity to trade routes. The region located on the migration route between Asia and Europe has been an important transit point during prehistoric and historic periods. According to the studies conducted in the region, first human traces in the area go back to Paleolithic Period[193]. Flint tools belonging to the Middle Paleolithic Period have been found in the archaeological site in Havuzbaşı Region[194] located in Çınarcık Village borders in Yenice District of Çanakkale Province.

According to the archaeological studies conducted in the vicinity of the Project site, first settlements that date back to Neolithic Period have been located mostly on the coastal regions as well as flatlands. Beşik-Sivri Tepe, Alacalıgöl, Kumtepe and Inlimanı settlements that date back to this period are important archaeological sites. Like the overall Anatolia, Troad Region has also experienced urbanization during Chalcolithic and Bronze Ages. These have been recorded through scientific studies and there are many settlements in the area which date back to these periods. The most important and well-known archaeological settlement dating back to these periods is Troia (Hisarlık Tepe). Listed among World Cultural Heritage sites, Troia has seen continuous settlement beginning from 4th century BC until Roman period. Troia's cultural impact dissemination area emerging during historical process has been extending from the inner parts of Anatolia to the Greek mainland. All settlements established in the region have developed as the satellite towns of Troia or under Troia's cultural hegemony. Troia's impact is clearly seen in the settlements of Taşlıtarla Tumulus, Delikız Hill Region, Harmangöğsü Settlement, Ambartarla Settlement, Ophryneion City, Rhoiteion City, Çoban Hill (Aenteion), Işıldak Hill/Tumulus, Yarım Tumulus, Dalyan Tumulus, Arisbe Antique Port, Arisbe, Damyeri Castle and Işıldak Hill settlements which have been determined during archaeological surface studies conducted in the region which covers the Project site and its vicinity.

Troad Region, which is located at the beginning point of land and sea trade routes between Anatolia and Greek mainland, has continued to develop in the Troia's hinterland during Middle and Late Bronze Ages as well. Some evidence relating to political, social, and economic relations between Hittite Empire, the most important political power in the Late Bronze Age's Anatolia, and Troia have been found during studies[195].

[193] Özbek, O. (2010). Gelibolu Yarımadası Tarihi Milli Parkı'nda Prehistorik Dönem Araştırma: 2008 Sezonu, 27. Araştırma Sonuçları Toplantısı 1. 239-252.

[194] Harmankaya, S.-Tanındı, O. (1996). TAY, Türkiye Arkeolojik Yerleşmeleri 1, Paleolitik / Epipaleolitik. İstanbul: Ege Yayınları. Özdoğan, M. (1991).1989 Yılı Marmara Bölgesi Araştırmaları ve Toptepe Kazısı. Kazı Sonuçları Toplantısı XII/I Ankara: Kültür Bakanlığı Yayınları. 345-375.

[195] Sevin, V. (2000). Anadolu`nun Tarihi Coğrafyası 1. Ankara: Türk Tarih Kurumu Yayınları.

Settlements in the Troad Region experienced invasions of sea tribes during 1200s BC and the region entered into a period called the dark age after these invasions. Gavuryeri, Küçükbeşige, Ballı Burun, Kümbet-Kocabahçe and Kemallı-Gökçebayır settlements in the region have also been dated to this period other than Troia.

The dark age which is thought to have lasted until 8th century BC was followed by the establishment of Hellenistic colonies[195]. The region experienced the domination of Lydians for a short while in 7th and 6th centuries BC. The region has entered the domination of Persian Empire after 546 BC with the entire Anatolia.

Great Alexander started his Anatolia expedition from Lampsakos (Lapseki) in 334 BC and Persian domination came to an end in the region in this period. The region, which was under the rule of Lysimachos until 281 BC, entered under the rule of Pergamon Kingdom in 190 BC after having been given to the Pergamon King Eumenes. The region has come under the rule of Romans after the death of Pergamon King Attalus in 133 BC. The important settlements in the region which date back to Hellenistic and Roman Periods are Delikız Hill Region, Malyeri Settlement, Civler Village Old Cemetery, Gavur Harmanı Settlement, Zeytintarla Settlement, Dedeçeşme Settlement, Ophryneion City, Rhoiteion City, Çoban Hill (Aenteion), Damyeri Castle, Çorakalan, Köserelik, Lampsakos archaeological sites.

The region entered under the rule of Byzantine Empire after the fall of Rome (476 AD). Important settlements in the vicinity of the Project site that date back to this period are Halileli Village Settlement, Dümrek Village Old Cemetery, Malyeri Settlement, Sarıoğul Settlement, Değirmen Sapağı Cemetery Area, Black Church, Gavur Harmanı Settlement, Kabageven Cemetery, Armutçukuru, Sabunluk, Gavuryeri, Gavurtaşı, Çaltılıtepe Castle, Kırçalı Castle, Kaletaştepe Castle, Tepetarla Settlement, Asarlık Settlement, Sivricetepe Castle, Asarlıkkaya Castle, and Sigeion City.

First traces of Turkish existence in the region are dated back to Kaykaus II (1264)[196]. During the Beyliks period the region saw activities of the Sarukhanids, the Karasids and the Aydinids[197]. The region has come under the rule of Ottomans after Cimbe/Çimpe castle was captured in 1354[198]. Dedeçeşme Settlement, Havuçluk, Akçapınar Village Settlement, Delikız Hill Region, Harmangöğsü Settlement, Gavuryeri and Sabunluk are important settlements in the Ottoman Period.

The region became the administrative logistic centre of the Ottoman Empire at the Dardanelles front during the World War I. The region has been occupied by the Greeks on 22 June 1920, following the Armistice of Mudros and it has been saved from the occupation forces on 25 September 1922.

The historical background knowledge as the result of the desktop research is important in terms of demonstrating the potential of tangible cultural assets within the borders of Çanakkale province, including the Project location. Known settlements having archaeological importance in the vicinity of the Project area are presented in Figure 16.2 and Table 16.7.

[196] Turan, O. (1998). Selçuklular Zamanında Türkiye, İstanbul: Boğaziçi Yayınları.

[197] İnalcık, H. (1964). "Rumeli". *İslam Ansiklopedisi IX*. İstanbul: Milli Eğitim Basımevi. 766-773.
Mantran, R. (1991). Osmanlı İmparatorluğu Tarihi, I, İstanbul: Say Yayınları.

[198] Hammer, B. J. V. P. (1329). Devlet-i Osmaniye Tarihi, I, (Trc. Mehmed Ata), İstanbul. 167 – 192.

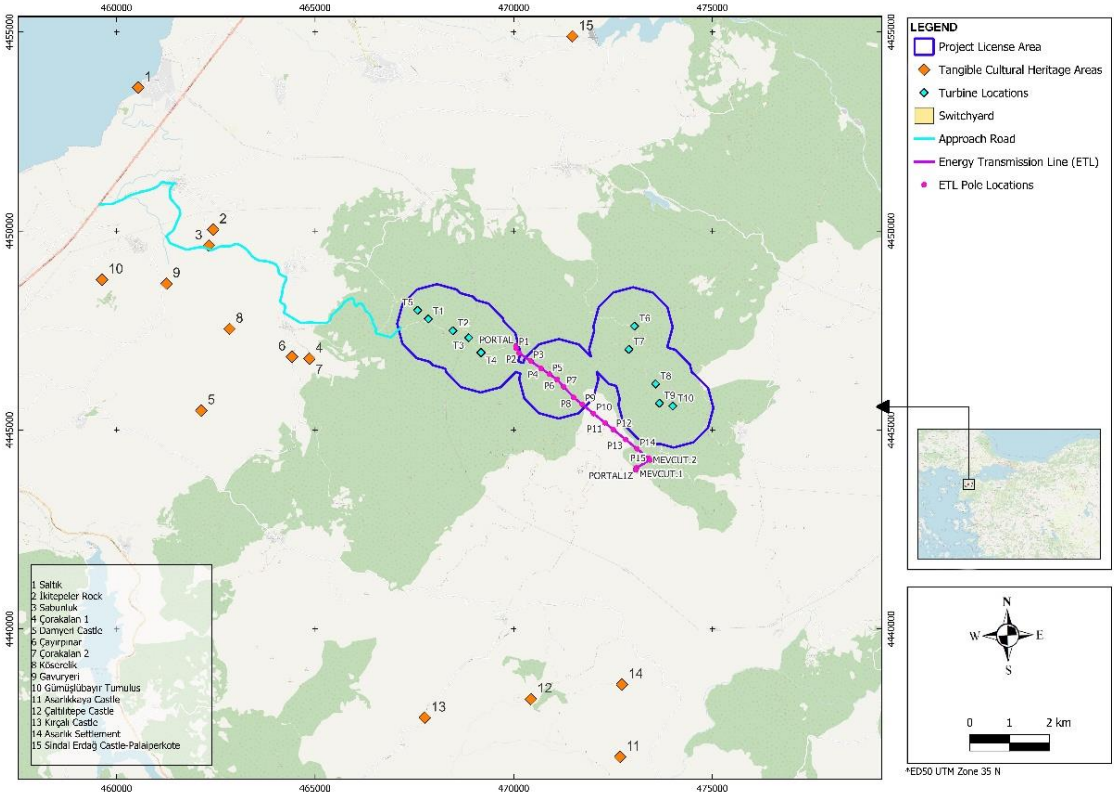

Figure 16.2: National Tangible Cultural Heritage Areas

Table 16.7: National Tangible Cultural Heritage Areas

No	Name of Tangible Cultural Heritage Asset	Province	District	Village	Distance to the Nearest Project Impacts Area (km)	Periods							
						Neolithic Period	Chalcolithic Period	Early Bronze Age	Iron Age	Hellenistic Period	Roman Period	Medieval	Late Ottoman
1	Saltık	Çanakkale	Merkez	Yapıldak	2.4								
2	İkitepeler Rock				0.5								
3	Sabunluk			Kızılkeçili	0.1								
4	Çorakalan 1			Yukarıokçular	1								
5	Damyeri Castle			Damyeri	3.2								
6	Çayırpınar			Yukarıokçular	0.9								
7	Çorakalan 2				0.9								
8	Köserelik				1.5								
9	Gavuryeri			Musaköy	1								
10	Gümüşlübayır Tumulus				1.9								
11	Asarlıkkaya Castle			Osmanlar	7.3								
12	Çaltılıtepe Castle			Bodurlar	6.4								
13	Kırçalı Castle			Akçalı	8.1								
14	Asarlık Settlement			Ortaca	5.4								
15	Sindal Erdağ Castle-Palaiperkote		Lapseki	Gökköy	6.5								

World Heritage List[199] and World Heritage Tentative[200] List of UNESCO are considered under the internationally recognised cultural heritage sites.

Türkiye has 21 sites inscribed on the World Heritage List of UNESCO (as of 6 November 2023). Those located in the wider region of the Project are listed in Table 16.8 and shown in Figure 16.3. The closest site to the Project is the “Archaeological Site of Troy” in Çanakkale, which is located at a distance of 40 km to the southwest of the Project area.

Among the sites included in the World Heritage Tentative List of UNESCO, 2 sites are located in the wider region of the Project. The closest site to the Project is the “Archaeological Site of Assos” in Çanakkale, which is located at a distance of 79 km to the southwest of the Project area.

None of the internationally recognised cultural heritage sites is overlapping with the Project area. Therefore, Project activities is not anticipated to have any impact on the areas listed neither in the World Heritage List or the World Heritage Tentative list. In case alternative areas need to be used during the construction or operation phase of the Project, such as quarries or dump sites, the areas listed in Table 16.8 below should be avoided.

Table 16.8: Internationally Recognised Cultural Heritage Areas (World Heritage List and World Heritage Tentative List of UNESCO)

No	Site Name	Province	District	Distance to Project (km)
World Heritage List of UNESCO				
1	Archaeological Site of Troy	Çanakkale	Merkez	40
2	Pergamon and its Multi-Layered Cultural Landscape	İzmir	Perge	120
World Heritage Tentative List of UNESCO				
3	Archaeological Site of Assos	Çanakkale	Ayvacık	79
4	Ayvalık Industrial Landscape	Balıkesir	Ayvalık	92

[199] UNESCO World Heritage Convention. (n.d.) *World Heritage List*. https://whc.unesco.org/en/list/

[200] UNESCO World Heritage Convention. (n.d.) *Tentative Lists*. http://whc.unesco.org/en/tentativelists/

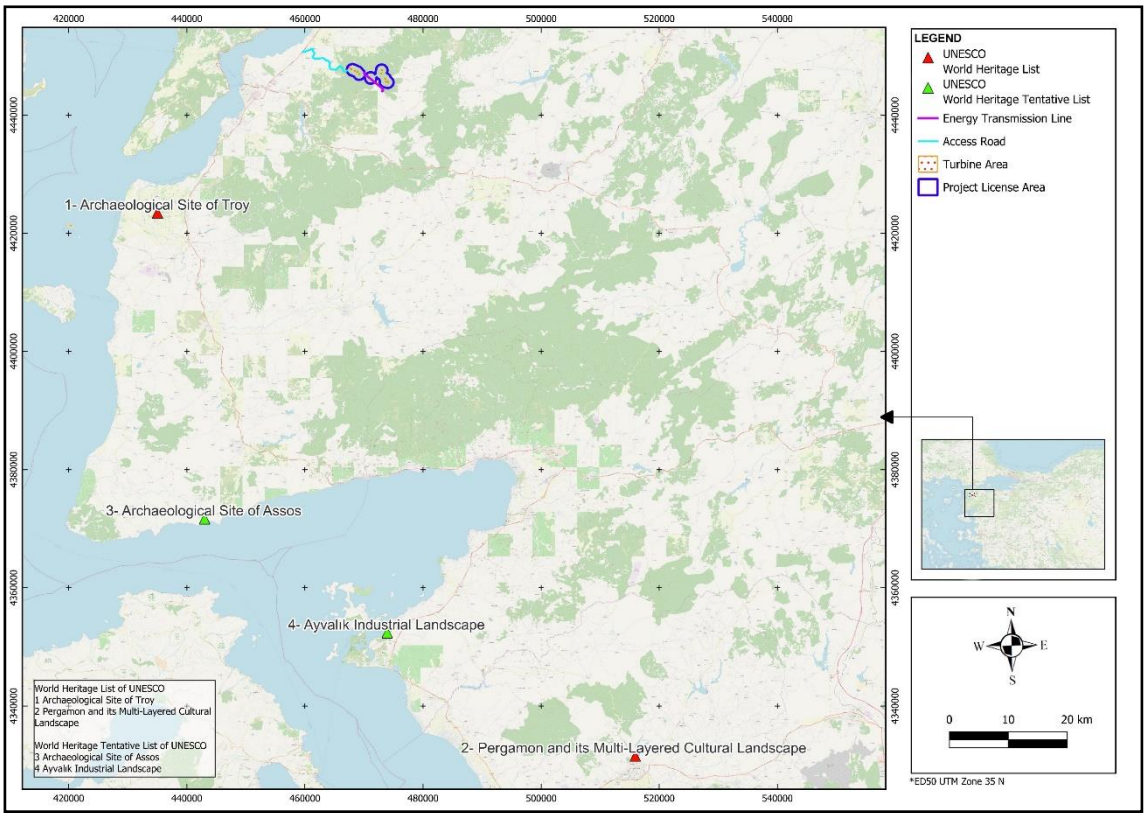

Figure 16.3: International Tangible Cultural Heritage Areas

16.4.1.2 Intangible Cultural Heritage

UNESCO defines intangible cultural heritage as means,practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize. 201

The region, which is at an important location from a geographical perspective, was preferred by people as a settlement location since the early periods of history due to its arable fields and natural riches such as water resources. The region witnessed occasional migration movements in time. This has greatly contributed to the intangible cultural heritage values in the region.

The first settled Turkic tribes which settled first in the region at the crossroads between coastal Aegean and central Anatolia its vicinity generally lived as nomads in the highlands. Turkic tribes were accepted to settle in the area during Seljukian Period. Turkish tribes arriving in the area also brought with them their families, traditions, rituals, beliefs and all the tangible and intangible cultural values they acquired on the Project.

Today, local people in the region generally define their lineage as coming from Yoruk tribes. Due to climate conditions, local people have the tradition of living in plain areas in the winter and in highland plateaus in the summer. The migrations between the plain and the plateaus; events developing during these seasonal migrations; the relations between produced products and animals; shared feelings in sadness such as death and in joys such as circumcision, wedding, engagement, soldier farewell; folkloric proverbs incorporating the lifestyle of the local people; "Folk Dances" dubbed with prayers, curses, short poems and songs combined with music and similar cultural elements all reflect the Yoruk-Turkmen culture in the region. Yoruk

[201] UNESCO. (2003). Convention for the Safeguarding of the Intangible Cultural Heritage. https://unesdoc.unesco.org/ark:/48223/pf0000132540

culture, the traditional lifestyle in the region, is still alive in the region with seasonal migrations, tents, festivities such as circumcision and wedding ceremonies. In addition, there are also tribes transitioning from a nomadic lifestyle to a sedentary lifestyle in this geography as seen in other regions in Anatolia as well (Kinik/Kizil Keçili tribe).

There was significant involvement of the region's inhabitants as soldiers in the Ottoman army during the Çanakkale (Dardanelles) and Gelibolu (Gallipoli) Battles from 1915 to 1916. Therefore, the current inhabitants of the region are extremely familiar with the fronts and heroic stories of the Çanakkale (Dardanelles) and Gelibolu (Gallipoli) Battles.

Nationally and internationally known intangible cultural heritage assets in the close vicinity of the Project area are presented in Table 16.9 and Table 16.10.

As of 2024, there are 30 elements of Türkiye inscribed on the UNESCO Representative List of Intangible Cultural Heritage. Among these elements, there are 9 elements registered in the region where the Project area is located (Çanakkale), as listed in Table 16.9**.**

Table 16.9: International Intangible Cultural Heritage Elements[202]

No	Intangible Cultural Heritage Element	Year of Admission to the UNESCO List
1	Âşıklık (minstrelsy) tradition	2009
2	Traditional Sohbet Meetings	2010
3	Ceremonial Keşkek tradition	2011
4	Turkish Coffee Culture and Tradition	2013
5	Flatbread Making and Sharing Culture: Lavash, Katyrma, Jupka, Yufka Katrıma, Jupka, Yufka	2016
6	Spring Celebration– Hıdrellez	2017
7	Culture of Çay (Tea), a Symbol of Identity, Hospitality and Social Interaction	2022
8	Iftar/Eftari/Iftar/Iftor and its socio-cultural traditions	2023
9	Traditional knowledge, methods and practices concerning olive cultivation	2023

Table 16.10: National Intangible Cultural Heritage Elements[203]

No	Element Group Titles	Inventory / Local Applications
1	Traditional Turkish Handicrafts	Çanakkale Ceramics Craftmanship
2	Traditional handicraft and craftsmanship	Oil wrestler leather pants (kispet) making
3		Basketry
4	Weaving art and traditions	Lapseki Sackcloth Weaving
5	Embroidery, sewing and knitting traditions	Çanakkale Embroidery
6	Traditions of solidarity, solidarity and charity	Village Charity Tradition
7	Traditions and Practices Based on Beliefs	Rain Prayer
8		Bairam Greetings
9	Faith, celebration and traditions linked to the calendar	Hıdrellez
10	Traditional Folk Dance	Çanakkale Greeting Folk Dance
11		Zeybek
12	Traditional Spectator Arts and Games	Marriage By Eloping with a Girl in Village Entertainment Dramas

[202] UNESCO. (n.d.). *Intangible Cultural Heritage: Türkiye*. Retrieved on April 29, 2024, from https://ich.unesco.org/en/state/trkiye-TR

[203] Republic of Türkiye Ministry of Culture and Tourism. (n.d.). *Somut Olmayan Kültürel Miras Türkiye Ulusal Envanteri.* Retrieved on November 6, 2023 from https://aregem.ktb.gov.tr/TR-344757/somut-olmayan-kulturel-miras-turkiye-ulusal-envanteri.html

No	Element Group Titles	Inventory / Local Applications
13		Camel Play (Theatrical Village Play)
14		Bear Play (Theatrical Village Play)
15	Traditional Sports	Oil wrestling
16	Agricultural and vineyard-garden practices and traditions	Olive and Olive Oil Culture
17	Turkish culinary culture/ traditional food and beverage making and social practices	Ceremonial Keskek

16.4.2 Field Survey Findings

16.4.2.1 Tangible Cultural Heritage based on Field Surveys

Registered and unregistered tangible cultural heritage sites located within the study area have been identified by the cultural heritage team through ESIA surveys. The sites identified to be located within the study area have been classified based on the criteria presented in Table 16.11.

Table 16.11: Site Classification Criteria

Site Classification	Type of the Surface Material	Size of the Site Taken into Consideration	Intensity Rate of the Surface Material
Registered Sites	Sites that are registered and protected by the Law No. 2863.		
Unregistered Sites			
Archaeological Site	Ceramic, roof tile, architectural stone block, glass object shards, stone object shards, metal object shards, bone etc.	10mx10m	Between 10-100 pieces (High Intensity)
	Architectural remains, etc.		1 tower, 1 wall, 1 cistern etc.
Other Cultural Heritage Sites	Sites including the remains of historical structures such as bridge, civil architecture example, fountain, grave/cemetery etc.		

Provincial distribution of the sites identified within the study area is presented in Table 16.12.

Table 16.12: Cultural Heritage Sites Identified within the Study Area

Province	District	Neighbourhood	Registered Sites	Unregistered Sites		Total
				Archaeological Site	Other Cultural Heritage Sites (Modern/ Old Cemetery, Civilian Architecture etc.)	
Çanakkale	Bayramiç	Çatalçam	-	Akbunar Slope Settlement	-	**1**
		Karıncalık	-	-	-	**0**
Total			**0**	**1**	**0**	**1**

Distribution of the sites identified with respect to their location/position within the study area is provided in Table 16.13.

Table 16.13: Distribution of Cultural Heritage Sites

Legal Registration Status	Location/ Position of the Site/ Asset	
	Within the Project License Area	Outside the Project License Area, Within the Access Road
Registered	-	-
Unregistered	-	1
Total	**0**	**1**

List of registered and unregistered sites, together with information on their registration status, classification, features and position, is provided in Table 16.14 and shown on Figure 16.4.

Table 16.14: Cultural Heritage Sites within the Study Area

No	Site Name	Province	District	Neighbourhood / Village	Registration Status		Location to the Project		Classification of Areas		Approximate Distance to the Project License Area (km)	Site Descriptions
					Yes	No	Within the Project License Area	Outside the Project License Area, Within the Access/Site Road	Arch. Site	Other Cultural Heritage Site		
1	Akbunar Slope Settlement	Çanakkale	Bayramiç	Çatalçam		x		x	x		1.22	The settlement is located outside the Project license area, within the Project Access Road. The Slope Settlement contains a large amount of ceramics and architectural fragments from the Roman and Byzantine Periods. The site is unregistered.

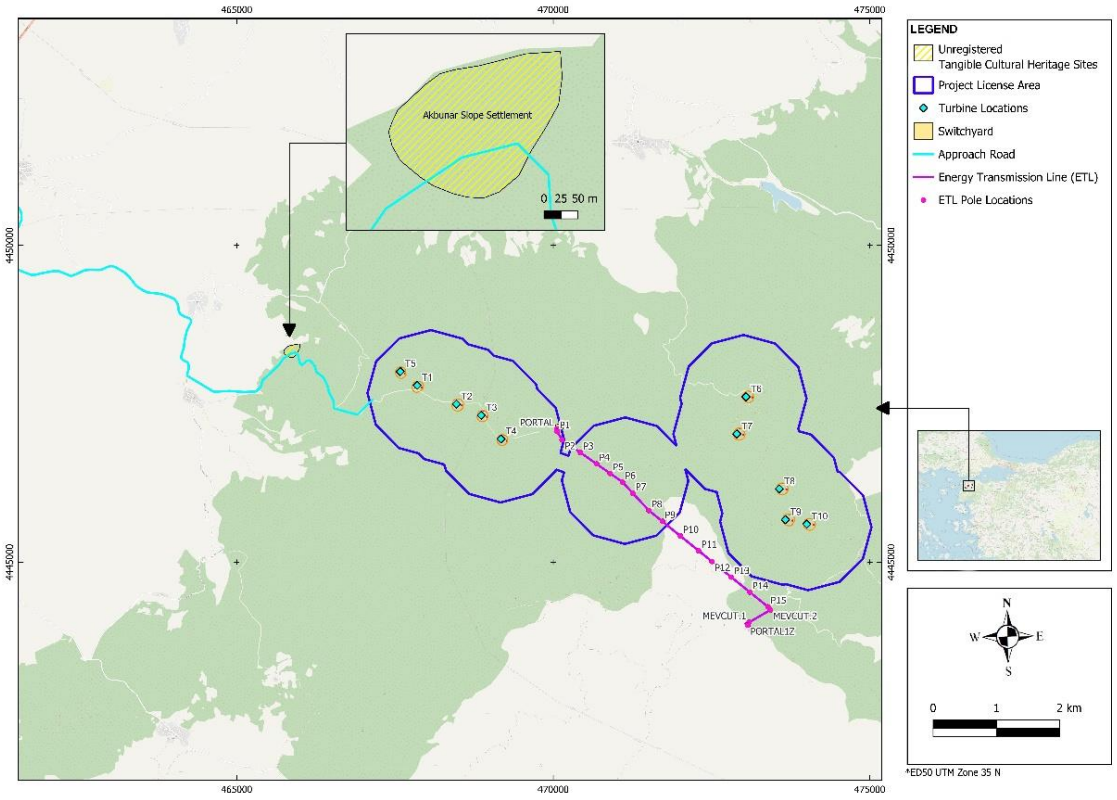

Figure 16.4: Locations of the Cultural Heritage Sites within the Study Area

There are rich natural resources (such as water resources, proximity to agricultural areas) suitable for human settlement around the geographical area where the Project is located. On the other hand, there may be tangible cultural heritage assets (chance finds) that have been buried in the geographical area of the Project or its close vicinity and whose existence will be determined by advanced research techniques or that will be unearthed during the construction works.

The layout and photographs pertaining to the unregistered cultural heritage site is presented below.

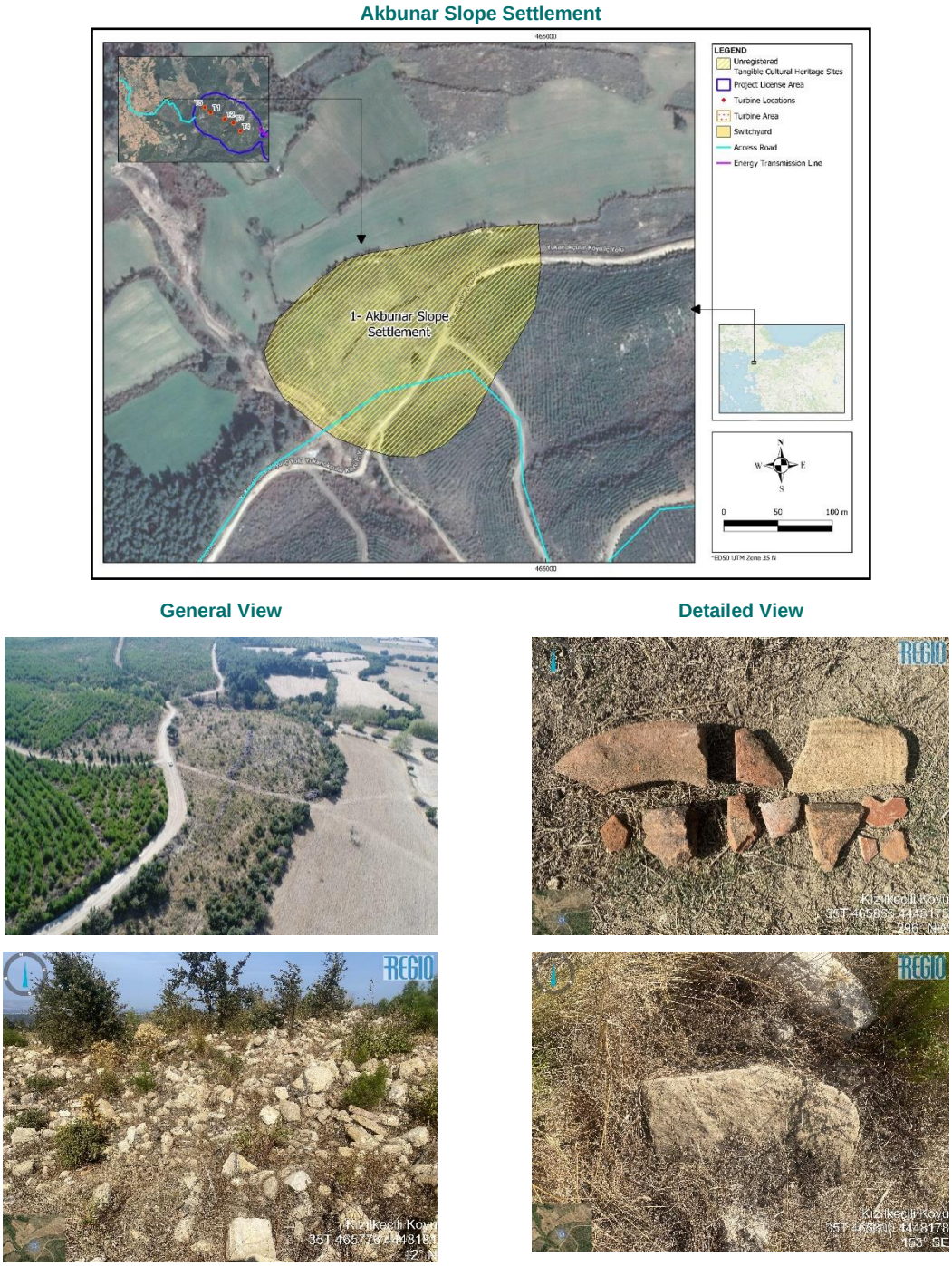

Figure 16.5: (1) Akbunar Slope Settlement (registered) Outside the Project License Area, within the Project Access Road

16.4.2.2 Intangible Cultural Heritage based on Field Surveys

According to the National EIA report, a stakeholder engagement meeting was held on 13 December 2021 in Üçpınar neighbourhood of Lapseki district of Çanakkale province within the scope of the National EIA studies of the Project. Additionally, social impact assessment studies were carried out to determine potential impacts of the Project and to develop mitigation measures. During the social impact assessment studies, the existing social and cultural

characteristics (including intangible cultural heritage elements) of the Project impact areas were also examined.

Additionally, face-to-face interviews were made with local people to determine whether any intangible cultural heritage element would be affected by the Project activities or not. Seven people participated in the interviews from two different neighbourhoods of Lapseki and Merkez districts of Çanakkale province (Table 16.3).

Findings of the intangible cultural heritage (ICH) studies conducted within the Project are presented below:

- Yoruk (Sunni Muslims) live around the Project area.
- In Çanakkale region, where the Project area is located, cultural elements such as birth, circumcision, military drafting, marriage, pilgrimage and death are among the main transition periods of life. It can be stated that these transition periods are beliefs and practices that have been maintained for centuries from the past to the present. Many beliefs and practices followed during the transition periods of life are mostly practiced in rural or villages located in the close vicinity of the Project area.
- Agriculture in rural areas is conducted following modern methods.
- "Yukarıokçular" and "Üçpınar" settlements which are located around the Project Licence Area are used as "plateau". The pasture culture, which is essential as a social phenomenon as well as natural and economic characteristics, has been lived by locals since ancient times. In the middle of May every year, migration from Bayramiç villages to these plateaus starts. After about 6 months of settlements in these plateaux, the return to the villages starts again around the mid of October.
- It has been observed with the field study that practices related to traditional medicine and healing continue in the region.
- Oral cultural heritage is still alive in the region and is often in the form of heroic stories, anecdotes and concise remarks of the past.
- Traditional celebrations from the turning points of life are still known and people are yearning them.
- The dead are buried in the cemeteries of the village in accordance with the Muslim traditions.
- In neighbourhoods, everyday life (socialization) is a gathering in common village room / village coffee house for men and visiting neighbours for women.
- Weather forecasting traditions are still alive.
- As a result of the conducted studies on the intangible cultural heritage, it was understood that there is a "sheepherding" and "pasture" culture that continues with traditional methods in Yukarıokçular and Üçpınar settlements within the Project License Area.
- Traditional animal husbandry and forestry are the main livelihoods of the local people who participated in the intangible heritage study.
- It is observed that that traditional children’s games such as çelik çomak, dörtel saklambaç (hide and seek), aşık, misket and beştaş are still played by the locals.

16.5 Assessment of Impacts

It is possible that some activities conducted within the scope of the Project may cause significant negative impacts on tangible and intangible cultural heritage assets. Potential impacts and their significance are discussed in this section.

16.5.1 Construction Phase

Elements that might have an impact on cultural heritage during construction phase of the Project are provided in Table 16.15.

Table 16.15: Project-Based Potential Impact Elements for the Construction Phase

Tangible Cultural Heritage	Intangible Cultural Heritage
Topsoil stripping	Human Movements
Excavation and Filling	Traffic Movements (vehicles and staff)
Blasting	
Construction traffic movement	
Siting of construction sites and other Project/associated facilities	
Piling	
Landscaping/ earth-mounding	
Waste disposal including excess excavated materials	
Structures, installation features (fencing, cables etc.)	
Presence of workforce	
Leaks and spills	

Tangible and Intangible Cultural Heritage

The activities to be conducted during all Project phases may potentially cause direct impacts on the cultural heritage receptors, if not properly managed. Potential impacts are direct damage or disturbance to cultural heritage assets, including:

- Physical damage due to land preparation activities, including topsoil stripping, excavation, filling, and blasting
- Physical damage due to construction activities, including noise, vibration, dust, equipment and heavy vehicles, spills and leaks
- Noise and visual intrusion on people's appreciation of cultural heritage
- Disruption of access to cultural heritage sites
- Enhanced access to cultural heritage sites allowing increased opportunity to outside parties for collection of artefacts or damage to resources
- Loss or change of identity or significance of the intangible cultural heritage
- Effects of noise and visual intrusion on the ability of communities to appreciate and use their intangible cultural heritage
- Disruption or diminution of cultural ecosystem services including customary ways of understanding the wider world and for maintaining social relations and group identity.

In addition to direct impacts, damage due to looting and interference may occur. Sites may suffer inadvertent damage or interference. There may be piecemeal illicit removal of portable antiquities from archaeological sites within the Project area.

Critical Cultural Heritage

Critical cultural heritage is defined as 'one or both of the following types of cultural heritage:

- The internationally recognised heritage of communities who use, or have used within living memory the cultural heritage for long-standing cultural purposes; or
- Legally protected cultural heritage areas, including those proposed by host governments for such designation'.

Examples of legally protected areas which would be considered as cultural heritage 'include world heritage sites and nationally protected areas' (IFC, 2012a, 3, fn6).

Under IFC PS8, critical cultural heritage should not be removed, significantly altered, or damaged. In exceptional circumstances when impacts on critical cultural heritage are unavoidable, a process of informed consultation and participation of the Affected Communities should be applied as described in IFC PS1 and which uses a good faith negotiation process that results in a documented outcome. External experts should be retained to assist in the assessment and protection of critical cultural heritage.

Baseline information on the internationally recognised cultural heritage areas has been provided in Section 16.4.1.1. Given the distances of the sites under the World Heritage List, it is assessed that the Project will not have an adverse physical or setting impact on them nor will it induce any significant changes to visitor numbers, site access and conservation.

The closest site under the World Heritage List of UNESCO is located at a distance of 25 km in the south of the Project Area (“Archaeological Site of Troy” in Çanakkale). It is assessed that the Project will not have an impact on this site.

There is no legal protected site or registered cultural heritage site within the study area (including the ETL, site and access roads, etc.) that can be considered as Critical Cultural Heritage.

The Project will adopt a proactive management of the potential Project impacts, prioritising avoidance where possible. In case avoidance is not possible, relevant archaeology and cultural heritage management/mitigation measures will be taken in accordance with the national legislation, IFC PS8, EBRD PR8 and other applicable standards.

The Project will adopt a proactive management of the potential Project impacts, prioritising avoidance where possible. In case avoidance is not possible, relevant archaeology and cultural heritage management/mitigation measures will be taken in accordance with the national legislation, IFC PS8, EBRD PR8 and other applicable standards.

The Project does not propose to use the cultural heritage, including knowledge, innovations, or practices of local communities for commercial purposes (examples include, but are not limited to, commercialization of traditional medicinal knowledge or other sacred or traditional technique for processing plants, fibres, or metals). Assessment of the impact of the Project on intangible cultural heritage (ICH) has been conducted in the Project area and its vicinity in compliance with the international standards and national legislation. Findings of the ICH studies conducted within the Project are presented in previous sections.

Management of Potential Impacts

In line with Article 4 of the Law on Conservation of Cultural and Natural Properties (No: 2863), the Project Company will notify the responsible Museum Directorates or Regional Councils for the Conservation of Cultural Property about the archaeological sites and immovable cultural heritage assets, including registered and unregistered sites, identified within the study area, as given in this ESIA Report. To this end, the information collected through the field surveys (such as site-specific photos, site survey forms, site coordinates, digital data, expert notes, etc.) will be delivered to these institutions in order to initiate official decision processes relevant to these sites. The cultural heritage authorities to be notified in each province are listed in Table 16.16.

Table 16.16: Cultural Heritage Authorities Responsible

Project Related Museum Directorate	Duty Area
Çanakkale Museum Directorate	All Project Area
Project Related Regional Council for the Conservation of Cultural Property	**Duty Area**
Çanakkale Regional Council for the Conservation of Cultural Property	All Project Area

General management measures applicable to different types of sites are listed in Table 16.17. Specific measures and actions stipulated by the relevant cultural heritage authorities in their official decisions (e.g. trial pits, geophysics surveys, salvage excavations, technical drawings, relocation, construction under supervision of the related museum, etc.) will be implemented for the management of potential cultural heritage impacts as part of the Project.

Table 16.17: General Management Measures Applicable to Different Classification of Sites

Site Classification	Framework Management Measures
Registered Site	Avoiding physical intervention Archaeological monitoring for potential disturbance of the project activities. Following the decisions of the relevant Regional Council
Archaeological Site	Avoiding physical intervention Notify the cultural heritage authorities Mark as archaeological sensitive area in the Project/construction drawings and plans Avoiding physical intervention/construction until the final decision of the Regional Council is Issued Following/implementing the decisions of the Regional Council (e.g. test or salvage excavation, if required) Archaeological monitoring for implementation of Regional Council decision.
Other Cultural Heritage Site	Avoiding physical intervention Notify the cultural heritage authorities Relocation of moveable cultural heritage asset where applicable Consideration of Project alternatives in case of immovable cultural heritage assets where applicable Avoiding physical intervention/construction until the final decision of the Regional Council is Issued Following/implementing the decisions of the Regional Council (e.g. Technical documentation, measured drawing, etc., if required) Archaeological monitoring for implementation of Regional Council decision.

Cultural Heritage Management Plan

A Cultural Heritage Management Plan will be developed for the Project as part of its ESMS. The key measures to be taken through the implementation of the Cultural Heritage Management Plan are listed below:

- Training on implementation of the Cultural Heritage Management Plan, including the Chance Find Procedure, will be provided to all relevant Contractor and Subcontractor personnel as part of the induction training (to be given at the time of employment) and refreshments will be done through toolbox talks throughout the construction phase. If required, the Operator will also train the operations and maintenance personnel on the Cultural Heritage Management Plan, including the Chance Find Procedure.
- Sites located close to the Project area and other project sites (e.g., camp sites, dump sites, access roads and quarries etc.) will be protected, where appropriate, by providing temporary flagging/fencing and signage subject with approval from the cultural heritage authorities.
- Sufficient resources for the implementation of the Cultural Heritage Management Plan will be provided by the Project Company. Archaeological monitoring and technical elements of the Chance Find Procedure will be implemented by qualified experts during the construction works, as necessary.

Following the notifications (for the sites identified as part of ESIA or discovered during construction) to be made to the authorities in line with Article 4 of the Law on Conservation of Cultural and Natural Properties (No. 2863), appropriate measure(s) will be taken in line with the official decisions of the cultural heritage authorities. Such measures may include

documentation, application of remote sensing (e.g., geophysical survey) at areas where chance finds are discovered to clarify the character and location of sites and inform design of targeted salvage strategies, excavation of test pits to verify the results of remote sensing at chance find areas, salvage excavation and recording, etc.

16.5.2 Summary of Construction Impacts

The potential Project impacts, proposed mitigation measures and residual impact significance are summarised in Table 16.18.

Table 16.18: Construction Impacts, Proposed Mitigation Measures and Residual Impacts (Tangible Cultural Heritage)

No	Cultural Heritage *Site Name	Registration Status		Impact Magnitude				Value of Heritage Asset	Significance of Impact (Either Adverse or Beneficial)	Description of Impact and Specific Mitigation Measures	Residual Impact
		Registered	Unregistered	Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency [204]				
1	Akbunar Slope Settlement		X	Moderate Change	Irreversible	Short-term	One-off	Medium	Moderate	The cultural asset is located outside the Project license area, within the Project Access Road. Therefore, the cultural asset and its surrounding landscape could be visually impacted by the Project. According to the provided data by the Project, the access road to the turbines will be expanded to the identified area border. Due to the historical sensitivity of the area, the route of the access road will be avoided from the identified site border. Additionally, the following procedures about cultural assets will be conducted before the construction activities: ● Official notification to begin the legal protection assessment process will be made by the Project Company to the Çanakkale Regional Council for the Conservation of Cultural Property. ● The identified location will be marked as an archaeological sensitive area on Project/construction drawings. ● Any ground-disturbed activities will not be planned within the identified area. ● The construction activities will be avoided from the identified archaeological site during the Project lifespan.	If the determined recommendations are taken into consideration and implemented, any "residual impact" will not occur.

[204] This column designates the possibility of impact recurrence.

Based on the results of impact assessment on the tangible cultural heritage;

- "Value of Heritage Asset" are defined as "Medium" in one area,
- "Scale & Severity of Change/ Impact" is defined as "Moderate Change" in one area,
- "Significance of Impact (Either Adverse or Beneficial)", which is evaluated by overlapping the parameters "Value of Heritage Asset" and "Scale & Severity of Change/ Impact", is found to be "Moderate" in one area.

There is no identified "Replicable Cultural Heritage" within the Project license area (including the ETL, site and access roads, etc.). Since the cultural heritage assets identified within the Project license area are evaluated with the natural, visual and historical landscape, the cultural heritage assets may be considered immovable and non-replicable cultural heritage assets.

As a result of desk studies and field works, any harm to intangible cultural heritage elements because of the Project activities is not foreseen for all settlements in the study area. The project will not restrict access to any intangible cultural heritage element in and around the license area (including the ETL, site and access roads, etc.).

16.5.3 Operation phase

Provided that the impact-mitigation measures are taken during the construction phase there will be no element (human movements etc.) which may have an impact on cultural heritage during the operating phase and there will be no related impacts.

16.6 Mitigation Measures

16.6.1 Construction Phase

16.6.1.1 Tangible Cultural Heritage

During the construction works within the scope of the WPP Project, nine unregistered cultural heritage sites will be affected. Specific mitigation recommendations designed to minimise or completely eliminate adverse effects on these areas are presented in Table 16.18.

Additional mitigation measures to be taken by the Project Company for the construction phase are summarized below:

- In order to clarify the vibration caused affects that may occur on the cultural heritage assets during the construction phase, a risk analysis report will be prepared, and the report will be shared with Project's shareholders and Çanakkale Regional Council for the Conservation of Cultural Property. Additional measures (such as structure reinforcement, creating for a buffer zone for the cultural heritage assets, selection, and mobilisation of proper construction equipment to minimize vibration near the archaeological assets during the construction phase etc.) will be taken according to the result of the report.
- A complaint mechanism will be established within the scope of the Project, through which complaints related to cultural heritage can be submitted and the complaints and producing solutions are periodically monitored.
- In case of a cultural heritage related salvage and/or test excavation (including restoration/conservation) required, it will be ensured that necessary staff, technical assistance, other necessary services and equipment are provided.
- An archaeologist (as a cultural heritage monitoring specialist) will be employed under the Project organisation chart or a cultural heritage monitoring consultancy service will be assigned to make daily archaeological monitoring during the construction phase. The mobilisation of the monitoring archaeologists or consultancy service will be made before the

construction activities of the Project, and the name and posts of the archaeologists or consultancy service will be specified in the organization chart of the project in all documents.

- The cultural heritage/archaeological monitoring expert/s will work with the equipment operators and have authority to stop the work. The expert/s will accompany all ground disturbance activities of the Project.
- The expert/s will instruct the operator to stop the work in case of a chance find. Continuation of the ground disturbance activities after a chance find will also be under the authority of the expert/s.
- The expert/s of the Project will train the employees about Cultural Heritage Management Plan and Chance Find Procedure.
- The expert/s will ensure that Cultural Heritage Management Plan and Chance Find Procedure are adequately enforced during all ground disturbance activities.

In addition, the Cultural Heritage Management Plan (and its sub-procedure The Chance Find Procedure, which are to be prepared to eliminate, minimize and prevent the effects of the Project components together with the associated facility (i.e. the ETL) construction activities on cultural assets, should be known and implemented by all parties involved in the Project.

16.6.1.2 Intangible Cultural Heritage

The local people who are living in the villages and neighbourhoods of the Project's surrounding areas are composed of Turkish (Yoruk) people who have adopted the Islamic faith. Any change did not occur regarding the intangible cultural heritage assets of the settlements.

Çanakkale (Merkez / Yukarıokçular Village and Lapseki / Üçpınar Village) region where the Project Area is located, cultural elements such as birth, circumcision, military drafting, marriage, pilgrimage, and death are among the main transition periods of life. It can be stated that these transition periods are beliefs and practices that have been maintained for centuries from the past to the present. Many beliefs and practices followed during the transition periods of life are mostly practiced in rural or villages located in the close vicinity of the Project Area.

It was observed that the locals still continue their existing traditions. Therefore, no recommendations are made as no adverse effects on intangible cultural heritage are expected to occur.

A potential positive impact on the intangible cultural heritage is not expected. Cumulatively, the impact of the Project on intangible cultural heritage can be evaluated as “Neutral”.

16.6.2 Operation phase

Since the measures for the negative impacts that the Project may have on cultural assets will be eliminated by the implementation of Cultural Heritage Management Plan during the construction phase, there will be no cultural assets to be intervened during the operation phase, hence there are no recommendations for the operation phase.

There is no need for "a suggestion for cumulative impact" as Project impact sources do not have any cumulative effect on tangible and intangible cultural heritage.

According to the National EIA Report, it is stated that there is no registered area in the Project area and its vicinity. Besides, it is committed that if any movable or immovable cultural property is encountered during the construction activities, it is undertaken that the construction works will be stopped (Law on Preservation of Cultural and Natural Assets Law No: 2863, Article 4 – Obligation to Notify) and the nearest relevant official authority or Museum Directorate will be notified. Therefore, the commitment about the cultural heritage preservation should be considered during the Project construction phase.

16.7 Summary of Outcomes

16.7.1 Tangible Cultural Heritage

There is one unregistered cultural asset within the Project license area. Apart from these cultural assets, no other cultural asset was identified within the Project area. On the other hand, some indirect effects of construction activities (such as operation of crushers, vibration created by heavy tonnage vehicle traffic) on cultural assets may occur. Therefore, when designing all Project activities, it is recommended to take the existing archaeological assets into account and to take the necessary measures specified in Table 16.18 and Section 14.6 in order to minimize the possible negative effects on these assets.

As a result of the surface surveys and archaeological excavations carried out in the past years in and around the Project area, many cultural heritage sites have been identified. It is also known that scientific studies are still ongoing in these areas (Table 16.19).

Table 16.19: Important Scientific Research Carried Out Around the Project Area

No	Site Name	Head of Research/ Responsible Person of Research	Responsible University for Research/ Responsible Institution for Research	Distance to Project Area (km)	Province	District	Village
1	Archaeological Site of Troy[205]	Prof. Dr. Rüstem Aslan	Onsekiz Mart University	38	Çanakkale	Merkez	Tevfikiye
2	New Researches In The Northern Troad (Surface Survey in the Central District at Çanakkale fromthe Neolithic Period to the end of the Iron Age) 206	Derya Yılmaz (Editor) Neyir Kolankaya-Bostanci Adnan Baysal Ümit Güder Mehmet Kaşka M.Hamdi Sayar Mehmet Ali Yücel Sencan Altınoluk	Ankara University Hacettepe University Trakya University Onsekiz Mart University Süleyman Demirel University İstanbul University Onsekiz Mart University Onsekiz Mart University	15	Çanakkale	Merkez	-
3	Lapseki Salvage Excavations	Prof. Dr. Reyhan Körpe	Onsekiz Mart University	20	Çanakkale	Lapseki	Cumhuriyet

In this context, it is possible to encounter new cultural assets during the construction activities to be carried out at the Project site which will require intervention in the soil. Therefore, during the construction phase of the Project, it is necessary to complete the elements for monitoring and training specified in the Cultural Heritage Management Plan, and to implement the Chance Find Procedure in case of encountering any tangible cultural heritage assets during the construction work.

16.7.2 Intangible Cultural Heritage

Potential sources of impact have no effect on intangible cultural heritage elements identified in the impact area of the Project.

During the construction phase of the Project, it is necessary to fulfil the elements for monitoring and training specified in the Cultural Heritage Management Plan and to implement the Chance

[205] https://www.kulturportali.gov.tr/portal/troyakazisi

[206] http://acikerisim.sdu.edu.tr/xmlui/handle/123456789/79564

Find Procedure in case of encountering any intangible cultural heritage assets during the construction works.

Depending on the Project's social/community investment strategy, social investment projects can be prepared for promoting rural tourism not only for intangible cultural heritage assets but for physical cultural heritage as well (e.g., local weaving traditions in Çanakkale province). Financial support to these projects through local communities may contribute to the protection of intangible cultural assets as well as providing source of income for the local people.

17 Cumulative Impacts

17.1 Methodology and Project Standards

The ESIA Study for the Harmancik Wind Power Project recognizes the importance of Cumulative Impact Assessment (CIA) in evaluating the combined impacts of past, present, and foreseeable future developments on the environmental and social landscape. CIA extends beyond the boundaries of individual projects, aiming to comprehend the synergistic, additive, or countervailing impacts that multiple activities may exert on various resources and ecosystems.

The need for CIA emerges because cumulative impacts can result from the successive, incremental, and/or combined impacts of multiple actions, projects, or activities. These impacts can have significant consequences on the environment and affected communities. CIA is necessary to identify and manage these cumulative impacts, which may not be expected in the case of a stand-alone development. It helps assess the potential impacts and risks of a proposed development over time, considering the impacts of other existing, planned, and reasonably anticipated future developments. CIA also aims to ensure the sustainability and viability of selected environmental and social elements, address the concerns of affected communities, and support the development of governance structures for managing cumulative impacts.

The decision to conduct a CIA for the Project is rooted in the recognition that individual projects, while complying with environmental and social standards, may collectively contribute to significant impacts on shared resources. By understanding these cumulative impacts, the project owners to proactively address potential environmental and social challenges, enhance sustainability, and foster responsible project development.

In the context of the Project, where there are other nearby activities such as other wind power plants, geothermal power plants, and electricity transmission lines, conducting a CIA is crucial to assess the cumulative impacts of these developments. Within this scope the process identified within IFC's *Good Practice Handbook: Cumulative Impact Assessment and Management*[207] was followed. Accordingly, the methodology that was followed through the implementation of the cumulative impact assessment is summarised below:

- *Step 1: Scoping Phase I – VECs, Spatial and Temporal Boundaries*

In this initial step, the CIA process will collaboratively identify and agree upon the Valued Environmental and Social Component (VECs) in consultation with stakeholders. The temporal and spatial boundaries of the analysis will be established, encompassing the full range of potential impacts, drawing upon regional studies, environmental assessments, and stakeholder consultations.

- *Step 2: Scoping Phase II – Other Activities and Environmental Drivers*

The assessment will then identify all developments (including existing and planned activities) within the defined boundaries, and natural environmental and social stressors affecting the VECs (e.g., climate change and population growth). This phase aims to comprehensively capture all sources of stress on VECs, both human-induced and natural, contributing to a holistic understanding of the cumulative impacts.

- *Step 3: Establish Information on Baseline Status of VECs*

[207] IFC's Good Practice Handbook Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets, 2013

This step involves defining the existing condition of VECs, understanding their resilience, and assessing trends. The project will utilize existing data and, where necessary, collect targeted baseline information to establish a clear starting point for evaluating cumulative impacts.

- *Step 4: Assessment Cumulative Impacts on VECs**

The focus here is on identifying potential impacts and assessing their expected impacts on the long-term sustainability and viability of VECs. The analysis is future-oriented, estimating the aggregated stresses on VECs resulting from various developments, both project-specific and external.

- *Step 5: Assess Significance of Predicted Cumulative Impacts**

This step involves defining appropriate thresholds and indicators, determining the magnitude and significance of impacts, and identifying potential trade-offs. The significance determination considers the sustainability and viability of the affected resources and ecosystems, providing a basis for informed decision-making.

- *Step 6: Management of Cumulative Impacts – Design and Implementation*

Finally, the project will utilize the mitigation hierarchy to design and implement management strategies. This includes engaging relevant stakeholders, proposing mitigation and monitoring programs, and adopting adaptive management practices to address uncertainties.

In summary, the Cumulative Impact Assessment for the Project is a proactive and iterative process aimed at understanding, managing, and mitigating the combined impacts of various activities, ensuring a responsible and sustainable approach to wind power development in the region.

17.2 Cumulative Impact Assessment

17.2.1 Step 1: Scoping Phase I – VECs, Spatial and Temporal Boundaries

The Scoping Phase I of the CIA for the Project marks the initiation of a comprehensive and collaborative process. This phase lays the groundwork for understanding the VECs and establishing the spatial and temporal boundaries crucial for evaluating cumulative impacts.

The output of this phase includes the identification of VECs, spatial boundaries, and temporal dimensions for the cumulative impact analysis. In consideration of the CIA scoping conducted for the Project, VECs to be considered have been selected as presented below:

The detailed list of governmental authorities and NGOs can be seen from Table 18.1 and Table 18.2, respectively.

Table 17.1: Valued Environmental and Social Component (VECs)

Area of Concern	VEC	Specified VECs
Land Loss	Forestry	Forest Areas
Air emissions, noise	Air quality and noise levels in settlements nearby the Project Area	Nearby settlements
Biodiversity	Bird species	*Verbascum hasbenlii* (Locally endemic flora species) Levant Sparrowhawk (*Accipiter brevipes)* Imperial Eagle (*Aquila heliaca*) Black Stork (*Ciconia nigra*) Lesser Spotted Eagle (*Clanga pomarina)* Large bodied soaring species
	Natural Habitats	G1.3 Mediterranean riparian woodland

Area of Concern	VEC	Specified VECs
		G1.7 Termophilus deciduous woodland
		G3.5 Pinus nigra Woodland
		G3.7 Pnius brutia woodland (Lowland to montane Mediterranean Pinus woodland (excluding Pinus nigra))
		H3.6 Weathered rock and outcrop habitats
	Flora and Fauna Species with High Conservation Priority	Endemic and / or Red List category CR, EN, VU, Flora
	Priority Biodiversity Features	Endemic and / or Red List category CR, EN, VU, Fauna
Cultural Heritage	Unregistered Cultural Heritage Sites	Akbunar Slope Settlement
Socio-Economic Environment	Land and Assets	People who will lose their lands and assets located on the lands
	Economy	Livestock Activities
		Industrial activities and employment
	Quality of Life	Access to healthcare, education, commercial facilities, natural water resources
Community Health & Safety	Safety from blade and ice throw and shadow flicker risk	Nearby settlements
		Canakkale Airport
	Fire safety	Fire Watch Safety Towers
		Community who could be affected by wildfires
	Traffic Safety	Passengers using Sarıgöl Ödemiş Road

For Cumulative Impact AoI regarding large, bodied bird species, since migratory route integrity is of concern, a wider AoI was defined as encompassing Western Anatolia, and encompasses the provincial boundaries of: Denizli, Aydin, Manisa, Izmir, Balikesir and Canakkale. The AoI accounts for both minor routes along the Aegean coast and also across the Dardanelles.

17.2.2 Step 2: Scoping Phase II – Other Activities and Environmental Drivers

Scoping Phase II of the CIA for the Project delves deeper into understanding the broader context surrounding the project area. This phase focuses on identifying other past, existing, or planned activities within the analytical boundaries, including natural and social external influences and drivers.

Accordingly, the identified current and future drivers are defined as below (Table 17.2) and locations of the environmental drivers are represented in Figure 17.1.

It shall be noted Table 17.2 includes the facilities/projects acting as environmental drivers. The additional environmental drivers such as climate change, urbanisation etc. are assessed in the following chapters in detail.

Table 17.2: Details of Existing and Planned Activities and Environmental Drivers

Name	Activity	Capacity	Distance to WPP License Area	Project Owner	Status
Ucpinar WPP	Wind Power Plant	112,2 MWm/109 Mwe (35 turbines)	~850 m	Derbent Enerji Üretim Pazarlama İthalat ve İhracat A.Ş.	Existing
Saros WPP	Wind Power Plant	138 MWm / 138 Mwe (69 turbines)	~5.50 km	Boylam Enerji Yatirim Üretim ve Ticaret A.Ş.	Existing

Name	Activity	Capacity	Distance to WPP License Area	Project Owner	Status
Akfen Kocalar WPP	Wind Power Plant	55.6 MWm/51 Mwe (14 Turbines)	~6.90 km	Isıder Enerji Üretim Pazarlama Ithalat ve Ihracat Anonim Şirketi	Existing
Borusan Koru WPP	Wind Power Plant	55.2 MWm /55.2 MWe (16 Turbines)	~8.70 km	Borusan EnBW Enerji	Existing
Mutlu Yenikoy WPP	Wind Power Plant	48 MWm /48 MWe (24 Turbines)	~11.20 km	Mutlu Gelibolu Elektrik Üretim Yat. İnş. San. Ve Tic.A.Ş.	Existing
Can - Canakkale ETL	Electricity Transmission Line	154 kv	~1.80 km	TEIAS	Existing
Canakkale Koru WPP ETL	Electricity Transmission Line	154 kv	~4.50 km	TEIAS	Existing

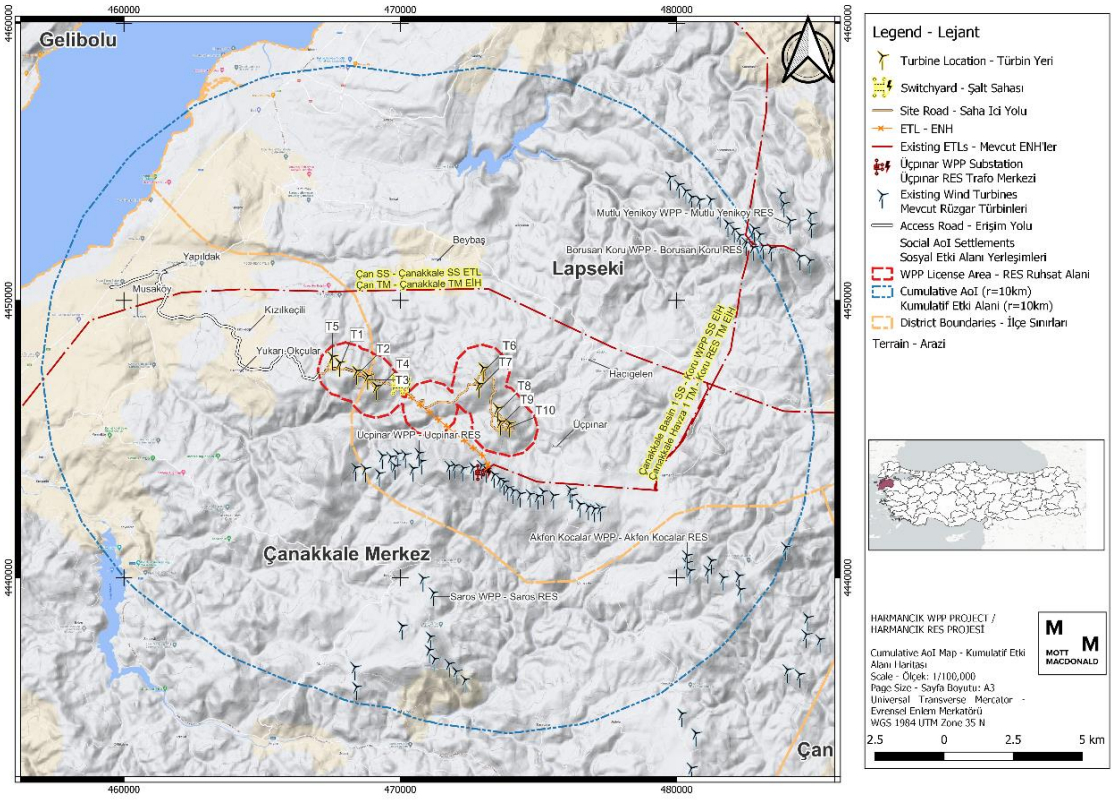

Figure 17.1: Cumulative AoI and Environmental Drivers

17.2.3 Step 3: Establish Information on Baseline Status of VECs

Step 3 of the CIA process for the Project involves establishing comprehensive information on the baseline status of VECs. This step is crucial for understanding the existing condition of VECs, their potential reaction to stress, resilience, and recovery time. Accordingly, the baseline status of the identified VECs can be described as below:

- *Forestry:* It was observed that, the forest areas are not under a significant stress caused by an identified environmental driver or any other environmental ongoing risk/concern.
- *Air quality and noise levels in settlements nearby the Project Area*
- *Biodiversity*
  - Critical Habitat: There is one flora species and four bird species that trigger critical habitat. Apart from these, although they are not critical habitat triggers, there are species that are important biodiversity features. These species are presented in *Chapter 12: Biodiversity.* Partial and temporary tree felling activities have been determined in the area. These activities do not pose a significant impact on critical species. However, the increase in WPP in the region poses a risk for critical bird species.
  - Natural Habitats: The natural habitat in the project impact area consists of four different types of forest and a rocky habitat. Although, there are partial tree cutting activities within the project impact area, the natural habitats are not under any other significant stress caused by an identified environmental driver or environmental ongoing risk/concern.
  - Flora and Fauna Species with High Conservation Priority: High conservation priority species are presented in *Chapter 12: Biodiversity.* The effects of partial tree felling on these species are moderate. However, the increase in WPP in the region poses a risk for priority bird and bat species.
- Cultural Heritage
  - Unregistered Cultural Heritage Sites: There is one unregistered cultural heritage site located in the route of the Project access road. The Slope Settlement contains a large number of ceramics and architectural fragments from the Roman and Byzantine Periods. Since the site is unregistered, it is not under protection from any external risks that may result from human activities, such as agriculture, urbanization, etc. Furthermore, no traces of an environmental driver on VECs regarding the cultural heritage were identified.
- *Socio-Economic Environment*
  - Land and Assets: There are no planned investments around the Project area. However, any expansion on the existing investments may result in further land acquisition and expropriation activities, which is assessed to create cumulative impacts.
  - Economy: Since all investments near the Project are in operation phase, no major cumulative impact is foreseen on the economic and livelihood activities of the surrounding communities.
  - Quality of Life: During the consultations with the local community members in October 2023, a number of grievances regarding noise and road traffic safety risks due to the activities of nearby WPP facilities (particularly Ucpinar WPP and Akfen Kocalar WPP) were received. Therefore, road traffic safety issues during construction phase of the Project and noise impacts during operation phase may lead to cumulative impacts.
- *Community Health & Safety*
  - Safety from blade and ice throw and shadow flicker risk: No major concern or grievance regarding ice thro has been observed. The nearest settlements are located far away from the critical distance of any wind turbine. Additionally, no observation or grievance regarding any shadow flicker is in question either.
  - Fire safety & Traffic Safety: No existing significant risk on traffic safety or in fire safety was determined.

17.2.4 Step 4: Assessment Cumulative Impacts on VECs

Step 4 of the CIA process is a pivotal stage in the evaluation of the Project. The primary focus is on assessing the cumulative impacts on VECs resulting from various past, present, and

foreseeable future developments. Accordingly, assessment of cumulative impacts on VECs are described below:

- **Land Loss:** Considering the fact that the identified environmental drivers are existing structures and no planned activity had been determined within the boundaries of Cumulative AoI, no additional land loss is foreseen.
- **Air emissions, noise:** As the identified environmental drivers are existing structures and according to the ambient air quality and noise baseline measurements described in in *Chapter 7: Air Quality and Chapter 9: Noise and Vibration* respectively, have also assessed the impacts of these environmental drivers on the identified, no significant impact is expected.
- **Biodiversity:** Habitat fragmentation, migration route changes due to avoidance, and collision risks on birds and bat species are expected to increase cumulatively with the enhancement of WWP in the region**.** Additionally, for some species that are sensitive to issues such as high temperatures, the combined effects of project activities and the projected climatic conditions may increase the challenges (Please see *Chapter 8: Climate & Greenhouse Gases (GHG)* for more information about expected climate trends.). It is also possible that the habitat of some species could be altered as a result of the combination of climate change and project activities.

  Since the Project is a subproject of the 9 WPP Project as defined previously, a high-level, qualitative, regional level cumulative impact is considered for all 9 subprojects. At the regional level, the 9 WPP Project is situated on the minor migratory routes of large, bodied birds, overlaps multiple KBAs with large bodied soaring trigger species, and interacts with wetlands of conservation significance in Western Turkiye. Collision risk assessments for Aydin subprojects are available (Akkoy WPP, Kestanederesi WPP, Hacihidirlar WPP and Dampinar WPP) however upon evaluation the model has been found inadequate, while Canakkale subprojects do not yet have collision risk assessments. Therefore, it is not possible at this stage to quantitatively define the overall collision risk for the 9 WPP Project. However due to their location near the Dardenelles Strait, it would be expected that the Canakkale subprojects would have heightened collision risks. In addition, Akkoy WPP is situated amidst important wetlands, and activity of collision prone species such as storks and pelicans are expected. Gauld et al (2021) made a flyway level assessment of mortality vulnerability of large bodied species due to transmission lines and wind farms, the results of which was overlapped with the Cumulative Project AoI[208]. Majority of the Project AoI is, regrettably, within what is considered “No Data” grids. However, within evaluated grids, the project AoI does overlap very high and high vulnerability grids, especially within Canakkale, but also Balikesir as well. Barrier effects are difficult to quantify, but especially Canakkale subprojects indeed contribute to heightened barrier effect pressure along a sensitive point in the flyway, especially due to high level of wind development in the province. Overall, the cumulative impact of the 9 WPPs at the regional level in terms of flyway integrity is expected to be moderate to major.
- **Cultural Heritage:** As there are no expected future developments in the near vicinity of Akbunar Slope Settlement other than the Project, no significant cumulative impacts on the tangible cultural heritage site is expected.
- **Socio-Economic Environment:** Since there are no planned investments in the region, no significant cumulative impact stemming from further land acquisition and expropriation activities is anticipated within the scope of the Project. Similarly, existing investments are not

[208] Gauld, J., Silva, J., Atkinson, P., Record, P., Acácio, M., Arkumarev, V., Blas, J., Bouten, W., Burton, N., Catry, I., Champagnon, J., Clewley, G., Dagys, M., Duriez, O., Exo, K., Fiedler, W., Flack, A., Friedemann, G., Fritz, J., . . . Franco, A. (2022). Hotspots in the grid: Avian sensitivity and vulnerability to collision risk from energy infrastructure interactions in Europe and North Africa. Journal of Applied Ecology, 59(6), 1496–1512. https://doi.org/10.1111/1365-2664.14160

estimated to create major cumulative impacts on the economic and livelihood activities. It is also estimated that the Project-related impacts will not interact with or trigger the other investments around the region. During the consultations with the local community members in October 2023, a few grievances related to the specified VECs were received. Therefore, the impacts on the Project affected local communities' quality of life will be taken into consideration during the Project phases due to the proximity of two WPPs (Ucpinar WPP and Akfen Kocalar WPP) to the Project's social AoI.

- **Community Health & Safety:** As there is not any concern or grievance regarding ice throw and considering the fact that the nearest settlements are located far away from the critical distance of any wind turbine, no cumulative impact on ice & blade throw is expected. Additionally, no observation or grievance regarding any shadow flicker is in question. Moreover, surface runoff flooding (pluvial flooding) may increase as a result of both development and changes in land cover and changes in precipitation events. Depending on projected changes in extreme precipitation events, sudden downpours and flash floods may become more frequent (see *Chapter 8: Climate and GHGs* for more details on projected climate conditions). In addition, warmer temperatures may increase the drying of soils and their inability to absorb rainfall, thereby increasing the potential for surface runoff and the risk of flash floods. The community health and safety could be at risk from all these effects of climate change. However, the risk is considered to be negligible because the relevant climate variables show a slight change from the baseline in the worst case.

17.2.5 Step 5: Assess Significance of Predicted Cumulative Impacts

Step 5 of the CIA process is a critical phase that involves determining the significance of the predicted cumulative impacts on VECs. This step aims to provide a comprehensive understanding of the magnitude and implications of the identified impacts in the context of past, present, and future actions.

Within this scope, summary of the cumulative impacts is provided in Table 17.3.

Table 17.3: Cumulative Impact Assessment Summary

Area of Concern	VEC	Specified VECs	Harmancik WPP	Ucpinar WPP	Saros WPP	Akfen Kocalar WPP	Borusan WPP	Mutlu Yenikoy WPP	Can - Canakkale ETL	Canakkale Koru WPP ETL
Land Loss	Forestry	Forest Areas	Negligible to Low	Negligible as no additional land use is in question	Negligible as no additional land use is in question	Negligible as no additional land use is in question	Negligible as no additional land use is in question	Negligible as no additional land use is in question	Negligible as no additional land use is in question	Negligible as no additional land use is in question
Air emissions	Air quality and noise levels in settlements nearby the Project area	Nearby Settlements	Negligible to Low	Negligible to Low	Negligible to Low	Negligible to Low	Negligible to Low	Negligible to Low	Negligible to Low	Negligible to Low
Noise	Air quality and noise levels in settlements nearby the Project area	Nearby Settlements	Negligible to Major	Negligible to Low	Negligible to Low	Negligible to Low	Negligible to Low	Negligible to Low	Negligible to Low	Negligible to Low
Biodiversity	Birds	*Verbascum hasbenlii* (Locally endemic flora species)	Major	NA	NA	NA	NA	NA	NA	NA
	Birds	Levant Sparrowhawk (*Accipiter brevipes)* Imperial Eagle (*Aquila heliaca*) Black Stork (*Ciconia nigra*) Lesser Spotted Eagle (*Clanga pomarina)*	Major	Major	Major	Major	Major	Major	Major	Major

Area of Concern	VEC	Specified VECs	Harmancik WPP	Ucpinar WPP	Saros WPP	Akfen Kocalar WPP	Borusan WPP	Mutlu Yenikoy WPP	Can - Canakkale ETL	Canakkale Koru WPP ETL
	Natural Habitats	G1.3 Mediterranean riparian woodland G1.7 Termophilus deciduous woodland G3.5 Pinus nigra Woodland G3.7 Pnius brutia woodland (Lowland to montane Mediterranean Pinus woodland (excluding Pinus nigra)) G3.F Highly artificial coniferous plantations H3.6 Weathered rock and outcrop habitats	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
	Flora and Fauna Species with High Conservation Priority Priority Biodiversity Features	Endemic and / or Red List category CR, EN, VU, Flora Endemic and / or Red List category CR, EN, VU, Fauna	Moderate to Major	Moderate to Major	Moderate to Major	Moderate to Major	Moderate to Major	Moderate to Major	Moderate to Major	Moderate to Major
Cultural Heritage	Unregistered Cultural Heritage Sites	Akbunar Slope Settlement	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Socio-Economic Environment	Land and Assets	People who will lose their lands and assets located on the lands	Major	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
	Economy	Livestock Activities Industrial activities and employment	Moderate	Low	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Area of Concern	VEC	Specified VECs	Harmancik WPP	Ucpinar WPP	Saros WPP	Akfen Kocalar WPP	Borusan WPP	Mutlu Yenikoy WPP	Can - Canakkale ETL	Canakkale Koru WPP ETL
	Quality of Life	Access to healthcare, education, commercial facilities, natural water resources	Low	Low	Negligible	Low	Negligible	Negligible	Negligible	Negligible
Community Health & Safety	Safety from blade and ice throw and shadow flicker risk and flooding	Nearby settlements	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
	Aviation	Canakkale Airport	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
	Fire safety	Fire Watch Safety Towers Community who could be affected by wildfires	Moderate	Low	Low	Low	Low	Low	Low	Low
	Traffic Safety	Passengers using Nearby Roads	Moderate	Low	Low	Low	Low	Low	Low	Low

The cumulative impact assessment criteria can vary depending on the specific context and objectives of the assessment. Here are the criteria to considered during the cumulative impact assessment:

- ***Number of Projects:*** Assess the cumulative impact based on the total number of projects in the area. This criterion considers the additive effect of multiple projects on environmental and social factors.
- ***Magnitude of Cumulative Impact:*** Evaluate the cumulative impact based on the combined magnitude of impacts from all projects. This criterion takes into account the severity and extent of environmental changes resulting from multiple developments.
- ***Interaction of Impacts:*** Examine how the impacts of different projects interact with each other. This criterion focuses on identifying additive, countervailing, masking, or synergistic effects resulting from the combined influence of multiple developments.
- ***Spatial Distribution:*** Analyze the spatial distribution of cumulative impacts to identify areas of concentrated impact and potential hotspots where multiple stressors coincide.
- ***Temporal Dynamics:*** Assess how cumulative impacts evolve over time, considering both short-term and long-term effects on environmental and social systems.
- ***Stakeholder Perspectives:*** Incorporate stakeholder perspectives and values into the assessment criteria to ensure that the concerns and priorities of affected communities are adequately addressed.

By considering these criteria in the cumulative impact assessment process, significance of each concern on VECs was assessed as below:

- Cumulative impact on Land Loss for forest areas will be negligible to low as the environmental drivers already exists.
- Similarly, the cumulative impact on air emissions, noise will also be negligible as the identified VECs area located far from the drivers and currently no significant concern is in question.
- Landscape & visual will not be affected cumulatively by the environmental drivers as the interaction was assessed to be negligible.
- Cumulative adverse impacts on fauna and flora due to projected changes in climate will be low to moderate since the Project AoI is within the KBA and migration routes of bats and birds. Therefore, local bat and bird populations may be subject to operational impacts due to noise and increased collision risk. The combined impacts of the project with projected climate trends may increase the challenges for some species which are also susceptible to issues such as high temperatures. It is possible that the combination of changing climate and project activity may alter the habitat range of certain species.
- Cumulative impact on habitat loss for natural areas will be moderate. For critical habitat trigger flora species, Harmancık WPP habitat loss impact is major. Nevertheless, the suitability of other WPP areas in the region for the distribution of the critical flora species is uncertain, hindering the assessment of the cumulative impact on the relevant species. Additionally, although it is expected that collision and barotrauma mortality impacts on some bird and bat species will increase cumulatively and create major concern, additional field studies are needed for the final evaluation of this impact.
- Cumulative impacts on cultural heritage are negligible considering different distances between Project components and different VECs.
- Cumulative impacts on socio-economic environment and community health and safety are also low as majority of the environmental drivers are already existing and no major concern or risk have been identified.

17.2.6 Step 6: Management of Cumulative Impacts – Design and Implementation

Step 6 marks the culmination of the CIA process, focusing on the design and implementation of management strategies. This phase is crucial for addressing the identified significant cumulative impacts on VECs and ensuring a proactive approach to environmental and social sustainability.

Acknowledging that cumulative impacts often result from the actions of multiple stakeholders, it is emphasized that the responsibility for managing these impacts is collective. Thus, addressing and mitigating each cumulative impact would require a pro-active approach and good collaboration with the relevant stakeholders. In addition, the importance of governments in establishing Cumulative Impact Assessment frameworks needs to be underscored as well. With this regard, management measures for the foreseen cumulative impacts are presented below.

This ESIA Report's chapters separately define mitigation strategies at the project level. Collaborative participation in regional management strategies will be required when project-specific mitigation measures prove insufficient and project mitigation alone is unable to avert an undesirable cumulative impact (IFC, August 2013). The IFC suggests taking the following particular steps, which might be necessary to manage cumulative impacts in an efficient manner:

- Adaptations to the project design (where possible, timing, location, and technology) to prevent cumulative impacts.
- Project mitigation techniques, such as adaptive management techniques, are used to reduce cumulative impacts.
- Project impacts mitigated by other projects (not managed by the proponent to further reduce impacts on VECs).
- Protection and improvement through cooperation in other regional programs for cumulative effect management.
- Participation cooperatively in other regional strategies for managing cumulative impact.
- Taking part in regional monitoring programs to evaluate the effectiveness of management initiatives and the realized cumulative impacts.

Project Company will be in charge of overall management for the combined effects. Project Company will ensure that all stakeholders identified during stakeholder management studies are informed about the progress of Project operations.

18 Stakeholder Engagementi Information Disclosure and Consultation

18.1 Introduction

This Chapter of the ESIA Report provides information about the Project stakeholders and previously conducted specific stakeholder engagement, information disclosure and consultation activities. In addition, it describes the Project's grievance mechanism to be established and the future stakeholder engagement activities that will be conducted within the scope of the Project.

18.2 Methodology

18.2.1 Overview

Continuous, open and transparent stakeholder engagement is an essential aspect in projects to ensure the project's sustainability, improved quality and better implementation. The objective of the stakeholder engagement is successfully managing the risks and impacts on communities, people, groups, businesses and any other interested parties affected by projects. Robust stakeholder identification and stakeholder mapping are the very first and significant steps of an effective stakeholder engagement.

Stakeholder engagement provides a mutual communication line between the Project Company and the Project stakeholders, which will continue throughout the Project lifecycle including pre-construction, construction and operation phases. Different phases of the Project can necessitate varying engagement and consultation activities. The Project Company is responsible for establishing a platform that enables continuous communication and consultation with all Project stakeholders.

As the international standards and requirements (particularly IFC PS1, PS2, and PS5, EBRD PR10, EP IV Principles 5 and 6), and DFC ESPPs 3 and 5 necessitate, stakeholder consultation and engagement involve the following aspects:

- Identification and analysis of all potentially affected individuals, groups, communities, organizations, vulnerable/disadvantaged individuals and groups that will be considered as stakeholders,
- Planning the steps for the way stakeholder engagement, information disclosure and meaningful consultation with stakeholders will be held,
- Identification of the issues that remain as a risk or adverse impact for the Project or the stakeholders,
- Formation of a good understanding of the Project for stakeholders,
- Addressing a grievance mechanism, which is free of manipulation, coercion and intimidation for long-term communication between the Project and the stakeholders,
- Responding to grievances in a timely manner through the grievance mechanism, and
- Regularly informing the stakeholders about the Project.

To ensure that stakeholder engagement processes are successful and effective, stakeholder engagement should be initiated earlier in the projects. In line with the IFC PS1, PS2, and PS5, EBRD PR10, EP IV Principles 5 and 6, and DFC ESPPs 3 and 5, stakeholder engagement has started during the National EIA process of the Project through engagement with the key project stakeholders. Please see Section 18.4.2 for past stakeholder engagement activities. Stakeholder engagement will continue throughout the Project lifecycle.

18.2.2 Applicable Guidelines and Standards

18.2.2.1 National Requirements

The Turkish EIA Regulation (OG Date/Number: 29.07.2022/31907) includes a number of requirements regarding information disclosure and stakeholder participation.

During the scoping phase of the projects, stakeholder engagement within the scope of the National EIA process starts with the establishment of a commission that involves representatives from related governmental bodies and that is responsible for review and assessment of the project.

Establishment of the commission is followed by the public participation meeting. Organizing a public participation meeting is legally obligatory as per the regulation. The aim of the public participation meeting is to ensure that the public and interested parties in the project (i.e., local community members, PAPs, governmental bodies, non-governmental organizations) are informed about the project and have an opportunity to raise their opinions, suggestions and/or concerns regarding the project. It is crucial that the PAPs who are assessed to be most affected by the project are enabled to participate in this meeting. Therefore, organizing the meeting that is accessible to the PAPs to the most possible extent is also underlined within the regulation.

The issues reported by the participants of the meeting are documented in the official meeting minutes to be considered and addressed in the EIA report. In addition, the institutions authorized by the MoEUCC prepare a SEP in order to inform the public about the project and its impacts, and to facilitate receiving the opinions and suggestions of the public regarding the project. The SEP is submitted in the annex of the National EIA report. However, this regulation is effective as of July 2022 and the public participation meeting of the Project subject to the EIA process was held in December 2021. Therefore, it is exempt from the requirement to prepare a SEP within the scope of the EIA process.

Once the National EIA report is submitted to the MoEUCC for review, the MoEUCC and the related provincial directorates announce to the public that the review process of the established commission has started, and the draft National EIA report is also open to public review and comments for 30 days. Appropriate communication channels (i.e., newspapers, noticeboards, and the Internet) are used for the announcement.

Following the review of the commission and the public, the final draft of the National EIA report is disclosed by the MoEUCC and the related provincial directorates for 10 days through announcement boards and the Internet. By considering the evaluations of the committee and public views, the MoEUCC gives the “EIA Positive” or “EIA Negative” decision regarding the project. EIA reports that receive a “EIA negative” decision are obliged to be re-disclosed to public review and relevant stakeholders (same methods as explained above). No additional public participation meeting is required.

At the final stage, the decision of the MoEUCC is also disclosed to the Project stakeholders by using appropriate means of communication.

National legislation related to consultation, information disclosure, stakeholder engagement and grievance mechanism also includes Law on Right to Information (No. 4982), Law on Preservation of Personal Data (No. 6698), Law on Use of the Right to Petition (No. 3071), and Regulation on the Principles and Procedures for the Enforcement of the Law on the Right to Information.

18.2.2.2 International Requirements

The stakeholder engagement and consultation requirements of the Project are assessed and planned by considering the following international standards:

- IFC's Performance Standards on Environmental and Social Sustainability (2012)
  - Performance Standard 1 – Assessment and Management of Environmental and Social Risks and Impacts: PS 1 emphasizes on the importance of: (i) an integrated assessment to identify the environmental and social impacts, risks and opportunities of the Project; (ii) effective community and stakeholder engagement through disclosure of Project-related information and consultation with local communities on matters that directly affect them; and (iii) the Client's management of social and environmental performance throughout the life of the Project through management programs, monitoring, and review.
  - Performance Standard 2 – Labor and Working Conditions: In accordance with Performance Standard 2, efforts to promote economic growth by generating employment and income should safeguard the fundamental rights of employees. Employees are a valuable asset to their companies, and a robust relationship between employees and management is essential for the company's sustainability. The client will establish a grievance mechanism for employees (and workers' organisations) to raise workplace concerns. Information about the grievance mechanism will be provided to employees during recruitment, and the mechanism will be easily accessible to them.
  - Performance Standard 5 – Land Acquisition and Involuntary Resettlement: Decision-making processes related to resettlement and livelihood restoration should include options and alternatives, where applicable. Disclosure of relevant information and participation of Affected Communities and persons will continue during the planning, implementation, monitoring, and evaluation of compensation payments, livelihood restoration activities, and resettlement to achieve outcomes that are consistent with the objectives of the Performance Standard.
- EBRD's Environmental and Social Policy & Performance Requirements (2019)
  - Performance Requirement 1 - Assessment and Management of Environmental and Social Risks and Impacts: PR 1 emphasizes the significance of integrated assessment of the environmental and social impacts and issues associated with the Project and identify the Project's stakeholders and design a plan for engaging with the stakeholders in a meaningful manner to take their views and concerns into consideration in planning, implementing and operating the Project with reference to the PR10. Mitigation measures defined for the environmental and social impacts will be developed and implemented so that vulnerable people within the scope of the Project are not disproportionately impacted.
  - Performance Requirement 5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement: During all Project-related land acquisition processes, PR 5 requires engaging with the PAPs and communities through meaningful consultation, and disclose relevant information throughout the planning, implementation, monitoring and evaluation of land acquisition, and resettlement process including livelihood improvement. The Client should ensure that all groups, including the vulnerable are informed and made aware of their entitlements, rights, opportunities and benefits.
  - Performance Requirement 10 - Information Disclosure and Stakeholder Engagement: PR 10 recognises the significance of a transparent engagement with relevant stakeholders (especially those defined as vulnerable groups within the scope of the Project) and disclose appropriate Project information throughout the lifetime of the Project. Providing an accessible grievance mechanism as a part of the stakeholder engagement is crucial for building strong, constructive, and responsive relationships which are essential for a successful environmental and social impacts management within the Project.
- Equator Principles IV (2020)
  - Principle 5 - Stakeholder Engagement: Principle 5 recognizes that for all Category A and Category B projects, the EPFI will require the client to demonstrate effective stakeholder engagement, as an ongoing process in a structured and culturally appropriate manner, with affected communities, workers and, where relevant, other stakeholders.

For projects with potentially significant adverse impacts on affected communities, the principle requires performing an informed consultation and participation process. The client is expected to tailor its consultation process to: (i) the risks and impacts of the project; (ii) the project's phase of development; the language preferences of the affected communities; their decision-making processes; and (iii) the needs of disadvantaged and vulnerable groups.

  - Principle 6 - Grievance Mechanism: Principle 6 recognizes that for all Category A and, as appropriate, Category B projects, the EPFI will require the client, as part of the ESMS, to establish effective grievance mechanisms which are designed for use by affected communities and workers, as appropriate, to receive and facilitate resolution of concerns and grievances about the project's environmental and social performance.

- DFC Environmental and Social Policy and Procedures (2020)
  - Environmental and Social Policy and Procedure 3 - Environmental and Social Review: It necessitates undertaking meaningful consultation with Project Affected People within the defined area of influence. For all projects, meeting the requirements related to stakeholder engagement, stakeholder analysis and engagement planning, access to information, consultation, reporting to stakeholders and the establishment of a grievance mechanism is obligatory. The form and scope of the consultation should be commensurate with the project risks and the nature and scope of the project.
  - Environmental and Social Policy and Procedure 5 – Public Consultation and Disclosure: The objectives are to ensure that Project Affected People are informed and consulted during project preparation and implementation and to enhance transparency and accountability related to DFC's environmental and social management. Projects are required to develop and implement a Stakeholder Engagement Plan tailored to project risks and impacts in accordance with the requirements of IFC PS1.

18.2.2.3 Applicable Policies and Management Systems of the Project Company

A Project-specific temporary SEP, which has been prepared prior to the ESIA process, is in place since October 2023. According to the content of the temporary SEP, the Project Company has a Corporate SEP that defines the stakeholders, disclosure approach, commitment to meaningful consultation and participation, ongoing reporting to external stakeholders, and grievance management of the Project Company.

The Project Company has also an integrated Quality, Health and Safety, Environment and Energy Management Systems and relevant certifications, which are listed below:

- ISO 9001: 2015 - Quality Management System
- ISO 14001: 2015 - Environmental Management System
- ISO 45001: 2018 - Occupational Health and Safety Management
- ISO 50001: 2018 - Energy Management System
- ISO/IEC 27001: 2013 - Information Security Management System
- ISO 55001 – Asset Management System

Of these management systems, ISO/IEC 27001: 2013 - Information Security Management System Certificate was received on 21 September 2022 and valid until 21 February 2025 whereas the remaining was received on 20 January 2021 and valid until 19 January 2024. In line with these management systems, the Project Company has an Integrated Management Systems Policy, which is disclosed at the website together with the following policies and management plans[209]:

[209] https://www.enerjisauretim.com.tr/

Corporate Level:

- Social Responsibility Policy
- Open Door Policy
- Resettlement Framework
- Policy on People and Culture
- GBVH Policy
- Information Security Management Policy
- Privacy Policy
- Code of Business Ethics
- Code of Compliance

Project Specific:

- Resettlement Action Plan
- Community Health, Safety Plan
- Emergency Response Plan
- Traffic Management Plan
- Security Management Procedure

Apart from the above-mentioned policies and management systems, the Project Company has Equality, Diversity, and Inclusion Regulation, Procedure Against Domestic Violence, Corporate Communication Procedure, and Crisis Management Procedure. In addition, the Social Management Procedure, which covers guidelines for land acquisition and compensation process, social impact management, social support for community benefit, facility-based plans and implementation and social management system, is applied at all facilities of the Project Company.

The Project Company is also a Business Council for Sustainable Development Türkiye member since 11 January 2022. Furthermore, the Project Company is a signatory of the United Nations Global Compact (UNGC) since 02 August 2022 and Women's Empowerment Principles (WEPs) since 20 April 2022 as well as member of Carbon Disclosure Project (CDP) since 2021.

As reported by the Project Company representatives, corporate policies of Enerjisa Üretim are applicable to all Project employees including contractors and subcontractors.

18.3 Stakeholder Identification

18.3.1 Overview

In line with the definitions of international standards, stakeholders are defined as the individuals or groups who are impacted by a project or possess an interest in its outcome. Project's impact may be positive or negative and can be direct or indirect. It is important to consider their opinions, perspectives, concerns and needs when undertaking a project to ensure successful outcomes.

18.3.2 Project Stakeholders

Identified stakeholders of the Project are categorized as external stakeholders (including governmental and non-governmental bodies, mukhtars/residents/local communities, vulnerable/ disadvantaged groups, media and universities) and internal stakeholders (all Project staff, including contractors and subcontractors and their employees) which are given in Table 18.1Table 18.4 through Table 18.3 below. All stakeholders are categorized and colour-coded as high (red), medium (yellow) or low (green) depending on their level of interest in the Project as

measured by an assessment of the magnitude of stakeholder influence and impact on the Project. In line with each stakeholder's level of interest, disclosure and consultation activities are determined based on certain frequencies for construction and operation phases of the Project. Disclosure and consultation activities to be implemented throughout the lifetime of the Project is outlined in Section 18.5.3 and detailly explained in the SEP together with the proposed implementation timetable.

Table 18.1: External Stakeholder List for Governmental Authorities

GOVERNMENTAL BODIES

Level	Organization	Relation to the Project	Level of Interest
National	Ministry of Energy and Natural Resources	Ministry of Energy and Natural Resources and its relevant departments have regulatory functions relation to the Project and its components.	High
	Energy Market Regulatory Authority (EMRA)	EMRA is one of the key stakeholders of the Project in relation to the Project scope and components in general.	High
	Turkish Electricity Transmission Company (TEİAŞ)	TEİAŞ is a key stakeholder when the ETL of the Project is considered.	High
	Ministry of National Defence	Ministry of National Defence is a significant stakeholder since securing the Project area is crucial.	Low
	Ministry of Agriculture and Forestry (MoAF)	MoAF may have specific views about the design, construction and operation activities of the Project.	Medium
	MoAF, General Directorate of Food and Control		
	MoAF, General Directorate of Livestock		
	MoAF, General Directorate of Fisheries and Aquaculture		
	MoAF, General Directorate of Nature Conservation and National Parks		
	MoAF, General Directorate of State Hydraulic Works		
	MoAF, General Directorate of Water Management		
	Ministry of Environment, Urbanization and Climate Change (MoEUCC)	MoEUCC has regulatory functions in relation to the Project such as environmental impact assessment permits and environmental permitting.	Medium
	MoEUCC, General Directorate of EIA, Permit and Audit		
	MoEUCC, General Directorate of Environmental Management		
	MoEUCC, General Directorate of Infrastructure and Urban Transformation		
	MoEUCC, General Directorate of Spatial Planning		
	MoEUCC, General Directorate of Protection of Natural Assets		
	Ministry of Transport and Infrastructure (MoTI)	MoTI may have specific views regarding evaluation of the Project.	Medium

GOVERNMENTAL BODIES

Level	Organization	Relation to the Project	Level of Interest
	MoTI General Directorate of Infrastructure Investments		
	MoTI General Directorate of Highways		
	Ministry of Labour and Social Security (MoLSS)	MoLSS may have specific views on labour and working conditions, and health and safety of the Project personnel.	Low
	MoLSS, General Directorate of Labor		
	MoLSS, General Directorate of Occupational Health and Safety		
	Ministry of Culture and Tourism (MoCT)	MoCT may have views in terms of legislation.	Low
	MoCT General Directorate of Cultural Heritage and Museums		
Regional	25th Regional Directorate of DSI (State Hydraulic Works)	This organization may have specific views about water courses running close to the Project area.	Low
	4th Regional Directorate of Ministry of Agriculture and Forestry	This organization may have specific views on the potential protected areas close to the Project area and the status of the trees in the Project area.	High
	14th Regional Directorate of General Directorate of Highways	The organization may provide opinion regarding road crossing within the Project area.	High
	Çanakkale Regional Board Directorate of Cultural Assets Protection	This organization is an important stakeholder to identify and clarify the archaeological potential of the Project area.	High
Provincial	The Governorship of Çanakkale	The governorship representing the national government is the highest authority in the province.	High
	Çanakkale Investment and Coordination Committee Directorate	This organization coordinates all kinds of investment and construction works to be carried out by ministries and other central government organizations in the provinces.	High
	Çanakkale Municipality	The municipality and its relevant departments will have responsibilities in relation to the Project.	High
	Çanakkale Municipality, Directorate of Environmental Protection and Control		
	Çanakkale Municipality, Directorate of Zoning and City Planning		
	Çanakkale Municipality, Directorate of Transportation		
	Çanakkale Governorship Provincial Directorate of Social Security Institution	This organization may provide specific views on labour and working conditions, and health and safety of facility personnel.	Low
	Çanakkale Governorship Provincial Directorate of Environment, Urbanization and Climate Change (PDoEUCC)	PDoEUCC has regulatory functions related to the Project such as environmental impact assessment permits and environmental permitting.	High
	Çanakkale Provincial Directorate of Environment and Urbanization	This organization has regulatory functions in relation to the Project such	High

GOVERNMENTAL BODIES

Level	Organization	Relation to the Project	Level of Interest
		as environmental impact assessment permits and environmental permitting.	
	Çanakkale Cultural Heritage Preservation Regional Board Directorate	This organization is an important stakeholder to identify and clarify the archaeological potential of the Project area.	**High**
	Çanakkale Provincial Directorate of Agriculture and Forestry	These organizations may provide provincial-specific and/or site-specific views on the Project.	**High**
	Çanakkale Provincial Command of Gendarmerie		**Medium**
	Çanakkale Water and Sewer Administration	This organization may provide an opinion related to water/wastewater infrastructure of the Project area.	**Medium**
	The Local Governorship of Lapseki, The Municipality of Lapseki	The Project area is located in Lapseki district and the local governorship, the central municipality and their related departments are stakeholders regarding obtaining relevant permits, approvals during planning, and construction and operation phases of the Project.	**High**
	Directorate of Zoning and Urbanisation		
	Directorate of Civil Works		
	Directorate of Plan and Project		
	Directorate of Cleaning Works		
	Directorate of Municipal Police		
	Lapseki District Directorate of Health		**Medium**
	Lapseki District Gendarmerie Command		**Medium**
	Lapseki District Directorate of Agriculture and Forestry		**High**

Table 18.2: External Stakeholder List for Non-Governmental Bodies

NON-GOVERNMENTAL BODIES

Level	Organization	Relation to the Project	Level of Interest
National, Provincial and District	Turkish Wind Energy Association	These foundations, associations, and chambers may provide their specific views related to the Project	**High**
	Türkiye Foundation for Combating Erosion, Afforestation and Protection of Natural Assets (TEMA)		
	Environmental Protection and Research Foundation (ÇEV-KOR)		
	Turkish Environmental Protection Foundation (TUÇEV)		
	Turkish Nature Conservation Association		
	Foundation for the Protection and Promotion of Environmental and Cultural Values (ÇEKÜL)		
	World Wide Fund for Nature (WWF) Türkiye		
	Bird Life International Türkiye Partner- Doğa Association		
	The Nature Conservation Centre		
	Resource, Environment and Climate Association (REC)		
	Ecological Research Society (EKAD)		
	Greenpeace Akdeniz Türkiye		
	Association for Sustainable Economics and Finance Research (SEFiA)		
	Troya Environment Association		
	Troya Renewable Energy Cooperative		
	Çanakkale Troida Women's Initiative Production and Operation Cooperative		
	Marmara Women's Cooperatives Union		
	Çanakkale Purple Solidarity Women's Association		

NON-GOVERNMENTAL BODIES

Level	Organization	Relation to the Project	Level of Interest
	Çanakkale Women's Handicraft Association and Women's Counselling Centre		
	Çanakkale Mentally Disabled Association		
	Çanakkale Branch of Türkiye Physically Disabled Association		
	Türkiye Visually Impaired People Association Canakkale Branch		
	Six Dots Association for the Blind Çanakkale Branch		
	Lapseki Chamber of Agriculture		
	Lapseki Chamber of Commerce		
	Lapseki Chamber of Tradesmen and Craftsmen		
	Lapseki Environmental Protection, Production, and Solidarity Association		
	Lapseki Beekeepers Association		
	Lapseki Solidarity and Beautification Association		
	İDA Solidarity Association		
	Kazdağı Natural and Cultural Assets Protection Association		
	Lapseki Poultry Lovers and Breeders Association		

Table 18.3: Other External Stakeholder Groups

STAKEHOLDER GROUPS

Level	Group	Relation to the Project	Level of Interest
Mukhtars/Residents/Local Communities	The mukhtars and residents at Kızılkeçili, Yukarıokçular, Yapıldak, Musaköy, Hacıgelen, Üçpınar, Beybaş villages	Villages are key stakeholders considering potential impacts of the Project.	**High**
	Local Businesses and Enterprises (Local shops, beekeepers, income-generating agricultural lands)		
	Structure owners whose structures are within the turbine setback area of the Project		
	Local communities including PAPs subject to direct land acquisition		
Vulnerable/ Disadvantaged Groups	Women	Vulnerable groups are key stakeholders considering potential impacts of the Project.	**High**
	The landless/homeless people		
	The elderly		
	People with disabilities		
	Unemployed people		
	Seasonal workers		

STAKEHOLDER GROUPS

Level	Group	Relation to the Project	Level of Interest
Media	Local, regional, and social media (including but not limited to the following newspapers, TV stations, social media channels): • Çanakkale TV • Ton TV • Channel 17 • Çanakkale Gündem • Aynalı Pazar Newspaper • Çanakkale Zafer Newspaper • Kalem Newspaper	It is important to engage with local and regional media organizations for effective public disclosure and consultation.	**Medium**
Universities	Çanakkale Onsekiz Mart University	Universities are one of the key stakeholders when research needs to be conducted within the scope of the Project.	**Medium**
Other potentially affected local social institutes	Local schools (i.e., Umurbey Primary School, Umurbey Secondary School)	It is essential to ensure that the social environments that pose a significant place for community health, safety and security issues (i.e., hospitals, fire stations) and/or where key stakeholders utilize/ spend their time are operating properly at every stage of the Project.	**Medium**
	Mosques		
	Local Coffeeshops		
	State Hospitals (Çanakkale Mehmet Akif Ersoy State Hospital, Lapseki State Hospital)		
	District Fire Stations (Çanakkale Municipality Fire Department, Lapseki Fire Station)		
	Fire Watchtowers near the Project affected villages		

Table 18.4: Internal Stakeholder List

INTERNAL STAKEHOLDERS

Level	Organization	Relation to the Project	Level of Interest
Internal Stakeholders	Project staff	These groups are one of the key stakeholders in terms of continuation of the Project activities in compliance with the international standards.	**High**
	Contractors and subcontractors and their employees		
	Suppliers and their workers		

18.4 ESIA Consultation Activities and Outcomes

18.4.1 Overview

International standards emphasize that stakeholder engagement and consultation is one of the key components of the ESIA process to reach and inform as many stakeholders as possible, especially those in the Project area of influence through the stakeholder engagement activities.

In this regard, the objectives of the Project's stakeholder engagement and consultation process include ensuring that identified stakeholders are appropriately informed and consulted on issues that could potentially affect them and maintaining a constructive relationship with stakeholders on an ongoing basis throughout the lifecycle of the Project.

18.4.2 Previously Carried out E&S Activities

During the National EIA process and prior to the ESIA studies, the Project Company conducted consultation activities with the governmental bodies to receive opinions on the Project through correspondence. These consulted governmental bodies are listed below:

- Ministry of Environment, Urbanization and Climate Change,
  - General Directorate of Environmental Impact Assessment, Permit and Inspection
  - General Directorate of Meteorology, Presidency of Observation Systems Department
  - General Directorate of the Protection of Natural Assets
- Ministry of Energy and Natural Resources,
  - General Directorate of Energy Affairs
- Ministry of Agriculture and Forestry
  - General Directorate of Forestry, Permit and Easement Department
- General Directorate of Highways, Survey, Project and Environment Department, Environmental Branch Directorate
- General Directorate of State Airports Administration, Department of Electronics
- General Directorate of Forestry Çanakkale, Permit and Easement Branch Directorate

According to the received opinion letters, a number of important concerns are noted as described below:

- Ministry of Agriculture and Forestry, General Directorate of State Hydraulic Works (DSİ) has concerns related to the Project's impact on water sources and riverbeds. They emphasize the importance of preserving structures and maintaining minimum distances between the turbines and riverbeds.
- Ministry Of Culture and Tourism, General Directorate of Cultural Heritage and Museums, Çanakkale Cultural Heritage Preservation Regional Board Directorate has reported that there were no cultural assets in the license area. However, during physical and construction interventions in the area, if any discovery of cultural heritage items or remains of cultural heritage significance subject to the Law No. 2863 is made, it is mandatory to immediately halt the activities and report this discovery to the nearest Museum Directorate within three days, in accordance with the "Obligation to Notify" under the mentioned law.
- General Directorate of Highways 14t^{h} Regional Directorate approval has been granted provided that Project area does not intersect with the routes within the responsibility of the Authority. In addition, within the scope of the Project activities, it was specified in the Authority's internal directive that "the minimum distances that wind energy power plants should have to the highway boundary line are as follows: on highways ... B: 1.5 * (H+L); on State and Provincial Roads ... B: 1.25 * (H+L), B: distance (m), H: tower height (m), L: blade length (m)." It was emphasized that these minimum distances should be adhered to,

transportation within the Project should be carried out in accordance with the 2918 Road Traffic Law, and the permits specified in the legislation should be obtained in advance for such transportation. It was also required that no new connections to the roads should be established, except for the existing connections within the Project area. Furthermore, if a connection is to be made from the Project area to a public road, it is necessary to apply to the Authority with detailed projects, taking into account the provisions of the 2918 Road Traffic Law and the regulations issued in connection with it.

- Ministry of Energy and Natural Resources, General Directorate of Mining and Petroleum Affairs, Special Areas and Map Department has emphasized that, the examination of the Project area has concluded with a favourable evaluation of the Project. As a result, the Project has been registered in the Authority's system as "Harmancık WPP Special Permit Area" under number ER: 3421571, as identified within the provided coordinates. Therefore, it is n"ted that there is no objection from the Authority to the finalization of the Project.
- Ministry of Agriculture and Forestry General Directorate of Nature Conservation and National Parks has emphasized that, a commitment from the Project Company is required regarding measures to eliminate or minimize the potential negative impacts included in the ecosystem assessment report, ornithological assessment report and bat monitoring report. In addition, during operational phase of the Project, the effects of the Project on birds shall be monitored, evaluated and reported by an ornithology expert for a period of 3 years. The work should be carried out in the field for a maximum of 3 consecutive days, representing the migration period, between 15 August and 15 October for the autumn migration period, and 30 days each between 15 March and 15 June for the spring migration period. Furthermore, during operational phase of the Project, the effects of the Project on bats shall be monitored, evaluated and reported by a bat expert for 5 days/night every month, from end of March to October.
- Çanakkale Special Provincial Administration License and Inspection Directorate has notified that forest area and surface water remain in the Project area. Following the National EIA process, it is necessary to apply to the Çanakkale Special Provincial Administration License and Inspection Directorate for the sub-scale plans that need to be made for the area in question in accordance with the Zoning Law No. 3194 and the relevant legislation. In addition, it is necessary for privately owned parcels, to apply for the Zoning Status Certificate from Administration and then obtain a building permit.
- Çanakkale Special Provincial Administration Water and Canal Services Directorate notes that there are drinking water transmission lines belonging to the villages in the Project license area. The damaged units, needs to be repaired by the Project Company in case any damage occurs as a result of Project activities.
- Canakkale Special Provincial Administration Road and Transportation Services Directorate has concerns about the Project's impact on villages road traffic safety. The approval has been granted provided that all traffic measures regarding the use of village roads are taken for transportation operations and traffic safety is ensured.

In conclusion, various authorities have raised concerns about different aspects of the Project. These concerns include safety, environmental impact, and compliance with legislation. The authorities have outlined specific requirements and recommendations for the Project's development. The official correspondences conducted within the scope of environmental and social studies were provided in the final National EIA Report.

Within the scope of the National EIA studies, social impact assessment studies were conducted as well. The Project Company appointed a social consultancy company, whose consultants have been on the field and consulting the residents in the nearby villages for approximately two years. Accordingly, stakeholder engagement activities started in July 2021 with the involvement of the social consultants to grasp the socioeconomic background of the Project affected villages. Consultations were conducted with mukhtars, local community members, and non-

governmental organisations to identify the issues and concerns of the stakeholders in relation to the Project.

Project affected villages were visited by the social consultancy company appointed by the Project Company in July and August 2021, before the EIA public disclosure meeting. The participatory field study was designed to exchange information on the phases and timeline of the Project, and to gain an understanding of the socioeconomic conditions and the main sources of income within the villages around the Project area, potential impacts and whether there were any concerns or grievances about the Project by the local community members.

The public participation meeting was carried out in Çanakkale, Lapseki District, Üçpınar village province within the scope of the National EIA Studies on 13 December 2021. The meeting aimed to engage with the public, especially the local community members, provide information about the Project, and gather their feedback and concerns regarding the Project. Potential local community members are composed of the ones who live in the residential areas that are close to the Project area and the end users who will be involved in benefitting from the activities undertaken in the scope of the Project.

The meeting was hosted by Çanakkale Directorate of Environment and Urbanization with a presentation provided to the participants. A total of 24 people participated in the meeting including officials from the Ministry of Environment, Urbanization and Climate Change Energy Investments Department, officials from Çanakkale Governorship Provincial Directorate of Environment and Urbanization, representatives from the Project Company, representatives from the Consultant Company, mukhtars of the Üçpınar and Yukarıokçular villages, and residents from the Üçpınar and Yukarıovacık villages. The presentation covered the issues related to the need for the Project, the rationale for choosing this particular area and the environmental measures that would be implemented for the potential impacts. The participants had a number of concerns and requests about the Project regarding the following:

- The potential positive and adverse impacts of the Project on the Project affected villages
- The human resource for the Project workforce
- The impacts on roads due to construction activities of the Project
- Mitigation measures for any damage due to the Project
- The possibility of constructing a new road within the scope of the Project
- If there would be any construction vehicles passing through the villages during the construction phase of the Project
- The current status of the legal permitting about the Project activities
- The potential support to provide to the local communities through the generated electricity
- The method of communication between the turbines and if it would be underground or not
- The impact of noise during the operation phase of the Project
- The potential harm of the Project to the animals within the Project affected villages

For the above-mentioned concerns and questions, necessary explanations and clarifications were provided to the participants in accordance with the relevant sections of the National EIA Report.

On the basis of the documents provided by the Project Company, the social consultants have continued to regularly visit the mukhtars and residents of the villages that are in close proximity to the Project area (mainly Hacıgelen, Kızılkeçili, Üçpınar, and Yukarıokçular). The consultants collected information about the history, residential conditions, natural structure, population, migration, health, education, and cultural patterns of the villages. During the visits, they also provided information about the Project and its potential impacts on the villages, especially land acquisition and expropriation.

It is observed that the regular stakeholder engagement and social consultation that had started in earlier phases of the Project led the residents to have a more positive attitude toward the Project by understanding the potential Project impacts and contributions of the Project Company to the villages. In this regard, the residents expect the Project Company to improve the villages' and residents' economic conditions in terms of the following aspects:

- The qualification mapping of the existing human resource in the region to feed the required workforce during and after the Project construction process. Determining the positions to be employed locally and the vocational knowledge and skills training to be provided accordingly,
- Providing support (especially in irrigation and maintenance and similar technical issues) for orchard gardening, which has become an important income-generating activity in the region recently,
- Conducting studies to increase the market opportunities of dairy production in the region.

In addition to the local community members and residents in the Project affected villages, specific emphasis was placed on outreach to local non-governmental organizations. Meetings were conducted with the IDA Solidarity Association and Kazdağları Ecology Platform to address their concerns and provide information about the Project. However, only a stakeholder list with contact details of the stakeholders were provided and the outcomes of the consultations with these stakeholders were not registered in a written way. Additionally, further information could not be retrospectively retrieved from Adam Smith.

The Social Impact Assessment and Field Reports prepared in 2022 by the Adam Smith Consultancy were provided to the Consultant for review. Accordingly, some of the villages included in the Project's social AoI were visited. Following these visits, the Consultant carried out a field visit in October 2023 with the aim of identifying and updating the changes in the social baseline structure in the neighbourhoods over the past two years and in parallel to this, to determine the demands/grievances that may come from the stakeholders. In addition to this, the Consultant conducted a RAP study in February 2024 for the Project to identify the procedures for the resettlement process and the steps the Project Company will take to mitigate adverse impacts, compensate for losses and provide development benefits to affected people and communities.

In brief, stakeholder engagement activities primarily focused on gaining approval from local stakeholders for the Project, whereas the Consultant's work cantered around assessing the Project's social impacts, including aspects like land acquisition and the Project's impact on the local economy. The Consultant also proposed measures to mitigate any adverse impacts.

18.4.3 Stakeholder Engagement Activities during ESIA

Mott MacDonald Social Team conducted a site visit on 30-31 October 2023 within the scope of the ESIA study of the Project. Out of the seven affected villages, only two were visited by the Consultant as a part of the site visit conducted in October 2023. This limitation in the site visit can be attributed to various factors such as time constraints and logistical challenges. However, despite this limitation, the potential information gaps were effectively addressed through various strategies. Primarily, the Consultant relied on extrapolation of interview results to gain a broader understanding of the overall situation since the villages in the scope of the Project have similar baseline characteristics. Additionally, secondary data sources were extensively utilized to supplement the information obtained on-site. These sources included reports, studies, and statistical data that provided a holistic perspective on the broader context. Some of the statistical data was available at district level and these were obtained from the governmental institutions' websites and Turkish Statistical Institute (TurkStat) database; they do not cover certain issues on social environment such as gender aspect, vulnerable groups, workforce distribution, and unemployment rates. Similarly, the statistical data at village level either remain as limited for some indicators (i.e., gender) or are based on estimated/ approximate numbers

(i.e., educational level, vulnerable groups, workforce distribution, unemployment rates) since majority of these data were gathered through the verbal statements of the mukhtars or representatives of the governmental authorities rather than the officially registered data.

Through the combined approach of extrapolation from interviews and the use of secondary data, the potential information gaps resulting from limited site visits were effectively mitigated. This ensured that the findings and conclusions derived from the assessment were as comprehensive and accurate as possible.

The aim of the site visit included collecting baseline data about the Project affected villages, understanding the Project-related concerns and expectations of the local community members, reflecting the views of key stakeholders, and identifying vulnerable groups.

In line with these aims, key district-level governmental bodies, mukhtars and local residents were consulted during the site visit in order to identify local community members and other Project stakeholders, understand their perceptions about the Project, address any concerns they may have about the Project, and identify the Project impacts. The difficulty in conducting interviews with some stakeholder groups affected by the Project (e.g., vulnerable groups, NGOs) due to time constraints and logistical challenges remained as a limitation of the consultation study. The external stakeholders interviewed during the field studies are listed below:

- Çanakkale Provincial Directorate of Agriculture and Forestry
- Mukhtar and residents of Hacıgelen village (Çanakkale)
- Mukhtar and residents of Üçpınar village (Çanakkale)

The main findings of these consultations are summarized below:

- The residents were informed about the Project about a year ago.
- Consulted residents of Hacıgelen and Üçpınar villages had some concerns about the Project's potential adverse impacts, which include damage on the natural water resources, the forests change in the current climate (i.e., less rain), and loss of trees, and animals due to Project activities.
- Residents of both villages reported that tree felling has started in the area where the wind turbines are located.
- Residents also stated their concern about the microclimate change in parallel with the activities of other energy companies in the region.
- It was mentioned that the nearest turbine to be built is 1.5 km distant to the villages and it may disturb the local residents since the sounds coming from other turbines operated by another company disturb the public at night.
- The majority of the consulted residents were aware of the Project's land acquisition activities and mentioned that the land acquisition negotiations were handled well by the Project Company. No important situation regarding the expropriation and land acquisition processes was noted.
- During the site visit, it was not possible to reach out all directly affected local community members. However, this limitation is filled with the studies carried out within the scope of RAP site visits in February 2024.
- The following development areas were suggested and/or expected by the consulted stakeholders:
  - Establishing socioeconomic/community development projects for the residents residing in the Project-affected villages,
  - Creating local employment opportunities for the youth and unemployed in the nearby villages,

– Providing support to construct or improve the social facilities (i.e., coffee house) in the nearby villages.

The above-mentioned development areas have been taken into consideration and elaborated in the relevant sub-sections of the Chapter 13: Social Environment within this ESIA Report.

18.4.4 ESIA Public Disclosure and Consultation

A disclosure package of the Project that includes the Final Draft ESIA Report together with the SEP, Non-Technical Summary (NTS)[210], Resettlement Framework (RF), Framework Biodiversity Action Plan (BAP), and stand-alone Critical Habitat Assessment (CHA) (both in English and Turkish) will be disclosed to the public through the Project Company's website. The objective is to enable the Project stakeholders to review the results of the ESIA study as well as to gather their comments and questions on the outcomes. The duration of the disclosure period has been determined to be 60 days for the Project.

During the disclosure period, the findings of the ESIA studies, potential impacts of the Project and mitigation measures to be applied will be shared in a public participation meeting which is planned to be held within the scope of the stakeholder engagement activities of the Project's ESIA process. This meeting may be held more than once depending on the accessibility of the meeting location and the size of the meeting area. Resettlement specific disclosure and consultation steps are given in RAP. During the resettlement specific disclosure and consultation meetings, Project-specific RAP will be disclosed to the PAPs directly affected by the Project.

The public participation meeting will be announced by soft copy invitations via e-mails, hard copy invitations via correspondence and mails, and press release by local newspapers and media agencies. The invitation will include a Project Information Document (PID) that involves brief information about the ongoing ESIA process as well as communication channels that the Project stakeholders can report their opinions and comments about the Project.

When selecting the meeting location, a nearby village that is easily accessible to all stakeholders (especially those living in the Project's area of influence) will be selected and, where necessary, transport will be provided to enable individuals who are living in the other villages and desire to participate in the meeting.

Local community members will be provided opportunities to interact with the Project Team on matters related to environmental and social aspects of the Project and provide inputs. The meeting minutes, which will include the stakeholders' questions and comments, will be kept in a written formal document. In addition to the verbal statements during face-to-face meetings/visits, stakeholders also may comment to the ESIA via phone calls to the Project Company/CLOs, and e-mails to the Project Company.

The documents in the disclosure package will be revised and finalized in line with the feedback from the Project stakeholders. Finalized disclosure package will also be published on the Project Company's website.

18.5 Stakeholder Engagement and Consultation Approach Throughout the Lifetime of the Project

18.5.1 Stakeholder Engagement Plan

Within the scope of the ESIA process, a Project-specific SEP covering the pre-construction, construction and operation phases is prepared by the Consultant. The objective of the SEP is to

[210] Summaries of the Climate Change Risk Assessment (CCRA) and Human Rights Impact Assessment (HRIA) that are conducted within the scope of the Project will be covered as part of NTS.

provide a brief summary of the stakeholder engagement activities undertaken to date and present a strategic guideline for future stakeholder engagement and consultation activities that will be implemented throughout the Project lifecycle in a comprehensive and culturally appropriate way. Also, the SEP will follow a gender-sensitive approach during all implementation phases. In parallel with this principle, a female CLO has been employed for the Project in order to undertake discussions with women in a more effective way during the lifetime of the Project. Please see Section 18.6.5 for contact details of the CLOs. The SEP ensures that communication tools and information sharing mechanism are accessible to the vulnerable groups identified within the scope of the Project.

The SEP defines the stakeholder engagement activities to be organized, grievance mechanism to be applied, and the Project personnel responsible for the overall SEP implementation. During the definition of these Project-specific components, the temporary SEP, which has been prepared prior to the ESIA process and in place since October 2023, was utilized. The temporary SEP includes information about the previous stakeholder engagement activities and describes the future engagement requirements as well as the grievance mechanism. As per the temporary SEP and other documents shared by the Project Company, it is seen that the stakeholder engagement activities conducted so far have followed a local community member-centred and structured framework in line with the international requirements. The same approach will continue to be applied on site throughout the Project lifecycle.

Stakeholder engagement and consultation activities will be conducted throughout the Project's pre-construction, construction and operation phases and recorded into a central log with relevant details (i.e., stakeholder group, consultation subject, and outcomes of the consultation).

In addition, a Project-specific grievance mechanism will be established and implemented as defined in the SEP for long-term communication between the Project and the stakeholders. Received grievances will be registered into a central log with relevant details (i.e., subject, priority level, and actions taken).

Both the stakeholder engagement process and management of the grievance mechanism that will be followed throughout the Project lifecycle is described in the SEP in detail. SEP will ensure communication tools and information sharing mechanism accessible to the vulnerable groups identified within the scope of the Project.

The Project Company is committed to actualize effective stakeholder engagement as defined in the SEP and in line with the IFC PS1, PS2 and PS5, EBRD PR10, EP IV Principles 5 and 6, and DFC ESPPs 3 and 5 requirements. The Project Company is also committed to follow the Turkish EIA Regulation (OG Date/Number: 29.07.2022/31907), Law on Right to Information (No. 4982), Law on Preservation of Personal Data (No. 6698), Law on Use of the Right to Petition (No. 3071), and Regulation on the Principles and Procedures for the Enforcement of the Law on the Right to Information.

The SEP will be revised with the outcomes of the public participation meeting that will be conducted after the Final Draft ESIA Report is prepared and disclosure package of the Project is shared with the public.

The SEP is a live document; therefore, it will also be reviewed and updated regularly and will include stakeholder engagement activities carried out during the pre-construction, construction, and operation phases of the Project. The SEP will be updated on an annual basis and the updated version will be published on the Project website.

18.5.2 Community Liaison Officer (CLO)

The main point of contact for the Project stakeholders will be the CLOs. Two CLOs (a male and a female) have been employed within the scope of the Project, whose contact details are

provided in Section 18.6.5. Accordingly, disclosure, consultation and engagement activities of the Project will also be managed by the CLO on the basis of the stakeholder engagement and consultation program defined in the SEP. The Project Company will be involved in the stakeholder engagement and consultation activities when necessary.

The CLO will also be responsible for registering the stakeholder engagement and consultation activities into the Project-specific consultation log. The consultation form and consultation log utilized for the Project are provided in Appendix C and Appendix D, respectively.

18.5.3 Stakeholder Engagement and Consultation Program

18.6 Project Grievance Mechanism

18.6.1 Overview

The Project Company is required to establish an effective and accessible grievance mechanism as a part of the stakeholder engagement, information disclosure and consultation. The aim of the grievance mechanism is to provide channels that are free of manipulation, coercion and intimidation in which local community members can report their requests, concerns and grievances regarding the Project and its impacts. Responding to grievances and resolving them in a timely, proactively, unbiased, effective and efficient manner is essential according to the international standards and requirements on stakeholder engagement. Specifically, it provides a transparent and credible process for fair and sustainable outcomes. By this way, trust and cooperation could be mutually developed among the Project stakeholders and the Project Company through corrective actions. Main components of a successful grievance mechanism also include anonymity, confidentiality and transparency principles. Project's grievance mechanism is explained in the SEP in more detail.

According to the temporary SEP that has been in place since October 2023, the Project Company has a grievance mechanism for the Project stakeholders. There is a grievance register form used for registration of the grievance. The form is saved within the eBA software system of the Project Company, which is used for documentation and workflow management. Samples of the grievance register and closure forms are presented in Appendix E and Appendix F, respectively.

Grievance register form includes the signature of the applicant for the grievances received through meetings and visits. However, receiving the signature of the applicant is not applicable within the scope of the international standards on stakeholder engagement and grievance mechanism management. Also, the part in the form that requires information about the applicant shall be left blank in the cases where the applicant would like to raise grievance anonymously. The gender part is included in the form to categorize the grievances by gender of the applicants and take gender-sensitive measures in times of necessity. The grievance register form is revised in accordance with these principles.

Grievances are categorized as external and internal depending on the type of the stakeholder. Since they have different grievance channels and resolution processes, they are defined in Sections 18.6.2. and 18.6.3 separately.

18.6.2 Principles of the Grievance Mechanism

To ensure compliance with the international standards (particularly IFC PS1, PS2 and PS5, EBRD PR10, EP IV Principles 5 and 6, and DFC ESPPs 3 and 5), there are a number of principles that the Project Company will apply to the Project's grievance mechanism in general. These principles can be summarized as follows:

- There will be a formalized and written Project Grievance Mechanism Procedure that involves the principles of the mechanism (including anonymity), available channels with contact details of the CLO, defined timeframes for acknowledgement of the receipt of complaints and subsequent resolution, sample subjects that describes the type of grievance as per the identified Project impacts (i.e., noise, air, visual, dust, GBVH, labour management, and traffic), and management and resolution process together with the assigned responsible Project staff.
- Grievance mechanism will be committed to confidentiality and anonymity. Grievance channels both online and offline will be enabled to receive anonymous applications.
- It is crucial to provide appropriate environment where all internal and external stakeholders can easily report any GBVH-related grievance in a safe and confidential way when they need. GBVH cases will be registered and processed as a part of the current grievance mechanism. However, they will be approached in a more sensitive way and in an immediate time manner through ensuring confidentiality, non-retaliation, protection and supervision of victims, and utilize legal expertise when needed. A female CLO has been employed for the Project in order to work more effectively with women stakeholders in case if a GBVH incident occurs during the lifetime of the Project. Please see Section 18.6.5 for contact details of the CLOs.

18.6.3 External Grievance Mechanism

External stakeholders can use the grievance mechanism through the following channels:

- The grievance form disclosed on the Project website[211] that enables anonymous grievance applications
- Verbal statements during face-to-face meetings/visits
- Phone calls and/or online messages (i.e., via WhatsApp) to the Project Company/CLO
- Petitions
- Posters[212] that are hung in common areas of the Project affected neighbourhoods, indicating what the clear communication channels are
- E-mails to the Project Company

The steps listed below summarize the external grievance mechanism process:

[211] Project website can be accessed via https://yekares2.enerjisauretim.com. The link of the grievance form on the Project website will be included once finalized.

[212] Poster is given in Appendix G.

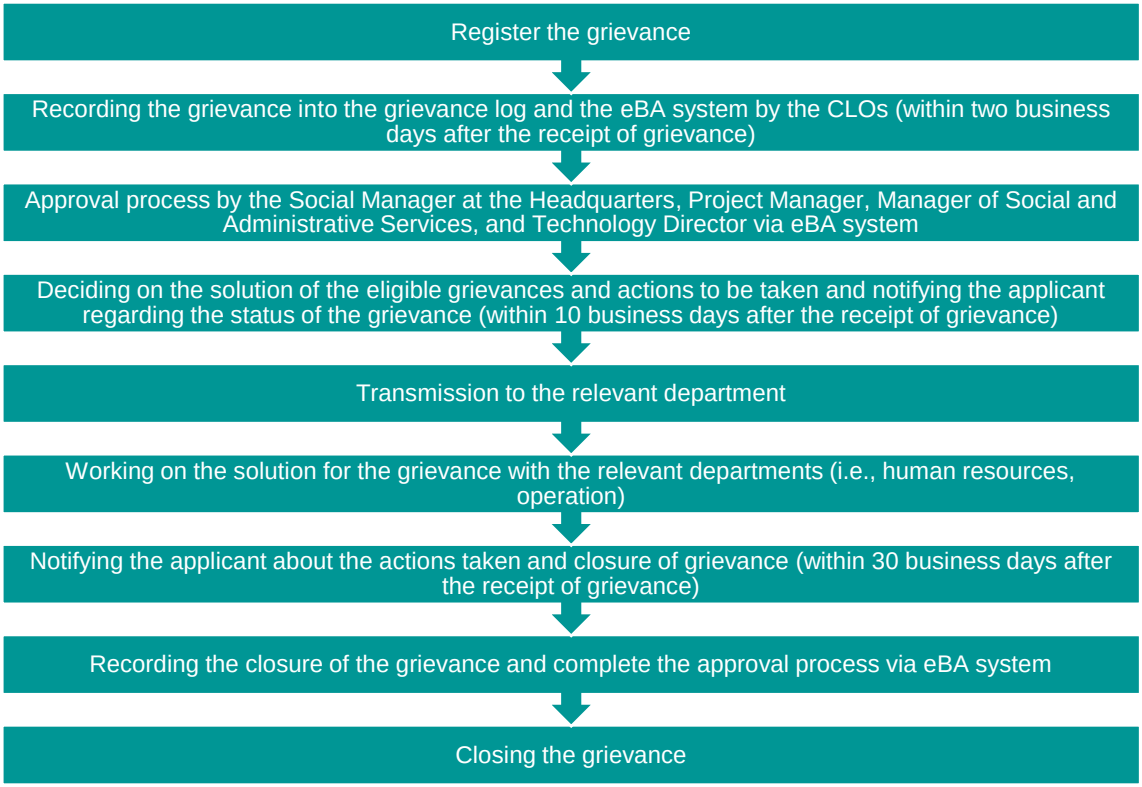

Figure 18.1: Steps of the External Grievance Mechanism Process

Should the Project Company be unable to resolve a complaint, or if the stakeholder is not satisfied with the outcome, the Project Company may consider seeking advice from other independent parties (i.e., local legal institutions and/or well-regarded NGOs) for further investigation, root cause analysis or actions in line with the good international practices on grievance management. Applicants always have the right to appeal to local or relevant legal authorities for a solution with which they are not satisfied.

Stakeholder request and grievance register log of the Project Company to be utilized throughout the Project is provided in Appendix H.

Although the Project's external grievance mechanism has been functioning effectively, there are a few areas that need to be improved for better implementation of the mechanism.

- The Project CLO will manage and monitor the grievance mechanism process in a close way since they are the main contact points on site for the stakeholders.
- All grievances will be reviewed to be classified whether they are genuine and related to the Project activities or not. If the issues/disputes raised are not related to the Project activities, kind guidance is provided to the applicant to contact relevant party.
- For eligible grievances, CLOs will assign actions to the relevant Project Company staff (depending on the subject of the grievance) for their assessment and clarification of the grievance resolution actions.
- Within a maximum of ten business days, CLOs will inform the applicant on resolution actions taken/to be taken. If the case requires a more complex investigation, this is also conveyed to the applicant. It is ensured that applicant is provided with updated information at each step of the process until the clarification of resolution actions.
- In general, grievances are estimated to be resolved and closed within 30 business days after the receipt. However, the timeline can change depending on the nature, subject and scope

of the grievance (i.e., the applicant's physical unavailability at the location of the grievance, inconvenient land/seasonal conditions, need for third-party assessments, arrangement of schedule for maintenance/repair works). Accordingly, the Project Company will make a prioritization among the grievances by considering their nature, subject matters and scope. The resolution period for the grievances with high priority will be revised as seven business days after the receipt of the grievance. For the grievances with medium priority, timeline will be 15 business days and the grievances that are prioritized as low will be resolved within 30 business days.

18.6.4 Internal Grievance Mechanism

Internal grievance mechanism covers the grievances of all employees working under the Project Company, its contractors, subcontractors and suppliers. The Project Company has formal employee grievance mechanisms. As specified in the temporary SEP, some of these practices are applied within the Project area. However, some improvement areas have been notified during the ESIA process of the Project. Both the employee grievance channels and improvement areas are listed below:

Table 18.5: Internal Grievance Mechanism Channels and Improvement Areas

Employee Grievance Channel	Improvement Areas
In line with the Code of Business Ethics[213] of the Project Company, there is an ethical violation declaration process within the Project Company that is managed by the Internal Audit Department to ensure the compliance with the ethical principles at corporate level. For this process, two documents named "Procedure for the Board of Workplace Behaviour Evaluation" and "Procedure on Ethics Evaluation" are in place. The Project staff can report ethical violations by using the ethical hotline, e-mail address, and an online form provided by the Project Company. Grievances reported through these channels are registered and evaluated by the Internal Audit Department. If a grievance is classified as an ethical issue, the Ethics Committee of the Project Company evaluates it and takes the required actions accordingly. On the other hand, if the issue concerns another department, it is directed to the related department(s). The ethical hotline and the online form can also be used by the workers of contractors.	● The steps of the ethical violation declaration process will be defined in detail with specified timeline for each step. ● The way these grievance channels defined under the Code of Business Ethics will be disclosed to the Project staff including contractors and subcontractors will be explained in detail and in a written way. ● The grievances reported by the Project staff through these channels will be registered in a central log that is established specific to the Project.
The Project staff can report their requests, recommendations and grievances during the employee committee meetings.	● The frequency of the employee committee meetings will be specified. ● The principles to be followed throughout these meetings will be clearly determined in line with the international standards on stakeholder engagement as well as labour and working conditions and disclosed to all Project staff. ● The grievances reported by the Project staff during these meetings will be registered in a central log that is established specific to the Project.
The Project staff can verbally or in a written way report grievances to their manager and Human Resources Department representatives.	● The principles to be followed will be clearly determined in line with the international standards on stakeholder engagement as well as labour and working conditions and disclosed to all Project staff. ● The grievances reported by the Project staff will be registered in a central log that is established specific to the Project.

[213] https://www.enerjisauretim.com.tr/hakkimizda/yonetim/politikalarimiz/enerjisa-uretim-is-etigi-kurallari

Employee Grievance Channel	Improvement Areas
The Project staff can report their suggestions through the eBA Suggestion System of the Company.	● The grievances/suggestions reported by the Project staff will be registered in a central log that is established specific to the Project.
Contractors and subcontractors will be responsible for providing their personnel with access to the grievance mechanism, collect the grievances accordingly, and inform the Project Company immediately upon receipt and take the actions for the management/resolution of the grievance with approval from the Project Company. If the subcontractors do not have a grievance mechanism, the Company will ensure the internal grievance mechanism will be accessible by the contractor and subcontractor workers.	● The workers of the contractors and subcontractors will be aware of the fact that they can directly use the Project's grievance mechanism channels and get in contact with the Project Company representatives. ● Instead of giving the responsibility to the contractor and subcontractor companies for providing access to the grievance mechanism, the Project Company will inform all Project staff about the grievance mechanism as a part of the induction process. The information provided during the induction will involve that the workers will not be retaliated or fired just because they raise grievances. ● The workers of the contractors and subcontractors will be free to assign their own workers' representative(s). ● Reporting grievances to the workers' representatives will also be a part of the internal grievance mechanism. Workers' representatives will be responsible for informing the CLO and/or other responsible personnel that manage grievances about all grievances that s/he received either verbally or in a written way. The CLO and/or other responsible personnel will register those grievances into the grievance log. ● The Project Company is recommended to conduct separate meetings with woman staff in the Project area in case women might have a specific concern or grievance that they cannot share with any of the grievance channels.
Grievance boxes are placed at the Project mobilization areas.	● There will be at least two grievance boxes at the Project area and facilities (i.e., refectory) and there will be available and empty grievance forms as well as pens next to the boxes. ● The grievance boxes will be locked and secured. Only the responsible personnel (i.e., the CLO, human resources manager) will have the keys of the boxes as well as the authority to open and check boxes. ● The Project staff will have the opportunity to apply anonymously. ● The location of the boxes will be specifically selected as out of sight from bystanders and cameras (i.e., resting areas) in order to preserve the anonymity of the grievance applicant. ● The grievance boxes will be checked daily, and grievances will be registered to the central grievance log immediately.

The Human Resources Department will be the main implementation body for the internal grievance mechanism of the Project and the following will be applied for all grievance channels for the successful implementation and management of internal grievance mechanism:

- Grievances will be classified and prioritized depending on their subjects while registering to the grievance log. Accordingly, resolution period for the grievances with high priority is recommended to be seven days after the receipt of the grievance. For the grievances with

medium priority, it is 15 days and the grievances that are prioritized as low can be resolved within 30 days.

- After the grievances are successfully closed and the corrective actions are taken, the results of the grievances including anonymous grievances will be displayed on the notice boards within the Project area.

In summary, all Project staff will be able to report their grievances through one-to-one meetings, petitions, telephone calls, e-mails, online forms that enable anonymous grievance applications, grievance boxes located in common Project areas (i.e., camps, refectory) that are checked on a weekly basis, and collective meetings. The Project Company aims at creating a positive working environment based on open and continuous communication.

18.6.5 Grievance Mechanism Channels and CLO Contact Details

The channels listed below can be used for receiving grievances. As stated in the temporary SEP, the Corporate Communication Department of the Project Company manages these grievances per the Corporate Communication Procedure and Crisis Management Procedure.

Grievance Mechanism Channels

- Official letter and/or petition to;
  - The Head Office (Barbaros Mah, My Office İş Merkezi, Çiğdem Sok. No:1/16 34746 Ataşehir/İstanbul), or
  - The Project Administration Office (Yukarı Okçular Mah, Çukurtarla Mevkii, Merkez/Çanakkale)
- Phone number of the Head Office: (0216) 512 40 00
- Project e-mail address: yekares2@enerjisauretim.com
- Project website: https://yekares2.enerjisauretim.com
- The grievance form disclosed on the Project website that enables anonymous grievance applications
- Posters that are hung in common areas of the Project affected neighbourhoods (i.e., teahouses and/or mukhtars' offices), indicating what the clear communication channels are

Contact Details of the CLO

The information contained herein is excluded from the publicly disclosed version of this document in compliance with personal data protection regulations.