MOTT MACDONALD

Uygar Wind Power Plant (WPP) Project

Environmental and Social Impact Assessment (ESIA) Report

June 2024

This page left intentionally blank for pagination.

Mott MacDonald
Mesa Koz
Sahrayıcedit District
Atatürk Street No. 69 / 255
34734 Kadıköy
Istanbul
Turkey

T +90 (0) 216 766 3118
mottmac.com

Uygar Wind Power Plant (WPP) Project

Environmental and Social Impact Assessment (ESIA) Report

June 2024

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	January 2024	ESIA Team	Hande Hatipoglu Gizem Arıkan Gürler Mustafa İşlek	Neslihan Ayvaz Özen	Draft ESIA Report
B	May 2024	ESIA Team	Hande Hatipoglu Gizem Arıkan Gürler Mustafa İşlek	Neslihan Ayvaz Özen	Draft ESIA Report
C	June 2024	ESIA Team	Hande Hatipoglu Gizem Arıkan Gürler Mustafa İşlek	Neslihan Ayvaz Özen	Final Draft ESIA Report

Document reference: 221100030 | ESIA | C |

Information class: Standard

Contents

Tables

Figures

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
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	Uygar 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

EN 1 Rüzgar Enerjisi Yatırım A.Ş. has been awarded to invest 250MW_e in the Balıkesir Connection Region 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, the "Agreement on Allocation of Renewable Energy Resource Areas and Connection Capacity Based on Wind Energy in Balıkesir Connection Area" was signed between EN 1 Rüzgar Enerjisi Yatırım A.Ş. and Ministry of Energy and Natural Resources (MoENR) on 9 May 2020. Subsequently, EN 1 Rüzgar Enerjisi Yatırım A.Ş. has been merged with Enerjisa Enerji Üretim Anonim Şirketi ("Enerjisa Üretim" or "the Project Company") upon the decision from Republic of Türkiye Istanbul Trade Registry Directorate dated 30 December 2022.

Uygar Wind Power Plant (WPP) Project ("the Project") with 60 turbines and 252 MW_m/250 MW_e total installed power, is planned to be implemented by Enerjisa Üretim in Balıkesir Province, Burhaniye and Savaştepe Districts, Haydar, İkizce, Büyükyenice and Taşdibi Neighbourhoods; İzmir Province, Bergama District, Oruçlar, Ürkütler, Yukarıada, İneşir, Alhatlı, Durmuşlar, Çamoba and Kozluca Neighbourhoods; Manisa Province, Soma District, Kiraz Neighbourhood. 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 Region of western Türkiye; aiming to harness the wind energy potential of the region.

The Project area is one of the areas declared[2] as a YEKA within the scope of the Renewable Energy Resource Areas (YEKA) Regulation[3]. The Project Company has secured the preliminary license dated 6 April 2023, and valid for eight months and seventeen days. Pre-license refers to the permission granted to the Project Company for a certain period of time (i.e., 21 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 EIA approval. According to the information shared by the Project Company, the construction period of the Project will be 21 months and the operation period will be 49 years as stated in the National Environmental Impact Assessment (EIA) Report.

The construction of the Project has been initiated in the first quarter of 2024 with the construction of Project roads and is planned to be completed by the third quarter of 2025. For detailed Project construction schedule, please refer to Section 2.5.2.

The Project will consist of 60 wind turbines with unit power of 4.2 MW_m/4.167 MW_e together with two switchyards, an administrative building, access and site roads, an internal Energy Transmission Line (ETL) to connect the switchyards and as well as an energy transmission line (ETL) as a Project associate facility (please refer to Section 2.3 for details). Blasting activities will be conducted at the specified turbine locations, and a 200 tonnes/hour capacity mobile crushing and screening facility[4], will be established for sizing the materials obtained from the

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

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

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

[4] 200 tonnes/hour capacity mobile crashing and screening facility is included in the National Environmental Impact Assessment (EIA) Study.

blasting. The Project is designed as such the WPP will have 1,000,000,000 kWh of annual electricity generation capacity with a total installed power of 252 MW_m/250 MW_e.

The Project is subject to conducting a National Environmental Impact Assessment (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 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*. The EIA Application File was submitted by the Environmental Consultancy Company, DE on 25 February 2022 to the MoEUCC, initiating the EIA process. Following the official announcement by the MoEUCC on 10 March 2022, the responsibility for the National EIA Report preparation was transferred to Nartus Company on 21 February 2023. In this sense, a National EIA Report was prepared for the Project by an environmental consultancy company, namely Nartus. The Review and Evaluation Commission meeting for the Project took place on 18 July 2023, at the MoEUCC, where all relevant institutions expressed their positive opinions on the final amendments on the Project and commitments are provided in final draft National EIA Report. The final National EIA Report prepared by Nartus was accepted by the official announcement shared on 1 September 2023 by the MoEUCC. The EIA Positive Decision for the Project was granted on 15 November 2023.

The internal ETL component of the Project is also subject to EIA Study. The responsibility of the EIA and permitting processes fully lies with the Project Company. For the internal ETL project, a Project Description File in line with the requirements of National EIA legislation has been prepared by a local company with a competency certificate to prepare the report and submitted to the MoEUCC.

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

The IFIs seek compliance with internationally accepted environmental and social standards. Therefore, they require the Project Company to conduct the environmental and social impact assessment study (ESIA). As defined in the World Bank's Environmental and Social Framework document, ESIA is an instrument and a systematic process to identify and assess the potential environmental and social impacts 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: Policy, Legal and Institutional Framework*.

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

1.2 Project Parties

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 generator 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 coming years[6].

1.2.2 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.

1.2.3 The Consultant

As part of the financing process and achieving the sustainable outcomes in the Project, Mott MacDonald (“the Consultant”) has been appointed by Enerjisa Üretim to undertake an Environmental and Social Impact Assessment (ESIA) Study to identify the impacts that are likely to occur due to implementation of construction and operation activities within the scope of the Project and 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 as well as construction and operation phase environmental and social sub-management plans in reference with the subjects and potential impacts covered in the ESIA report.

1.2.4 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 consultancy companies to support during the National EIA process. The consultancy activities include social studies undertaken by Adam & Smith, and environmental monitoring studies for the National EIA undertaken by Nartus. For the internal ETL project as a component of the Project, a Project Description File in line with the requirements of National EIA legislation has been prepared.

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 on 15 November 2023, from Energy Generation Strategy | EnerjiSA Üretim (enerjisauretim.com.tr)

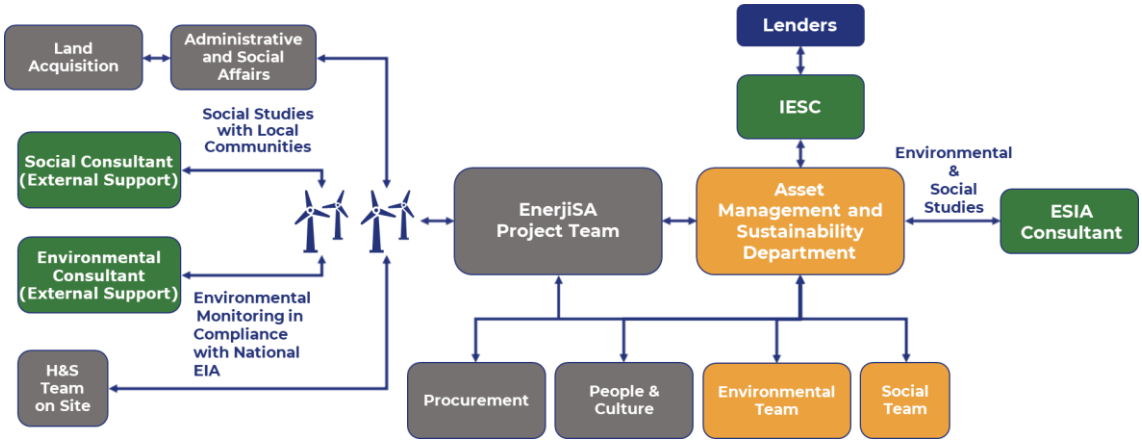


Figure 1.1: Project Organisational Chart

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

1.3 ESIA Scope and Objectives

The ESIA process anticipates and evaluates the impact of the Project on various aspects of the physical, biological, cultural, and socioeconomic environment. This is followed by the identification of appropriate mitigation measures to prevent, mitigate, correct, offset or compensate for adverse impacts related to the nature and scale of the Project.

Within the scope of the ESIA studies, the Consultant carried out environmental and social impact assessments and evaluated the outcomes of the completed EIA studies conducted within the scope of National EIA Report to comprehensively understand the Project's implications. The gaps analysed to assess the Project's compliance with the applicable national and international environmental, health, safety and social standards within the scope of the ESIA Scoping Report prepared by the Consultant. The identified compliance 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 ESIA studies. The Consultant carried out required work to collect additional data and conducted additional assessments required for the Project within the scope of ESIA studies. The findings and assessments of these work are presented in this ESIA Report providing the Project's potential impacts and the proposed measures to address them.

Accordingly, the primary objectives of ESIA for the Project are shared 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 the *Chapter 3: Policy, Legal and Institutional 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,
- Identification of potential risks associated with the Project and proposing mitigation measures to minimize or eliminate adverse impacts on the environment and communities,
- Evaluating the potential impact of the Project on local flora and fauna and proposing measures for protection of biodiversity,
- Assessing the potential impact of the Project on air and water quality, noise levels, emissions, and potential contamination, and proposing measures to mitigate adverse impacts,

- Evaluating the potential impact on cultural heritage sites, social structures, and local communities and proposing measures to preserve cultural and social heritage,
- Evaluating the potential impacts on community health and safety including the impact of noise, visual effects, and proposing measures to ensure wellbeing of the local communities,
- Assessing the 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 adverse impacts or eliminating them and maximizing positive contributions to the surrounding communities and ecosystem.

1.4 Project Timeline

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

- The detailed design phase of the Project has commenced.
- The National EIA process was initiated on 25 February 2022 and the process is completed on 15 November 2023 for the Project.
- The National EIA process for the internal Energy Transmission Line (ETL) was initiated on 26 October 2023 and ongoing.
- ESIA Scoping Report for the Project was prepared and finalised in November 2023.
- Primary ESIA baseline data collection performed from October 2023 to November 2023.
- Draft ESIA Report submitted in May 2024.
- The disclosure period of the Final Draft ESIA is 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.

This ESIA is structured as follows:

- Non-Technical Summary;
- The 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
- SEP (Stakeholder Engagement Plan)
- Community Level Assistance Program (CLAP) Methodology
- Human Rights Impact Assessment
- Resettlement Action Plan (RAP)

1.5.1 Non-Technical Summary

The Non-Technical Summary (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 ESIA Report.

1.5.2 Structure of the ESIA Report

The structure and content of this ESIA Report is shared in Table 1.1.

Table 1.1: Structure of ESIA Report

No.	Chapter	Description of Content
1	Introduction	Presents a brief overview and purpose of the ESIA study and report.
2	Project Description	Describes the Project, its main elements and activities for construction and operation, the alternatives options considered in reaching the final design.
3	Policy, Legal and Institutional Framework	Defines key national policy and legislation, and international requirements and guidelines applicable to the Project, as well as key national institutions and International Financial Institutions (IFIs).
4	ESIA Scope and Methodology	Sets out the stages of the ESIA, key assumptions and methodologies for undertaking the ESIA.
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.
6	Land Use, Soils and Geology	
7	Air Quality	
8	Climate & Greenhouse Gases (GHG)	
9	Noise and Vibration	
10	Landscape and Visual	
11	Waste and Resources	
12	Biodiversity	
13	Social Environment	
14	Occupational Health and Safety	
15	Community Health and Safety	
16	Cultural Heritage	
17	Cumulative Impacts	The assessment of cumulative impacts considers 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 from within the Project are identified.
18	Information Disclosure and Consultation	This chapter outlines the information disclosure, consultation and participation activities that have been undertaken as part of the ESIA process in accordance with the Stakeholder Engagement Plan (SEP).
19	References	Presentation of the references used during preparation of this 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, site staff and the local population

against site activity 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. As far as practical this would be based upon existing management plans and procedures implemented by the Project Company and would identify where additional strengthening may be required;
- 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 Environmental and Social Management System (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 shared 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 Project may introduce uncertainties in compliance requirements.
- Identifying cumulative impacts on the identified 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 shared below.

- The predictive models used for air quality, noise, shadow flicker, and visual impact assessment may have limitations in capturing actual 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 is essential to acknowledge these limitations and uncertainties to provide a realistic and transparent assessment. The Consultant applied many studies and strategies, to decrease and eliminate these challenges ensuring more robust and reliable outcomes within the scope of ESIA study, which are shared below:

- Conducted field studies to gather accurate data.
- Assessed the worst-case scenarios while carrying out all modelling studies e.g., air quality, noise.
- Developed frameworks that enable constant monitoring, assessment and adjustment of mitigation measures involving the integration of real data collection, continuous risk assessment and adaptive management strategies to ensure ongoing effectiveness of mitigation measures.
- Established a robust monitoring plan to verify effectiveness of mitigation measures during the construction and operation phases and ensure that 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 in relation to its location, the significant components of the Project and overview of the proposed activities which are to take place during the planning, construction and operation phases.

2.1.1 The Project

The Project involves the establishment and operation of a wind power generation plant consisting of 60 turbines, with a total installed power of 252 MW_m/250 MW_e, and a capacity to produce 1,000,000,000 kWh of renewable energy annually. The Project area, which is located in Balıkesir Province, Burhaniye and Savaştepe Districts, Haydar, İkizce, Büyükyenice and Taşdibi Neighbourhoods; İzmir Province, Bergama District, Oruçlar, Ürkütler, Yukarıada, İneşir, Alhatlı, Durmuşlar, Çamoba and Kozluca Neighbourhoods; Manisa Province, Soma District, Kiraz Neighbourhood in Türkiye, has been strategically chosen based on wind resource assessments and environmental considerations.

EN 1 Rüzgar Enerjisi Yatırım A.Ş. obtained a 250 MW_e connection right in the Balıkesir Connection Region through the “Competition Announcement for the Allocation of Wind Energy Based YEKA and Total Connection Capacities”. The agreement was signed with the MoENR on 9 May 2020. Later, EN 1 Rüzgar Enerjisi Yatırım A.Ş. merged with EnerjiSA on 30 December 2022.

The EIA Application File was submitted by the Environmental Consultancy Company, DE on 25 February 2022 to the MoEUCC, initiating the EIA process. Following the official announcement by the MoEUCC on 10 March 2022, the responsibility for the National EIA Report preparation was transferred to Nartus Company on 21 February 2023. Public participation meetings were conducted in İzmir, Balıkesir, and Manisa in April 2022.

During the pre-licence phase of the Project, it was planned to operate with 60 turbines, each with a unit power of 4.2 MW_m/4.167 MW_e, and a total installed capacity of 252 MW_m/250 MW_e. Due to overlapping areas between mining licenses and turbine locations, a modification was necessary in the EIA process.

Following the relocation, the opinions of commission member authorities were requested. In line with requests from these authorities, turbine locations were revised without changing the total installed capacity and total number of turbines. Finally, approval was requested from the MoENR.

Upon the submission of Final EIA Report, during the eight-months and seventeen days pre-licence period (which was still ongoing at the time of preparation of the Draft ESIA Report), there was an additional amendment regarding each electrical power capacity of the Project. The amendment included change of the electrical power from 3 MW_e to 4.167 MW_e, and therefore the total installed capacity to 252 MW_m/250 MW_e. This amendment aligns with the initially secured total nominal and electrical power capacity in the pre-licence of the Project.

The MoENR General Directorate of Energy Affairs received a new information form and change justifications for altered unit coordinates of the Project. Upon evaluation, it was confirmed that the unit coordinates fall within the designated YEKA area and do not impact neighbouring turbines. These changes comply with the relevant national regulation, as declared in official correspondence dated 19 April 2023.

The Project Company secured a pre-license for the Project on 6 April 2023, which was issued by EPDK and is valid for eight months and seventeen days.

The Project will involve the following works:

- Construction of 60 wind turbines and related parts (e.g., cabling systems), two switchyards, an administrative building, access and site roads, a mobile crashing and screening facility and the internal Energy Transmission Line (ETL) to connect the switchyards and the Project associated ETL to connect with national grid for the Project; and
- Operation of 60-turbine Uygar WPP.

According to the Project schedule, the construction phase is expected to be 21 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 610 at peak times, while this number is expected to be 22 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 increasing 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 results in a significant question mark in 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 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, geothermal, 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 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

[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)

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 and Layout

2.2.1 Location

The Project licence area falls within three provinces of Türkiye; namely İzmir, Balıkesir and Manisa, which are located in the Aegean region of Türkiye. Figure 2.1 provides the location of these three provinces of Türkiye.

Figure 2.1: Provinces of Türkiye where the Project Licence Area Falls within[10]

Source: Mott MacDonald

According to the Wind Power Plants Report published by Türkiye Wind Energy Association (TÜREB), considering the share of wind turbine power plants in operation in the Aegean Region, İzmir ranks first with an installed capacity of 1,886 MW_m (16.99% share), while Balıkesir ranks second with an installed capacity of 1,375 MW_m (12.39% share), and Manisa ranking fourth with an installed capacity of 727.55 MW_m (6.55% share). With the Uygar WPP Project, it is aimed to contribute to the national energy strategy targets as well as regional economy by utilizing the wind potential of Izmir, Balıkesir and Manisa provinces.

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

- Turbines T1, T2, T25, T26, T28, T35-48, T50-55 and T57-60 are located in Bergama District, Izmir,
- Turbines T3-24, T27, T49, T56 are located in Ivrindi District, Balıkesir, and
- Turbines T29 to T34 are located in Soma District, Manisa.
- Access roads are located in İzmir and Balıkesir Provinces, connecting the turbine area from Bergama District to İvrindi District.
- Two switchyards (one in north side and one in south side at the Project's layout)

[10] Yellow colour represents Manisa, purple colour represents Balıkesir, and green colour represents İzmir.

- ETL of the Project are; one is located between Bergama District, İzmir and Soma District, Manisa; connecting the Project substation to the Uygar WPP Transformer Substation (TS)-İzmir Havza TS and another one is located between Bergama District, İzmir and Soma District, Manisa; connecting the Project substation to the existing Uygar WPP TS-Bayramiç Havza TS.

In addition, the need for on-site access roads, which will provide access to the Project units and to the site, will be met by opening new roads (if necessary) and/or expanding the existing roads within the Project area. There is an internal energy transmission line to connect north switchyard to south (main) switchyard.

Furthermore, Uygar WPP TS-Bayramiç Havza TS will be constructed by the Turkish Electricity Transmission Corporation (TEIAS) and Uygar WPP TS-İzmir Havza TS will be constructed by the Project Company but both of them to be operated by TEIAS, having a route starting from the Project switchyard to the relevant regional substation (please refer to Section 2.3 for detailed information).

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. The mountains of the region descend perpendicularly to the sea, allowing sea winds to reach inland areas where the Project site is located.

2.2.2.1 Climate

The average daytime temperature in the region is 29°C in August, while the coldest month is January with an average maximum daytime temperature of 13°C. The number of hours of sunshine per day is highest in July with 11 hours of sunshine. The relative humidity in the region averages 75% in January, while it is easier to endure in July. Meteorological data of Izmir, Manisa and Balıkesir provinces, where the Project licence area is located, are provided in Table 2.1, Table 2.2, and Table 2.3 respectively. Accordingly, highest mean temperatures were seen in July, while the lowest temperatures were observed in January for all three provinces.

Table 2.1: Meteorological Data of İzmir Province (1927 – 2022 Measurement Period)

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean Temperature (°C)	8.80	9.6	11.6	15.9	20.8	25.4	27.9	27.7	23.8	18.9	14.3	10.6	17.9
Mean Highest Temperature (°C)	12.4	13.6	16.3	20.9	26.1	30.7	33.2	33	29.2	24	18.6	14.1	22.7
Mean Lowest Temperature (°C)	5.8	6.2	7.7	11.2	15.5	19.9	22.5	22.4	18.7	14.6	10.8	7.6	13.6
Mean Daily Sunshine Exposure (hour)	4.3	5.2	6.4	8	9.9	11.6	12.3	11.9	10.1	7.6	5.6	4.2	8.1
Average Number of Rainy Days	12.66	10.69	9.27	7.88	5.31	2.33	0.45	0.54	1.93	5.36	8.75	12.74	77.9
Mean Monthly Total Precipitation (mm)	134.8	103.4	75.1	45.7	31.3	12.4	4.1	5.9	15.1	44.1	91.8	146.2	709.9
Highest Temperature (°C)	22.5	27	30.5	32.5	37.6	41.3	42.6	43	40.1	36	30.3	25.2	43

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Lowest Temperature (°C)	-8.2	-5.2	-3.8	0.6	4.3	9.5	15.4	11.5	10	3.6	-2.9	-4.7	-8.2

Source: Provincial General Statistical Data. Ministry of Environment, Urbanization and Climate Change, General Directorate of Meteorology. Retrieved 16 April 2024, from https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=A&m=IZMIR.

Table 2.2: Meteorological Data of Manisa Province (1930 – 2022 Measurement Period)

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean Temperature (°C)	6.60	7.9	10.5	15.1	20.3	25.2	28	27.7	23.3	17.8	12.2	8.1	16.9
Mean Highest Temperature (°C)	10.8	12.7	16.2	21.5	27.1	32.1	35	34.9	30.7	24.4	17.6	12.3	22.9
Mean Lowest Temperature (°C)	3	3.7	5.3	8.9	13.4	17.6	20.5	20.4	16.2	11.8	7.5	4.5	11.1
Mean Daily Sunshine Exposure (hour)	2.7	3.7	5.1	6.1	8.2	10.1	10.8	10.2	8.6	6.2	3.9	2.3	6.5
Average Number of Rainy Days	13.23	11.11	9.89	8.96	6.76	3.39	1.05	0.83	2.28	5.72	9.42	13.57	86.2
Mean Monthly Total Precipitation (mm)	127.4	108	77.8	55.1	38.9	20	9.7	9.3	19.4	51.8	88.9	137.5	743.8
Highest Temperature (°C)	24.2	26.4	33.5	34.7	40.6	42.4	45.5	44.7	42.4	38.2	29.9	26.4	45.5
Lowest Temperature (°C)	-17.5	-10.9	-6.7	-2.7	2	7.4	10.5	8.5	3.3	-0.9	-7.3	-9.9	-17.5

Source: Provincial General Statistical Data. Ministry of Environment, Urbanization and Climate Change, General Directorate of Meteorology. Retrieved 16 April 2024, from https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=A&m=MANISA.

Table 2.3: Meteorological Data of Balıkesir Province (1999 – 2023 Measurement Period)

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean Temperature (°C)	4,7	6,1	8,8	12,8	17,8	22,6	25,5	25,6	21,3	16,0	10,4	6,4	14.8
Mean Highest Temperature (°C)	9,2	11,3	15,0	19,8	25,3	29,9	32,5	32,6	28,8	22,8	16,8	10,9	21.2
Mean Lowest Temperature (°C)	0,9	1,7	3,3	6,3	10,5	15,1	18,0	18,6	14,3	10,0	5,4	2,6	8.9
Mean Daily Sunshine Exposure (hour)	3,0	4,0	5,1	6,7	8,6	10,1	11,1	10,1	8,0	6,1	4,1	2,7	6.6
Average Number of Rainy Days	13,72	12,44	11,72	9,80	7,60	5,76	1,04	1,36	4,12	7,12	8,96	12,04	95.7
Mean Monthly Total Precipitation (mm)	86,3	77,7	64,0	56,7	37,7	34,6	11,6	4,8	28,2	47,9	76,1	78,9	604.5

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Highest Temperature (°C)	23,5	25,2	29,6	33,1	37,8	42,5	43,2	43,2	40,3	38,3	31,2	26,1	43.2
Lowest Temperature (°C)	-11,9	-18,8	-7,1	-4,0	1,1	5,0	11,0	9,4	3,2	-1,6	-7,9	-10,1	-18.8

Source: Provincial General Statistical Data. Ministry of Environment, Urbanization and Climate Change, General Directorate of Meteorology. Retrieved 16 April 2024, from https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=A&m=BALIKESIR.

In addition, local meteorology station data was provided in the National EIA Report prepared for the Project.

Meteorological information gathered from Bergama Meteorology Station (for the 1959 – 2022 period) under the National EIA studies are listed below:

- The annual average pressure is measured as 1008.8 hPa, the daily maximum pressure is 1034.3 hPa and the daily minimum pressure is 981.7 hPa. The month with the maximum pressure was January with 1034.4 hPa, and the month with the minimum pressure was March with 981.7 hPa.
- The annual average temperature is 16.1 °C, the daily maximum temperature is 45 °C, and the daily minimum temperature is -11.4 °C. The month with the maximum temperature was July with 45 °C, and the month with the minimum temperature was January with -11.4 °C.
- The annual total precipitation average is 667.3 mm. The month with the maximum precipitation was December with 172.5 mm.
- The annual average humidity is 63.2%. The monthly maximum relative humidity average is 75.4% in December and the monthly minimum relative humidity average is 49.7% in July.
- The average number of annual foggy days is 2.08, the average number of hail days is 2.21, the average number of frost days is 7.46, the number of thunderstorm days is 1.04, whereas the number of snowy days is 1.63, and the number of snow covered days is stated as 0.42.
- The maximum snow depth was observed in January with a maximum of 7 cm.
- The highest annual average total open surface evaporation was observed in July with 323.3 mm, and the lowest was observed in December with 19.4 mm. In terms of daily maximum open surface evaporation, the highest evaporation was observed in July with 16.6, and the lowest was observed in December with 2.8.

2.2.2.1 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 diagrams of Izmir, Manisa and Balıkesir Provinces are provided in Figure 2.2, respectively.

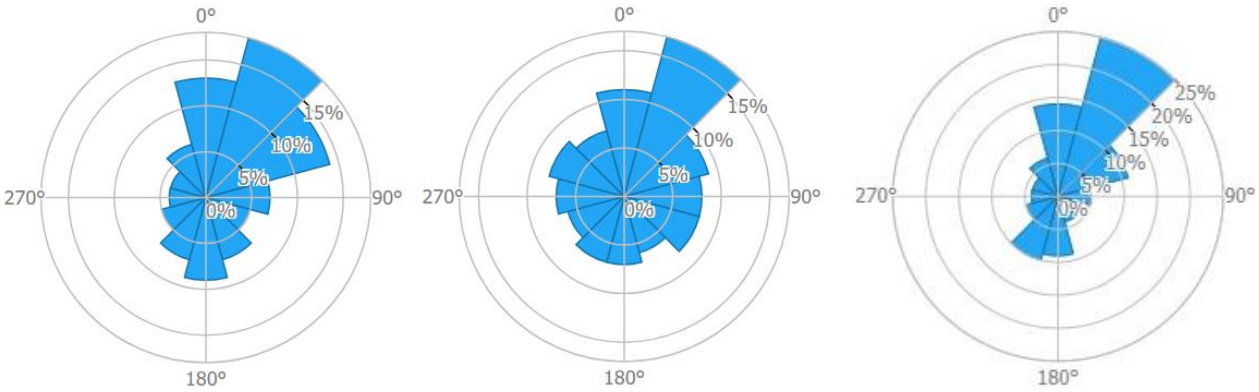


Figure 2.2: Wind Rose Diagrams of Izmir, Manisa, and Balıkesir Provinces[11]

Source: Global Wind Atlas. Retrieved 16 April 2024, from https://globalwindatlas.info/en/area/Turkey.

Turkey Energy Potential Map (REPA) indicates that the maximum wind speed in Izmir, Balıkesir and Manisa Provinces is 9.41 m/s, while the minimum wind speed is 1.96 m/s and the average wind speed is 5.05 m/s.[12] 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 6.5-8 m/s. Figure below shows the annual average wind speed distribution of İzmir, Balıkesir, and Manisa provinces. 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. In below figure, annual average wind speed distribution of İzmir, Balıkesir and Manisa provinces are provided.

[11] From left-hand side to right-hand side, figures indicate wind rose diagrams of Izmir − Manisa − Balıkesir.

[12] Ministry of Energy and Natural Resources (MoENR) General Directorate of Energy Affairs. Türkiye Rüzgar Enerjisi Potansiyeli (REPA). Accessed from https://repa.enerji.gov.tr/REPA/iller/BALIKESIR-REPA.pdf on 2 November 2023.

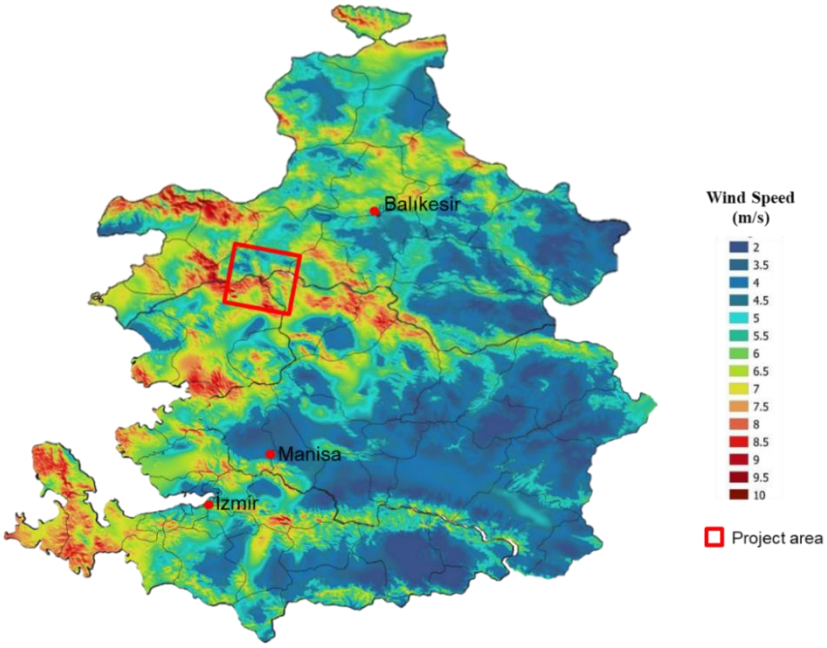


Figure 2.3: Annual Average Wind Speed Distribution of İzmir, Balıkesir and Manisa Provinces (at 100 m Elevation)

Source: Ministry of Energy and Natural Resources. (n.d.). *Türkiye Rüzgar Enerjisi Potansiyeli*. General Directorate of Energy Affairs, Ministry of Energy and Natural Resources. Retrieved on 23 October 2023, from https://repa.enerji.gov.tr/REPA/

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 the Project licence area and its components are provided in Figure 2.4. According to the 1/100,000 scale Master Plan prepared by General Directorate of Spatial Planning at the MoEUCC, some sections of the Project licence area, Project components, turbine points and the access roads fall within the "Agricultural Area", “Pasture Area” and "Forest Area" representations. In this context, the Project has an obligation to secure the necessary permits in regard with the Law on Pasture (No. 4342) and the Forest Law (No.6831), together with the Non-Agricultural Use Permit. Outside of the Project license area, ETLs are to be constructed within the scope of the Project as presented in Figure 2.4. According to the Project Introduction Documents (PID) prepared for ETLs in line with the National EIA requirements, including 1/100,000 Scale ÇDP, the ETLs routes fall within “Forest Area” and “Agricultural Area”. The summary of legislative obligations regarding the master plan are provided in Table 2.4.

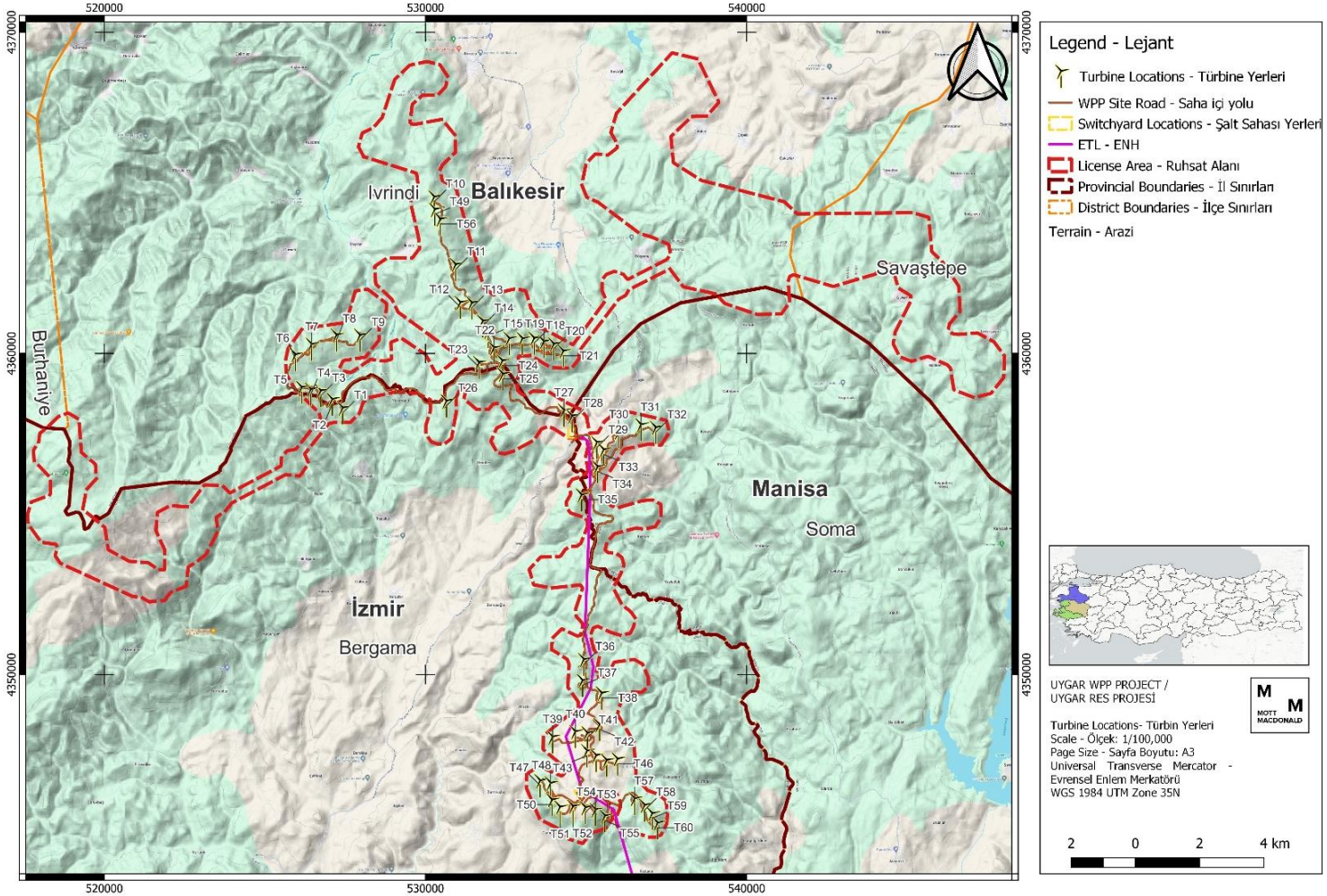


Figure 2.4: Location of the Project Licence Area (1/100,000 scale)

Table 2.4: Project Summary Table within the Scope of 1/100,000 Scale Master Plan

Demonstration Area within the Scope of Master Plan	Do Project Units Remain in the Master Plan Demonstration Area?					Basis of the Obligation	Are the Units in the Area Subject to Permit?
	Power Plant	Turbine	Switchyard	Access Road	ETL		
Agricultural Land	Partial	Yes	No	Partial	Yes	Soil Conservation and Land Use Law (5403), Soil Conservation and Land Use Law Implementation Regulation	Yes
Pasture Land	Partial	Yes	No	Partial	No	Law on Pasture (No. 4342) and Pastureland Regulation	Yes
Forest Land	Partial	Yes	No	Partial	Yes	Regulation on Implementation of Articles 17/3 and 18 of the Forest Law, Article 17 of the Forest Law (6831)	Yes

Source: Nartus. (2023). Uygar Wind Power Plant (WPP) Project National Final EIA Report and Duru, 2023, Uygar WPP Tali TS- Uygar WPP TS ETL Project Final Project Description Document and Duru, 2024, Uygar WPP TS-İzmir Havza TS ETL Project Final Project Description Document and

2.3 Project Components

The Project comprises the construction and operation of 60 horizontal axis wind turbines (HAWTs) to provide a maximum licensed power capacity of 250 MW_e to be delivered to the national grid system. Table 2.5 provides a summary of design parameters determined and accepted for the Project in accordance with the types of turbines used.

Table 2.5: Project Design Parameters

Design Parameter	Enercon GmbH[13]
General	
Project generation capacity	250 MW_e
Technology type	Horizontal-Axis Wind Turbine (HAWT)
Number of wind turbines	60
Type of wind turbine	4.2 MW ENERCON E-138
Nominal power	4200 kW
Wind class (IEC)	SA
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

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

Design Parameter	Enercon GmbH[13]
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

The Project consists of three main units and associated facilities (i.e., the Energy Transmission Line) subject to this ESIA study. These units are the basic component "turbine" which will be the main unit for energy production, the “switchyard” which will transmit the energy produced from the turbines to the national grid, ”the internal Energy Transmission Line (ETL)” which will connect the north switchyard to the south (main) switchyard, 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.

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.[14]

In the scope of the Project, 60 horizontal axis wind turbines with the following main design properties will be used:

- Type: 4.2 MW ENERCON E-138
- Hub Height: 111 m
- Rotor Diameter: 138.6 m
- Nominal Power: 4.2 MW_m/4.167 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 2.2. 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;

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

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 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 Switchyards

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 switchyards and substations will be provided by two transmission line one is 400 kV 123 km transmission line with 3B Pheasant 1272 MCM conductor and another one is 400 kV 13.1 km transmission line with 3B Pheasant 1272 MCM conductor. Connection between the north switchyard to the south (main) switchyard will be provided with the internal Energy Transmission Line (ETL). The number and locations of the switchyards integrated with the Project's layout are decided based upon the proximity to the wind turbines and accessibility to national grids. Thus, minimizing the length of electrical cables to reduce transmission losses and costs, and ensure transmitting the generated electricity efficiently.

The location of the switchyards is shown in Figure 2.5.

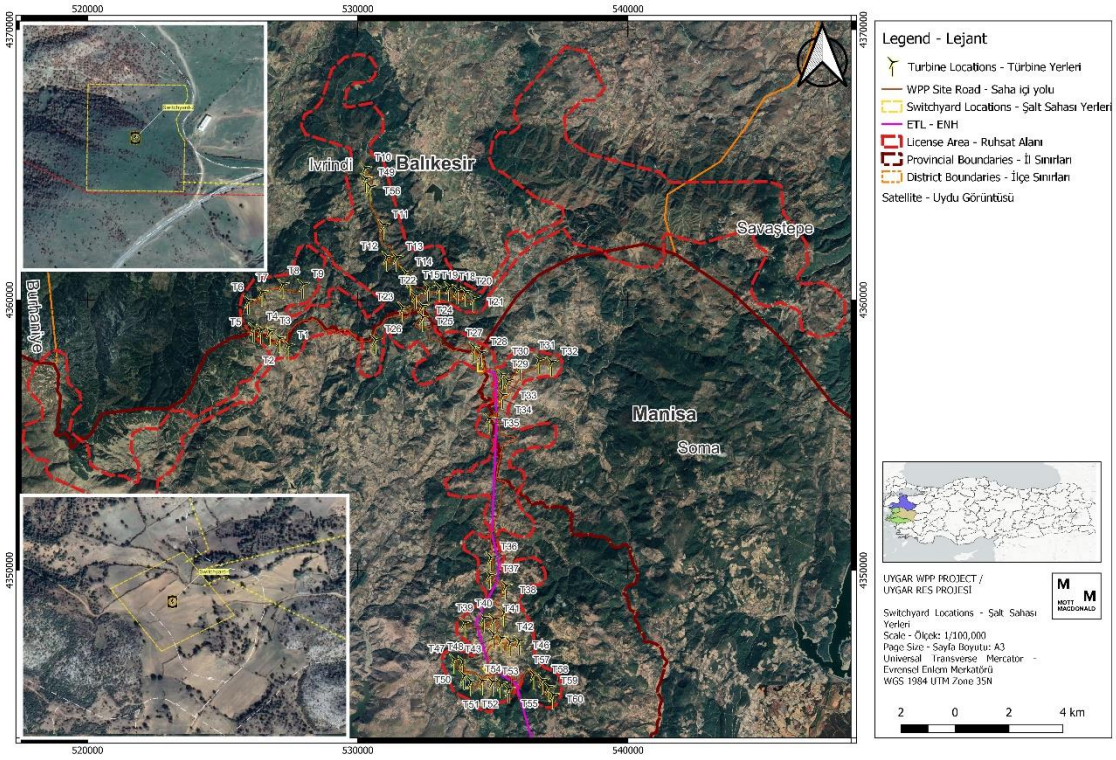


Figure 2.5: Project Switchyard Areas

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 transport road and the start of site roads while site roads cover the path along the wind turbines in the Project area.

It is to be noted that connection to the Project area will be provided through the connection roads from Bergama-Ivrindi Highway. These connection roads are defined as “Access Roads” in this Final Draft ESIA Report prepared by the Consultant. Figure 2.6 represents the types of roads that will be used within the scope of the Project.

As reported by the Project Company, there will be a site road construction performed within the Project licence area to reach southern turbines from the main access road. The only road construction to be performed within the scope of the Project is mentioned to be the site roads within the Project licence area, which will provide connection along the access roads, wind turbines and switchyards.

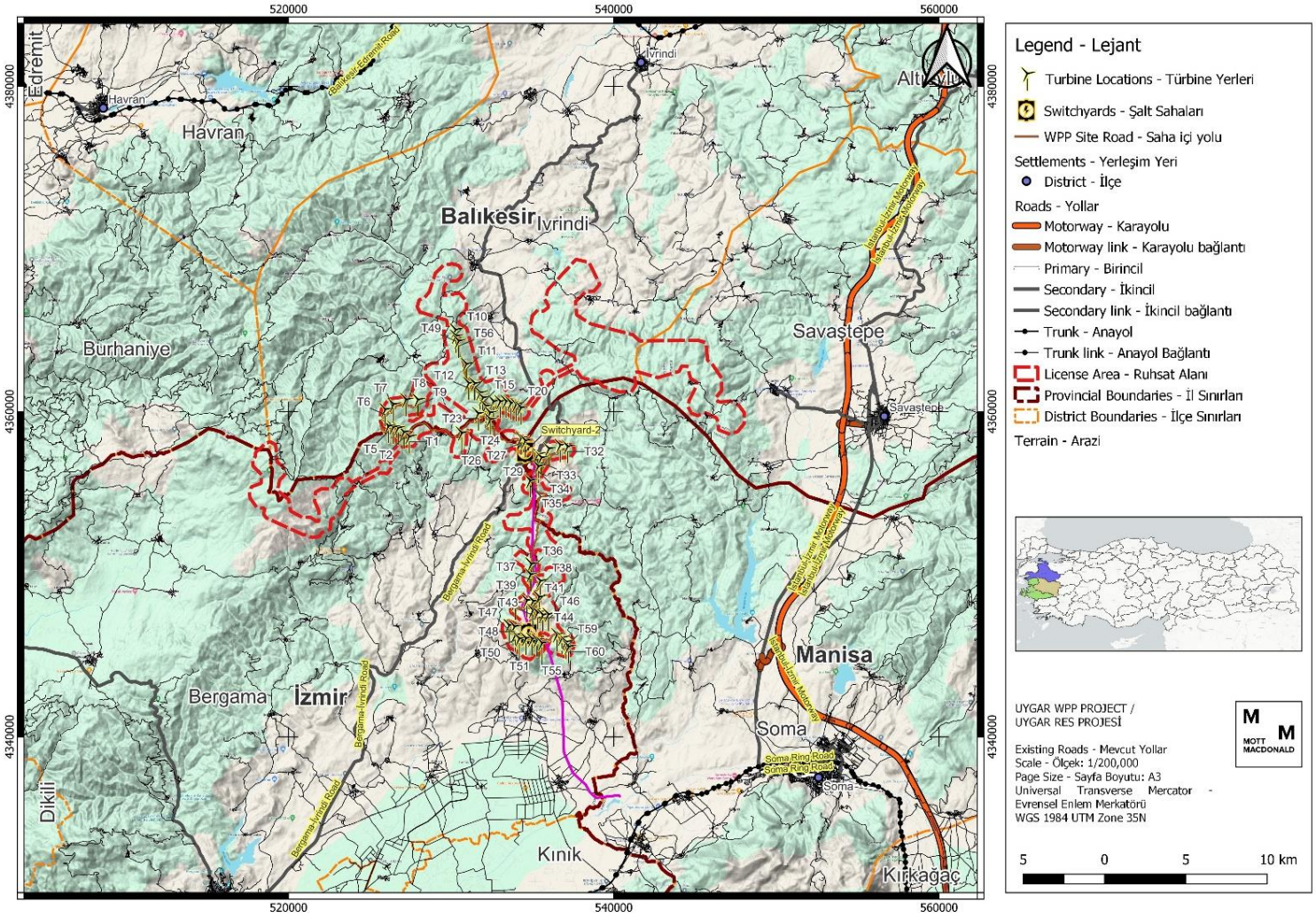


Figure 2.6: Roads around the Project area

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 200 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. 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

There will be an administration building where the personnel needs will be met during operation phase and where the SCADA[15] system room, a working station for the monitoring of the Project, and facilities for maintenance personnel are included as deemed necessary, as well as storage areas. This administration building will be located in the switchyard area. The Administration Building is designed to deploy full operational staff, not only technical but also administrative staff.

2.3.6 Internal Electricity Transmission Line (ETL)

The Project activities also cover construction of an internal energy transmission line (ETL) to connect the north switchyard to the south (main) switchyard. The Consultant has been informed that permitting process for the internal ETL is being managed by Project Company; and the responsibility of the National EIA study also lies with the Project Company. According to the National EIA studies for the internal ETL project, internal ETL name as Uygar WPP TS-İzmir Havza TS. According to the information shared from the Project Company, the voltage of the electrical energy transmission line is 400 kV and length of the line is 13.1 km. Please see Section 2.4 for more details on the Internal ETL.

2.4 Project Associated Facility

In addition to the Project components, the Project activities also cover construction of two energy transmission lines (ETL) for connection of the generated electricity to the national grid. The ownership will be transferred to Turkish Electricity Transmission Corporation (TEIAS) once connection is completed. The Consultant has been informed that permitting process for the ETL is being managed by TEIAS; the responsibility of the National EIA study also lies within the TEIAS. The Project Company has informed that EIA approval for the ETLs has been ongoing as of October 2023. The Project Company has provided the Final Project Introduction Document dated 3 October 2023. Nevertheless, as a result of the technical examinations made afterwards, due to the change in the length of the ETL, the PID was revised and resubmitted on 2 February 2024. However, the decision issued by the MoEUCC has not been provided yet. According to information shared with the Consultant, the target date for securing EIA decision from the

[15] Supervisory Control and Data Acquisition

MoEUCC is 14 June 2024. For land acquisition, urgent expropriation approval has been obtained for ETL, which is the responsibility of the Project Company.

The Project comprises of two ETLs; one 400 kV single-circuit internal ETL of approximately 13.1 km for connection to existing İzmir Havza Transformer Substation (TS) and one 400kV single-circuit ETL of approximately 123 km for connection to existing Bayramiç Havza TS, which is currently operated by TEİAS. Within the scope of the Project, permitting and construction of one line will be completed first, the Project will start the energy production with the completed line which will be connected to İzmir Havza TS, and the 2nd line which is connected to Bayramiç Havza TS, will be constructed by TEIAS in line with their own investment program. Therefore, and planning, design or construction activity related with the ETL connecting to the Bayramiç Havza TS has not yet started, and all of the permitting, design and construction activities will be followed by TEİAŞ.

The layout of the ETLs is shared in Figure 2.7.

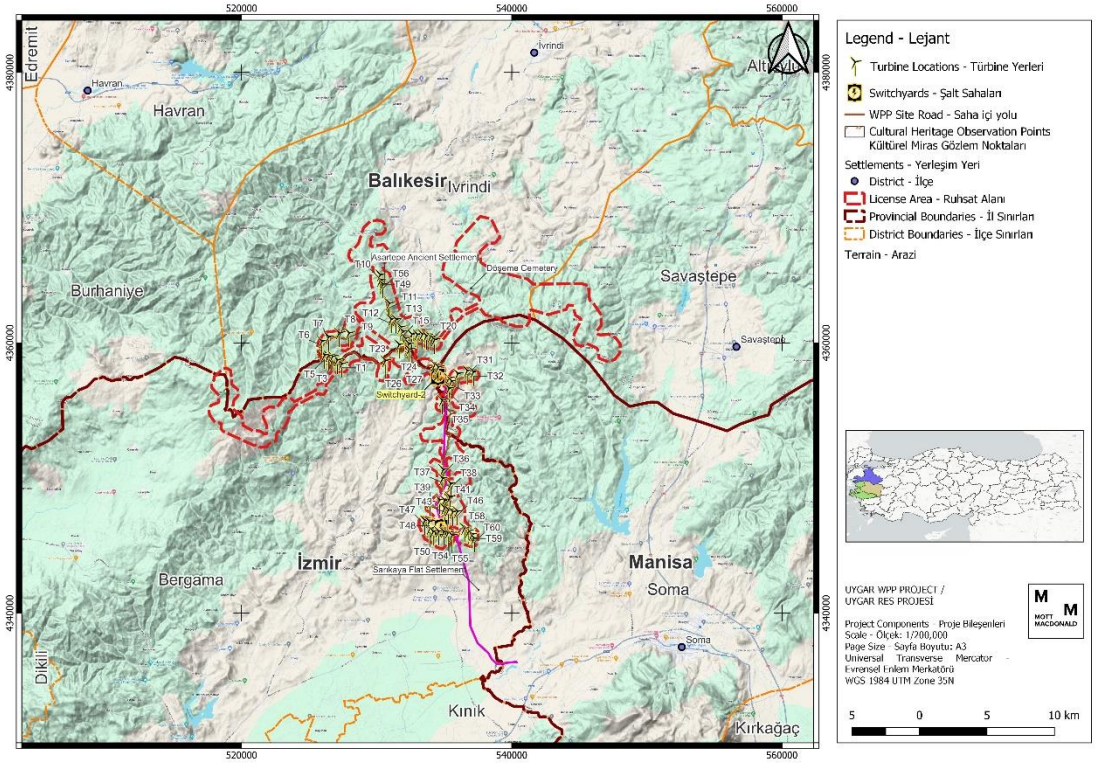


Figure 2.7: The layout of Energy Transmission Lines (ETL)

At this stage, the Energy Transmission Line (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

The Project is planned in three phases:

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

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

The activities to be carried out in the Project area will be completed in two stages.

- The first stage, designated as Phase 1, includes turbines T1-35, T49, and T56 (37 units), the planned roads for inter-turbine accessibility namely “site roads”, and Substation-1.
- The second stage, designated as Phase 2, includes turbines T36-T48, T50-T55, and T58-T60 (23 units), the planned roads for inter-turbine accessibility namely “site roads”, and Substation-2.

Blasting activities will be conducted at the specified turbine locations, 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, and it is planned to complete the pre-construction works within 24 months. It is also planned to complete the construction and assembly works within 21 months (Total of 19 months for civil and electrical construction works, and administrative building, eight months for energy transmission line construction works, and 11 months for turbine works). The timeline for the Project is shared in Table 2.6.

Table 2.6: Uygar WPP Project Timeline

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												
	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 (Main)												
	Switchyard Construction Works (Secondary)												
Control Building	Control Building Construction Works (Main)												
	Control Building Construction Works (Secondary)												
Energy Transmission Line Construction Works													
Turbine Works	Turbine Mechanical Erection												
	Turbine Commissioning and Test												
Planned COD													

Source: Provided by the Project Company on 31 May 2024

2.5.1 Pre-licence (Permitting) Phase

The pre-construction is a critical stage in the development of the Project, considering the activities and measures that precede the actual construction. 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

Please note that EIA approval for the ETL has been ongoing as of October 2023.The Project Company has provided the Final Project Introduction Document (PID) dated 02 February 2024. However, the decision issued by the MoEUCC has not been provided yet. According to information shared with the Consultant that, the target date for securing EIA decision from the MoEUCC is 14 June 2024. All permitting processes for the ETL connecting to Bayramiç Havza TM will be carried out by TEİAŞ. Please refer to Section 2.4 for detailed information on this subject. For land acquisition, urgent expropriation approval has been obtained for ETL, which is the responsibility of the Project Company.

2.5.1.1 Site selection

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

- Legal requirement: The main reason for selecting the project site is its designation as a Renewable Energy Resource Area (YEKA), officially announced in Official Gazette (OG Date/Number: 07.11.2018/30588) in accordance with the "Renewable Energy Resource Areas Regulation". This designation, as per the regulation, aims to efficiently use renewable energy resources, allocate areas to investors promptly, expedite investments, and promote the production of advanced technology components domestically or through local procurement for renewable energy facilities, contributing to technology transfer.

It is to be noted that the Project area is one of the areas declared as a YEKA within the scope of the regulation. It is also be noted that the Ministry of Energy and Natural Resources, General Directorate of Mining and Petroleum Affairs notified with an official letter numbered E-48909307-101.26.00.00-2023365162 and dated 8 August 2023 that the Project area has been registered as "Uygar YEKA Special Permit Area" under number ER: 3424283, as identified within the provided coordinates by the Project Company.

- Access the Project Area: The Project Company confirmed during the site visit and in the national EIA report that no new roads are needed for Project area access during construction. Existing roads, potentially improved, will be used. Access to the Project area will be through connection roads from Bergama-Ivrindi Highway and local access routes.
- Wind potential of the Project area: The Project Company plans to install 29 turbines in İzmir, 25 in Balıkesir, and six in Manisa. The Türkiye Energy Potential Map (REPA) indicates a maximum wind speed of 9.41 m/s and a minimum of 1.96 m/s in these provinces, with an average of 5.05 m/s. Project-specific wind measurements report an annual average speed of 6.5-8 m/s. The Project area is identified as one of the regions with the highest wind speeds among the provinces.

- Avoiding designated ecological and cultural heritage sites: While selecting the locations of Project components within the license area as well as the associated facilities, the designated ecological and cultural heritage sites are taken into consideration and avoided to avoid or minimize the impacts. During site selection process national authorities do not consider KBAs as a factor since those are not nationally recognized, however KBAs are internationally recognized areas that carry ecological significance and the Project overlaps Kaz 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

There are agricultural and pasture lands in the close proximity of the Project area. According to information provided by the Project Company and nearby communities, it is understood that the land acquisition process has started for the realization of the Project. The acquisition process is performed by the Project Company together with the support of the appointed social consultancy company. Site visit findings and cadastral checklist provided by the Project Company point out that acquired lands are privately-owned agricultural lands that overlap with the construction areas (i.e., access roads to the Project area).

The Project's land acquisition entails acquisition of 346 different parcels impacting an area of 645,330.83 $m^{2.}$ On the basis of the documents provided by the Project Company, 301 parcels of land will be acquired through urgent expropriation within the scope of the Project[16]. In addition, 26 of them are registered parcels of the Treasury and four of them are unregistered. Lastly, there are 15 public legal entity parcels acquired through Article 30. 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

[16] The Project Company has submitted expropriation lists to the Energy Market Regulatory Board, which contains information regarding the parcels that are to be expropriated. However, the Project Company will try to avoid expropriating the parcels as much as possible and instead will negotiate with the parcel owners to purchase them.

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 Resettlement Action Plan (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 conducted by the Consultant on 25 - 26 October and 7 – 8 December 2023, it was observed that the while local community members in Çamoba and Alhatlı neighbourhoods are aware of the Project’s land acquisition activities including urgent expropriation possibility, the residents in Durmuşlar and Kiraz have limited knowledge on how the expropriation process will be implemented. Also, the local community members from Çamoba had some concerns about the land acquisition and urgent expropriation processes (i.e., if their loss of livelihoods will be compensated, if they have any right to object regarding the valuations).

2.5.1.3 Permitting

The Project Company secured a pre-license for the Project on 6 April 2023, which was issued by the Energy Market Regulatory Authority “EPDK” for the commencement of investment in the Project area. The pre-license is valid for 23 months and seventeen days. Pre-licence of the Project comprises of two ETL lines; one 400/154 kV single-circuit transmission line for connection to Bayramiç Havza Transformer Substation (TS), and one 400/154 kV single-circuit transmission line for connection to İzmir Havza TS.

In order to carry out the necessary pre-construction activities for the connection of the Project's electrical transmission point to the 400/154 kV Bayramiç Havza TS and 400/154 kV İzmir Havza TS transmission systems, the Project Company signed the Pre-construction Works Protocol with the Republic of Türkiye Ministry of Energy and Natural Resources, General Directorate of Turkish Electricity Transmission Corporation (TEIAŞ), on 9 May 2023. At the stage where TEİAŞ gives its connection opinion, the routes are stated approximately. When the Project phase of the lines begins, final routes are formed according to the opinions of many institutions and land conditions. The reason why the Bayramiç Havza TM line, which is stated as 85 km, increased to 123 km is due to land conditions and feedback from institutions. The Izmir Havza TM line, which is 65 km, was shortened because the line does not go all the way to Izmir Havza TM, but goes to the 400 kV pole, which is 13.1 km away.

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. Upon the submission of the document to the EPDK, a decision has been made to carry out the preliminary license amendment by notifying with an official letter numbered 11934-24 issued on 6 July 2023. The opinion further confirms that each of the 60 turbines specified in the preliminary license dated 6 April 2023 and numbered ÖN/11779-20/05405 complies with the unit power, total installed capacity, and unit coordinates required under the Environmental Impact Assessment Regulation.

An Environmental Consultancy Company named DE prepared the EIA Application File, which was submitted on 25 February 2022 to MoEUCC. Following the official announcement shared on 10 March 2022 by the MoEUCC, the EIA process was initiated. The Review and Evaluation Commission meeting for the Project took place on 18 July 2023, at the MoEUCC, where all relevant institutions expressed their positive opinions on the final amendments on the Project and commitments are provided in final draft National EIA Report. The final National EIA report prepared by Nartus was accepted by the official announcement shared on 1 September 2023 by the MoEUCC. The EIA Positive Decision for the Project was granted on 15 November 2023

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

- “Non-Agricultural Land Use Permit” will be requested from the Ministry of Agriculture and Forestry
- Implementation of Allocation Change according to the Law No. 4342 on Pasture Lands.
- Necessary permits to be 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 21 February 2024. Application for obtaining the Forest Final Permit will be made after the zoning plans are finalized.
- Preparation of sub-scale zoning plans in accordance with Law No. 3194 on Urban Planning and related legislation, submission to the Ministry of Environment, Urbanization, and Climate Change's General Directorate of Spatial Planning for approval.
- Application for 'Workplace Opening and Operating Permits' according to the “Regulation on Workplace Opening and Operating Permits” after obtaining property and other necessary permits.
- EMRA Expropriation Permit has been secured on 21 November 2023.
- EMRA Rent Permit was obtained on 21 November 2023, but the signing of the agreements has not been completed yet
- EMRA Easement Permit has been secured on 21 November 2023, but the signing of the agreements has not been completed yet.
- The target date for securing EIA decision for ETL from MoEUCC is 14 June 2024.

The number of trees to be cut is not specified in National EIA Report. Tree felling will not be limited to turbine areas, it will also include access roads. There will be loss of 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 projects the timeline to complete forestry pre-permit and forestry final permit in Q1 2024 and Q1 2025, respectively.

Ministry of Agriculture and Forestry General Directorate of Nature Conservation and National Parks has opined that the horizontal distance between two turbines must be at least 300 m and the distance between two nearest wing tips must be at least 150 m. It has been seen that the prerequisite for the mentioned distance (300m and 150m) has been met and the minimum distances must be maintained. 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 between 7 August and 7 November for the autumn migration period, and between 7 March and 7 June for the spring migration period, 25 days each period. Monitoring should be conducted by an ornithologist for a maximum of five (5) days in a row and five (5) days apart, representing the entire migration period, and the effects of the operational phase on the birds should be investigated. During this monitoring process, regular reports should be prepared and the dates, times and from how many vantage points the field studies will be carried out should be stated in the report. In the prepared report; bird species using the region and their conservation status, what purpose the bird species detected in the region use the region, migrant and resident discernment, flight routes of the birds around the project area, distances of flight routes to turbines, thermal air currents in the region, climatic data of the region, bird and bat species, gathering areas of the species, populations of bird species using the region should be specified. The Project company will commit that the necessary measures will be taken to minimize the impact anticipated in National EIA studies, and immediately in case of a new negative impact that may be detected during the operation period. Regional Directorate will be presented with biodiversity monitoring schedules and reports regularly. All national and international policy applicable will be observed. The Project Company projects the timeline to complete pre-construction permit for drilling and engineering activities by the end of Q4 2025. The Project Company also projects the timeline to obtain approval for zoning plan by Q4 2024.

The timeline for the permitting activities of the Project is shared in Table 2.6

2.5.1.4 National EIA Process

The EIA process was initiated after the official announcement shared on 10 March 2022 by the MoEUCC. The final National EIA Report prepared by Nartus was accepted by the official announcement shared on 1 September 2023 by the MoEUCC.

The Review and Evaluation Commission meeting for the Project took place on 18 July 2023, at the MoEUCC, where all relevant institutions expressed their positive opinions on the final amendments on the Project and commitments are provided in final draft National EIA Report. The final National EIA report prepared by Nartus was accepted by the official announcement shared on 1 September 2023 by the MoEUCC. The EIA Positive Decision for the Project was granted on 15 November 2023.

The responsibility of the National EIA study lies with the Project Company for the internal ETL. Within the scope of the National EIA studies for the internal ETL project namely “400 kV Uygar WPP TS-İzmir Havza TS Energy Transmission Line”, a Project Information File in line with the requirements of national EIA legislation has been prepared and submitted to the MoEUCC. The EIA process of the internal ETL project was initiated with an announcement dated 02 February 2024 through the website of the MoEUCC.

2.5.2 Construction Phase

2.5.2.1 Timeline

The timeline for the construction activities of the Project is shared in Table 2.6.

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 Operation 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 testing
9. Power connection

According to the Project Information Document (PID) prepared 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 mobilization area including administrative and social building, temporary warehouses, vehicles, and equipment. Additionally, a temporary firefighting and alarm system will be established. Temporary site drainage, stormwater, and sanitary drainage will be provided as needed for the site, facilities with proper sewage disposal measures. 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 the *Chapter 18: Information Disclosure and Consultation* of this Final Draft ESIA Report. Public participation and information disclosure activities can be planned to address concerns and foster understanding about the Project.

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 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[17].

Mobile Crushing and Screening Facility

As mentioned in Section 2.3.4, a mobile crushing and screening facility with a capacity of 200 tonnes/hour will be established 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

During this construction phase, the work schedule for labour is planned to be 21 months, working 312 days per year, with each working day consisting of 10 hours and two shifts.

It is to be noted that construction activities will be carried out within the allowable construction hours in accordance with Regulation on Environmental Noise Control as well as IFC EHS Guidelines.

2.5.2.4 Equipment & Machinery

According to the National EIA Report, the equipment and machinery identified are shared in Table 2.7.

Table 2.7: Construction Equipment to be used for the Project

Equipment	Number
Bulldozer	10
Excavator	12
Path Grader	10
Path Roller	5

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

Equipment	Number
JBC (Backhoe Loader)	10
Truck	40
Trailer	5
Pickup Trucks	25

Source: National EIA Report, Nartus

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

It is to be noted that as indicated in the official letter issued with a number of E-66995690-611.02-8999786 dated 15 August 2023 by the Ministry of Agriculture and Forestry, General Directorate of Forestry as part of the EIA process, a commitment has been made to ensure two "First Intervention Fire Vehicles" with a minimum water tank capacity of 300 kg and a hose of at least 100 meters, which will be continuously ready for deployment.

2.5.2.5 Workforce Accommodation & Mobilisation

There were two workforce accommodation facilities (in Bergama district, İzmir and Soma district, Manisa) as presented in Figure 2.8.

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 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.

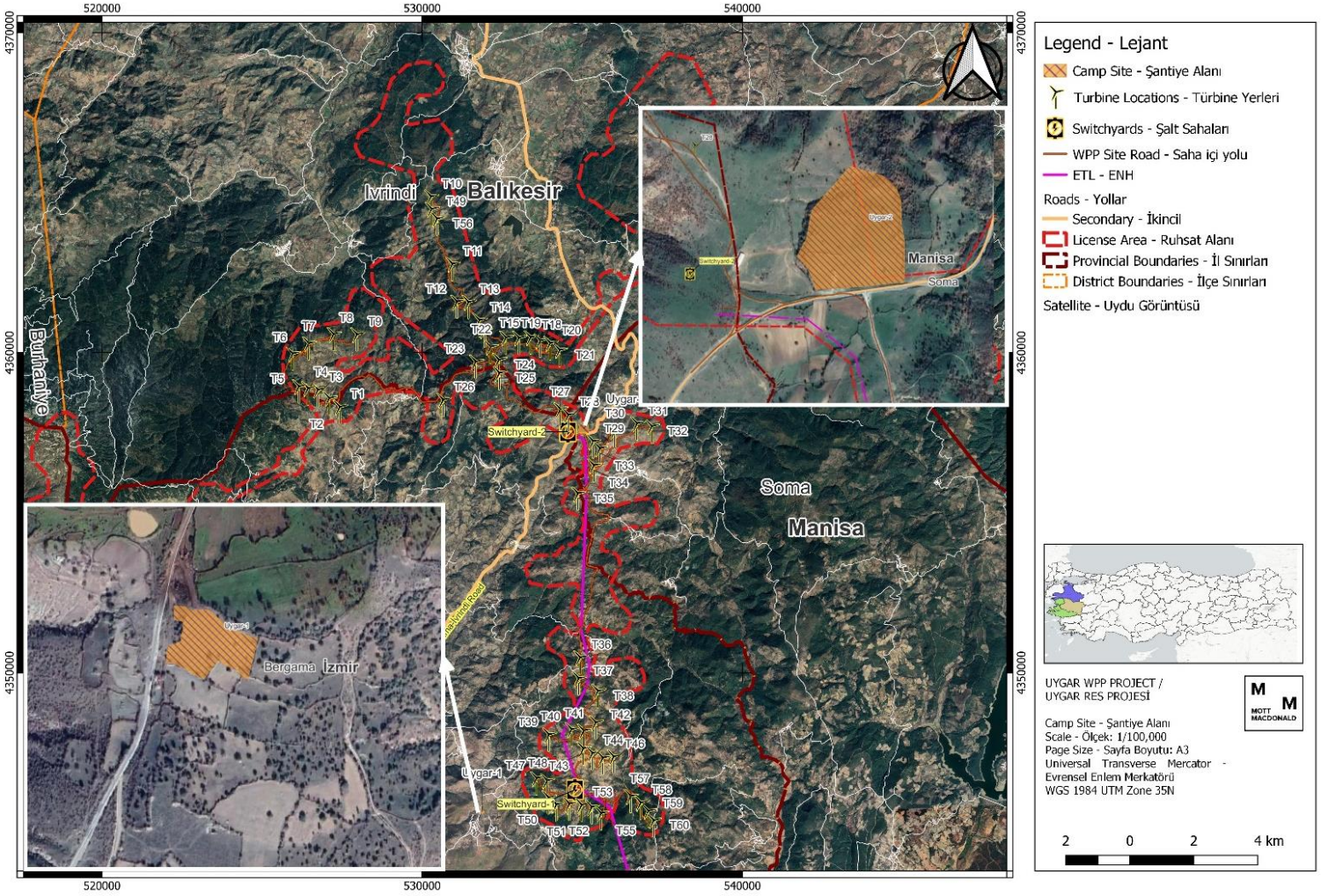


Figure 2.8: Two Camp Sites of the Project (1/100,000 scale)

2.5.2.6 Resource Use

- The fuel will be used due to the use of construction equipment and machinery and during the transportation of Project's workers during the construction phase. The fuel will be stored in above-ground storage tanks located in the mobilization areas.
- The electricity will be supplied by the national electric grid or diesel-fired generators to be used in the Project area.
- The utility water to be supplied from the licensed water supply contractor will be delivered by water trucks and used during the construction phase to meet the daily needs of the staff and to prevent dust generation in the Project area. At the current state of construction phase planning, no rainwater harvesting is planned on site. The Project company ensures that the water supply needs will be met by the licensed companies all throughout the construction phase. 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 is used to control dust will remain within the soil structure, so wastewater generation is not anticipated. Domestic wastewater generated during the construction phase of the Project will be collected in a septic tank. The septic tank will be emptied by a vacuum truck when the septic tank reaches 80% capacity to be disposed to the local sewer network in accordance with the relevant legislation of the relevant Metropolitan Municipality.
- 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.*
- All activities during the construction phase will be conducted in open areas. Piled materials, scrap materials, dust-prone products, or raw materials can be stored outdoors, provided by providing related standards met and necessary measures are addressed. Measures to be taken will be provided in the *Chapter 11: Waste and Resources* of this Report.

2.5.2.7 Construction Workforce

Within the scope of the Project, a total of 610 people, 100 Enerjisa Üretim employees and 600 subcontractor employees, are expected to work in the Wind Power Plant are expected to work in the Project area 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 (OG Date/Number: 02.11.2013/28809), licenses are granted for a minimum of 10 and a maximum of 49 years, considering the nature of the activity. Accordingly, the Project's lifespan is set at 49 years. At the end of this period, pending compliance with regulatory requirements, the Project's life can be extended through modernization efforts.

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 2.6. After obtaining property and other necessary permits, “Workplace Opening and Operating Permit” will be granted according to the related national regulation.

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.

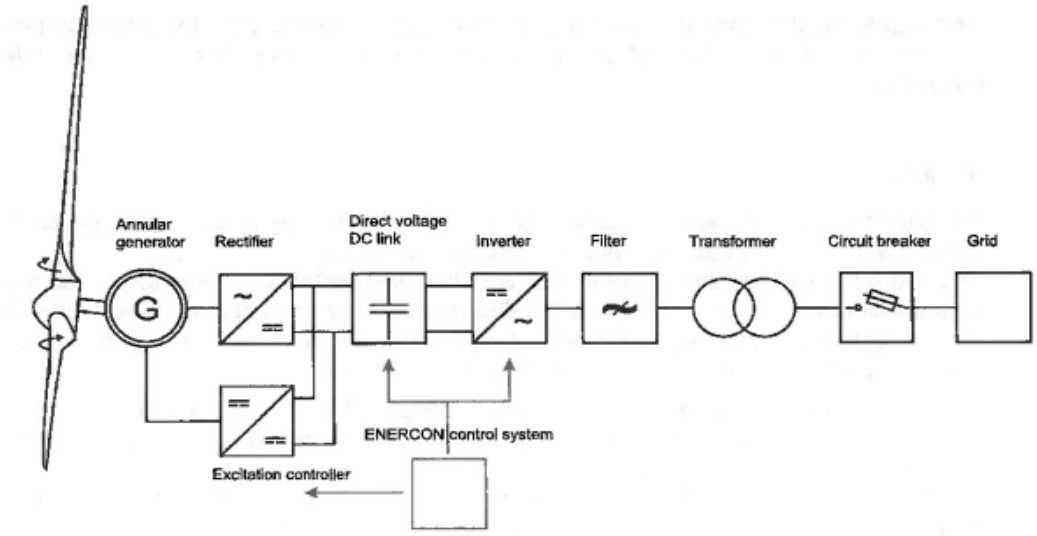


Figure 2.9: Simplified electric diagram of an E-138 EP3 wind turbine

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 TEIAS.

2.5.3.4 Operational Workforce

Within the scope of the Project, a total of 22 people, 19 Enerjisa Üretim employees and three 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 supply contractor will be used during the operation phase to meet the daily needs of the personnel. 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 waste generated during the operation phase of the Project will be collected in a 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 relevant legislation.

During the maintenance and repair of the turbines within the Wind Power Plant, chemical substances are employed. The utilized chemical materials are temporarily stored in dedicated storage areas provided with secondary containment and then sent for disposal through licensed companies. To prevent contamination of surface and underground water sources and avoid soil pollution, and store the chemicals safely, the necessary measures taken are shared in the *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 (oily rags, empty lubricating oil containers, used filters from machinery, etc.) will be accumulated separately in leak-proof containers labelled with "Hazardous Waste." All wastes with hazardous characteristics will be stored separately in the hazardous waste storage area.

The social and technical infrastructure needs of the personnel during the operational phase of the Project will be met through the planned administrative and social building. Electricity to run the Administration Building will be supplied from the grid with diesel-fired emergency generators as back-up. The administrative building will include offices for technical work, a kitchen for daily needs and rest rooms. Accommodation for the personnel will be arranged through 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 the wind turbine technology and type. For the Project, four maintenance activities will be conducted 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 be inspected annually. Furthermore, spare electrical equipment will be stored 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 Study. 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 be observed. However, these impacts are not anticipated to present high-significance risks, and they can be sufficiently managed by carrying out the proposed mitigation strategies as provided with this ESIA study.

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

As a result, the Project's implementation will contribute to the socio-economic and technological development and increased use of renewable energy to feed the Turkish national grid.

2.6.2 Location Alternatives

The most significant criteria for choosing the Project location is that the chosen Project area was declared as a Renewable Energy Resource Area (YEKA) in accordance with the decision published in the Official Gazette (OG Date/Number: 07.11.2018/30588) under the scope of the Renewable Energy Resource Areas (YEKA) Regulation.

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 60 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 avoids known major migratory routes of species, however might overlap some minor routes. The turbine locations were also evaluated within the framework of the authorities and responsibilities of relevant public institutions and organizations. As a result of this evaluation process, it was necessary to relocate the turbines due to overlapping areas between mining licenses and turbine locations.

The official opinion of the General Directorate of Energy Affairs was secured regarding the changes in wind turbine locations. As a result, the positive consent letter of the General Directorate of Energy Affairs dated 19 April 2023 was secured, stating that it is found appropriate to continue the National EIA process according to the revised 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 Uygar WPP 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 TEIAS 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 Unit Power Alternatives

During the pre-licence phase of the Project, it was planned to operate with 60 turbines, each with a unit power of 4.2 MW_m/4.167 MW_e, and a total installed capacity of 252 MW_m/250 MW_e. The Project Company secured a pre-license for these total installed capacities on 6 April 2023.

During the National EIA process, the amendment of which is required for the changing in the turbine locations were carried out with the amendment is also conducted for the unit power of the turbines (with the nominal power remaining unchanged-MW_m) was aimed to be decreased from 4.2 MW_m/4.167 MW_e to 4.2 MW_m/3 MW_e, thus changing the Project installed capacity to 252 MW_m/180 MW_e.

Upon the submission of Final EIA Report, during the eight-months and seventeen days pre-licence period (which is still ongoing at the time of preparation of this Final Draft ESIA Report), there was an additional amendment regarding each electrical power capacity of the Project. The amendment included change of the electrical power from 3 MW_e to 4.167 MW_e, and therefore the total installed capacity to 252 MW_m/250 MW_e. This amendment aligns with the initially secured total nominal and electrical power capacity. The positive consent letter of the General Directorate of Energy Affairs dated 19 April 2023 was secured, stating that it is found appropriate to continue the National EIA process according to the revised locations and total installed power.

Also, 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.

According to the Project Information Document (PID), two technology alternatives have been considered for the ETL to be constructed within the scope of the Project; i) underground transmission lines and ii) overhead transmission lines. Overhead transmission lines have been selected in this Project since underground transmission lines have higher capital cost and more operational difficulties compared to overhead transmission lines. Those have been also chosen considering the fact that underground transmission lines might pass through areas with established infrastructure. No alternatives have been presented in the PID in terms of the Project route. According to the PID, this is because the selected route has been chosen with the least economic and environmental impacts.

3 Policy, Legal and Institutional 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 Institutional 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 stablishes policies on protection, and maintenance of forest areas as well as management of agricultural investments and activities. Duties of the MoAF also include determining policies on conservation and sustainable use of water resources.
  - MoAF General Directorate of Forestry: The general directorate manages forest resources by protecting forests from illegal activities, natural disasters, and fires, combating pests, and carrying out quarantine services. They are also responsible for improving forest areas and services, managing forest ownership processes, conducting reforestation and erosion control activities, and supporting private afforestation efforts.
- 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 Regulatory Framework

3.2.1.1 Legislative Framework

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 9 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 7 November 2018 and numbered 30588.

According to the National EIA Report, in terms of installed power and the number of turbines and with the inclusion of a mobile crushing and screening plant established for sizing the materials obtained from the blasting, 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". The ETL to be constructed within the scope of the Project is subject to "Environmental Impact Assessment Regulation Annex-2" according to the Final Project Information Document (PID) prepared for the ETL project.

3.2.1.2 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 [18]

Law/Regulation	Official Gazette (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

[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 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 quality and noise management, site safety and worker safety as well as 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 [19]

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

[19] 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 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
Regulation on Wastewater Discharges to Sewerage System[20]	-	-
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

[20] Published by the Water and Sewerage Administration authorities of Izmir and Manisa Metropolitan Municipalities.

Law/Regulation	Official Gazette (OG) date	OG number
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
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

Law/Regulation	Official Gazette (OG) date	OG number
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 Guidelines

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 are listed below:

- IFC's Environmental and Social Policy & Performance Standards (2012)
- Equator Principles IV (2020)
- EBRD's Environmental and Social Policy & Performance Requirements (2019)
- U.S. International Development Finance Corporation (DFC)'s Environmental and Social Policy and Procedures (2020)
- EIB's Environmental and Social Standards (2022)
- 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 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)
- 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 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, ISO9001)
- 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 Performance Standards (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 and Their Relevance 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 client'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 use of resources including energy and water; and (iii) to reduce project-related greenhouse gas (GHG) emissions that contribute to climate change.	Yes	Chapters 5, 6, 7, 8, 9, 10, 11, 15 and 16
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	Yes	Chapter 13 and Chapter 18

Performance Standard	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	appropriate consultation and disclosure; lastly, (iii) to improve or at least restore the livelihoods and living conditions of displaced communities.		
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 integrate conservation and development priorities.	Yes	Chapter 12
PS 7: Indigenous Peoples	PS 7 recognizes that Indigenous Peoples are more likely to become vulnerable to risks and impacts related to the 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[21]	-
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

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

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

Table 3.4: Equator Principles and Their Relevance to the Project

Equator Principles	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
Principle 1: Review and Categorisation[22]	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-Designated Countries[23], compliance with the applicable IFC PSs and the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines)., and (ii) for projects located in Designated Countries[24], compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues.	Yes	Chapter 3
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 Project Company to develop and / or maintain an Environmental and Social Management System (ESMS). Principle 4 requires that an Environmental and Social Management Plan (ESMP) will be prepared by the Project Company to address	Yes	ESMP and ESMS Plans and Procedures

[22] **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.

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

[24] 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.

Equator Principles	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	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).		
Principle 5: Stakeholder Engagement	Principle 5 recognizes that for all Category A and Category B Projects the EPFI will require the Project Company 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 preferences of the Affected Communities; their decision-making processes; and (iii) the needs of disadvantaged and vulnerable groups.	Yes	Chapter 13, Chapter 18 and SEP
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.	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 client 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 client 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 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)	Yes	

Equator Principles	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	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 Project Company's management of environmental and social performance throughout the life cycle of the project.	Yes	Chapter 5 and 17
PR 2: Labour and Working Conditions	PR 2 recognises that workforce is a valuable asset for the Project Company 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 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 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.	Yes	Chapters 5, 7, 9, 10, 11, 15 and 16
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	Yes	Chapter 14 and 15

Performance Requirement	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	and consumers associated with project activities, by performing a risk control hierarchy.		
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 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 environmental and social sustainability.	Yes	Chapter 12
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[25]	-
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[26]	-
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 project) and disclose appropriate project information throughout the lifetime of the project. Providing an accessible grievance mechanism as a part of	Yes	Chapter 18 and SEP

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

[26] The project does not use financial intermediaries.

Performance Requirement	Scope and Triggers	Potentially Applicable to the Project?	Relevant Chapter within ESIA Report
	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[27] 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 Performance Standards 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.

[27] 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.

Table 3.6: International Legislation Relevant to the Project

Topic	Convention/Legislation
International Conventions and Standards	International Organisation for Standardisation (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

Topic	Convention/Legislation
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 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

Topic	Convention/Legislation
	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
	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 in compliance with applicable laws and the EBRD Environmental and Social Policy (ESP) and PRs, and IFC's Sustainability Policy and PSs; to identify and assess the severity of potential impacts on receptors and identified resources; develop and describe mitigation measures that will be taken to prevent or minimize any potential negative effects and maximize the potential benefits; and 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 and based on the numbers of people affected by land acquisition, project location in the internationally protected Key Biodiversity Area, noise generation, air and other potential cumulative impacts, and presence of high-risk activities such as blasting activities. The final decision on the categorization of the Project has not been shared with the Consultant yet while preparing this Final Draft ESIA report. The decision will be shared in the Final Draft ESIA report once it is received.

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.

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	-

	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 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 related 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 underground energy transmission line, 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 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

As informed in the ESIA Scoping Report, 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 Project Company'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 Area of Influence (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 – October 2023 (specific surveys are detailed in the relevant topic chapters);
- Stakeholder engagement activities – October 2023
- Site reconnaissance survey
- Biodiversity survey
- Archaeological walkover survey
- Noise monitoring surveys; and
- Air quality monitoring surveys.

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 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 Good International Industry Practice (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 International Finance Corporation (IFC) Environmental, Health, and Safety (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 amount 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, KPIs, etc.) for unplanned events related to this topic, such as spills and flooding, for both construction and operation phase.

Although no significant impact on water sources is anticipated due to activities to be carried out during operation phase, impacts on hydrogeology is scoped in since the groundwater is planned to be used for personnel needs. On this basis, it is intended that consideration of water quality and hydrology impacts during the operation 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: Policy, Legal and Institutional Framework*, each chapter presents topic-based policy and legislations. In this chapter, water quality, hydrology and hydrogeology related policy and legislations 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 Regulation 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. 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. As highlighted in the Scoping Report, 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 5.5.

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[28]". 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 site visit Ivrindi (Balıkesir) District Directorate of Agriculture and Forestry and local people consulted regarding historical use of the Project area. Although there are agricultural and husbandry activities taking place in the Bergama, Soma, İvrindi 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, a 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 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 must withstand the loads and stresses caused by operation, installation, and sludge removal

[28] 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

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: 17/2/2005, OG Number: 25730)	International Value (WHO) (Guidelines for Drinking-water Quality: Fourth Edition)	Project Standard
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
Potassium	-	-	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
Aluminium	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
Beryllium	-	-	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
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.

According to the information found in the National EIA Report, a part of the Project area, including some of the turbines, is located within the long-range protection area of Sarıcalar Dam. Detailed information has been provided in the *Section 5.3.1.*

A 3 km radius from the site is used to assess groundwater and surface water derived receptors. The area of influence (see Figure 5.1) 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 area of influence.

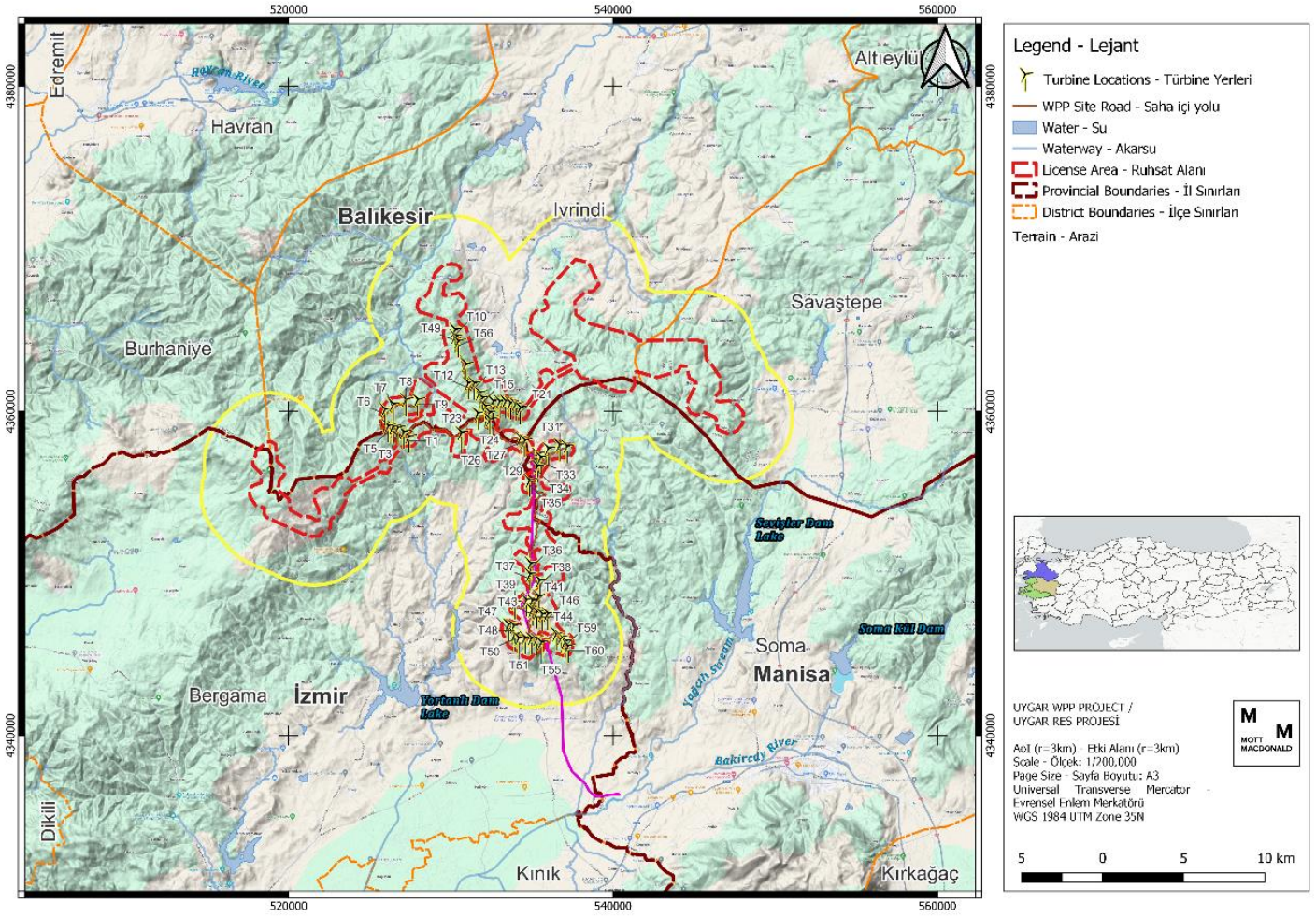


Figure 5.1: Hydrology Area of Influence

5.2.3 Limitations and Assumptions

According to the findings of the site survey, which has been conducted during dry season in early October, 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.

Anticipated impacts on the surface water bodies are surface or stormwater runoff; contaminated sediments due 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, additional groundwater sampling and laboratory analysis are performed to assess baseline groundwater quality.

It is also assumed that the operation activities of the Project will not have significant impacts on the surface water sources in the vicinity.

5.3 Baseline Conditions

The baseline status of water bodies near the Project area have been examined by considering surface water and groundwater bodies. Within this scope, information regarding the baseline status of surface waters and groundwaters were obtained by examining the below documentation:

- Uygar WPP National EIA Report, 2023, Nartus
- National Basin Management Strategy (2014-2023), 2014, MoFA
- North Aegean Basin Pollution Prevention Action Plan, 2016, MoEUCC
- North Aegean River Basin Management Plan Preparation Project River Basin Management Plan Draft Report, 2020, MoAF; General Directorate of Water Management
- Susurluk River Basin Management Plan, 2018, MoAF; General Directorate of Water Management
- Manisa Province Environmental Status Report for 2022, 2023, Manisa Governorship Provincial Directorate of Environment, Urbanisation and Climate Change,
- İzmir Province Environmental Status Report for 2022, 2023, İzmir Governorship Provincial Directorate of Environment, Urbanisation and Climate Change,
- Balıkesir Province Environmental Status Report for 2021, 2022, Balıkesir Governorship Provincial Directorate of Environment, Urbanisation and Climate Change,
- 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 WPP License Area remains within the North Aegean Basin and Susurluk Basin (Figure 5.2 & Figure 5.3).

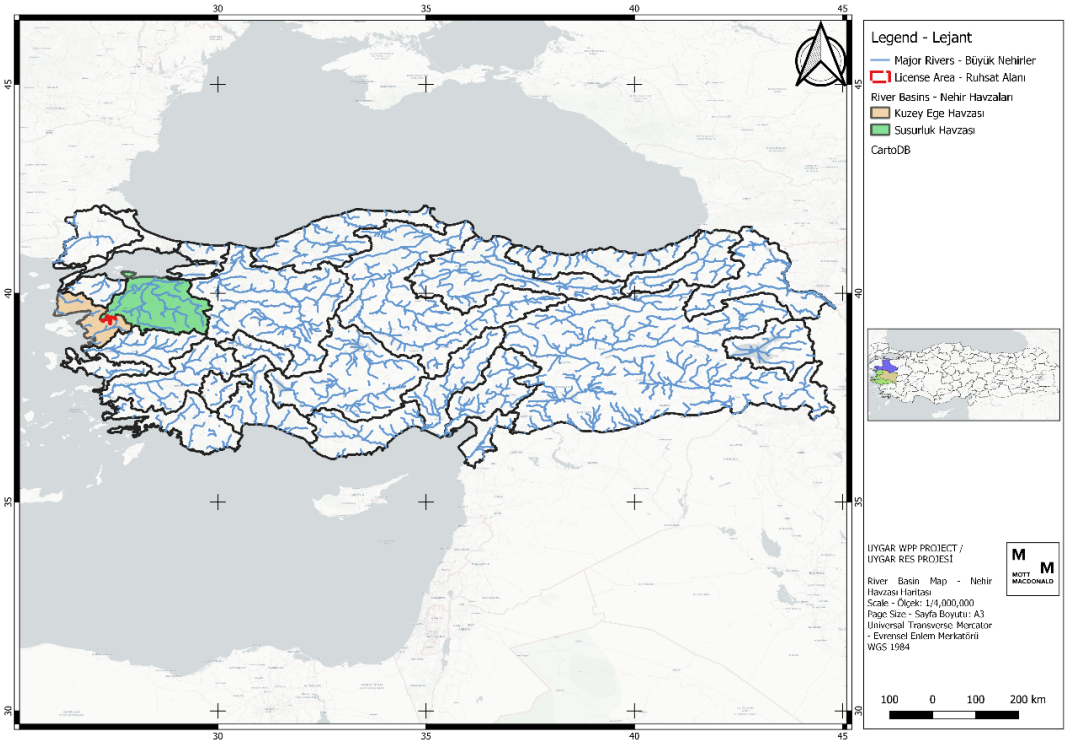


Figure 5.2: Project Location & North Aegean and Susurluk Basins 1/2 (National Basin Management Strategy (2014-2023), 2014, MoFA)[29]

[29] National Basin Management Strategy (2014-2023), 2014, MoFA

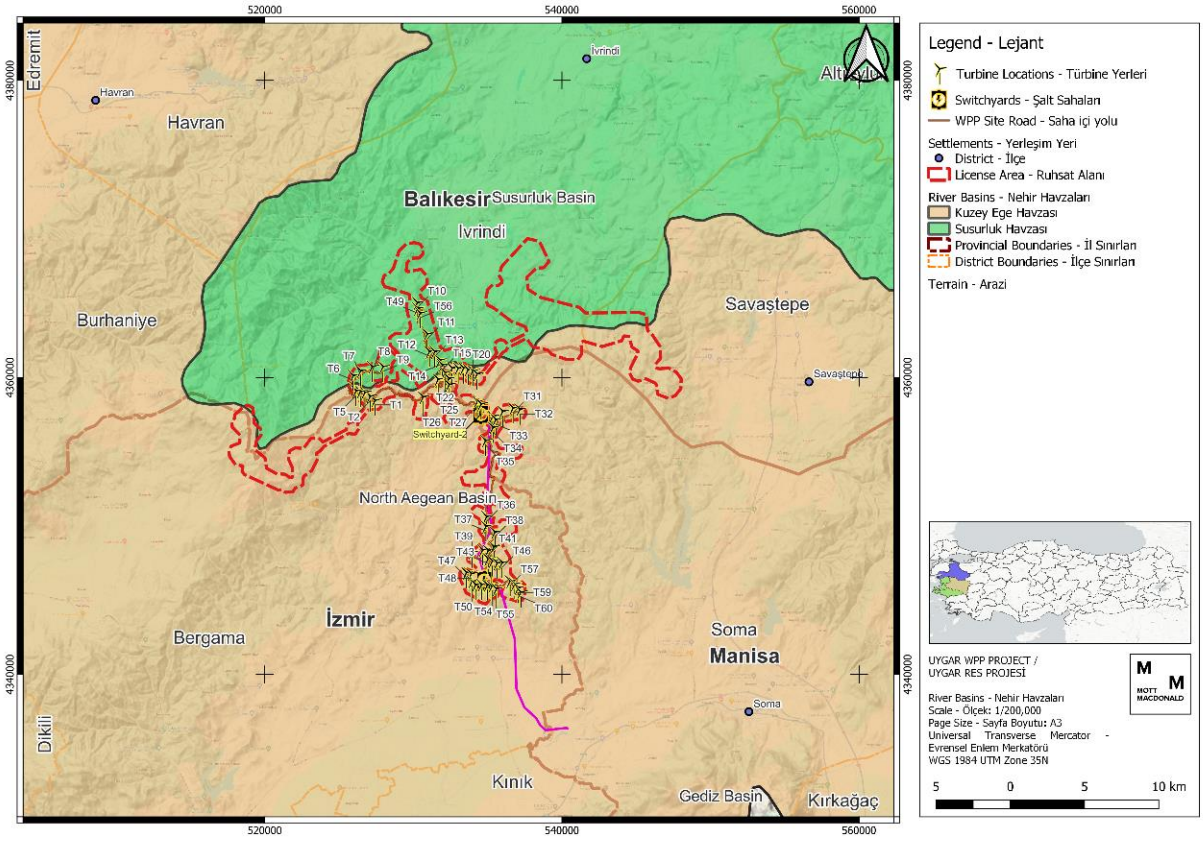


Figure 5.3: Project Location & North Aegean and Susurluk Basins 2/2 (National Basin Management Strategy (2014-2023), 2014, MoFA)[30]

The North Aegean Basin comprises total of 69 water bodies consisting of 43 rivers, 21 lakes and 5 coastal water bodies[31], whereas the Susurluk Basin comprises total of 156 water bodies consisting of 107 rivers, 37 lakes, 9 coastal water bodies, and 3 transitional water bodies[32].

In the North Aegean Basin, water has been utilized by several sectors such as, agriculture, industry, tourism as well as drinking water. The summary of the water usage for above sectors is presented in Table 5.3.

Table 5.3: Water Usage in the North Aegean Basin[33]

Sector		Source	Water Consumption (hm^3/year)
Agricultural		Groundwater	196
		Surface Water	487.5
Industrial	OIZ	Groundwater	2.5
	SIZ		0.35
	Mining		3.08
	Olive Production		0.29

[30] National Basin Management Strategy (2014-2023), 2014, MoFA

[31] North Aegean River Basin Management Plan Preparation Project River Basin Management Plan Draft Report, 2020, MoAF; General Directorate of Water Management

[32] Susurluk River Basin Management Plan, 2018, MoAF; General Directorate of Water Management

[33] North Aegean River Basin Management Plan Preparation Project River Basin Management Plan Draft Report, 2020, MoAF; General Directorate of Water Management

Sector		Source	Water Consumption (hm^3/year)
	Others		35.02
	TÜPRAŞ	Surface Waters (Güzelhisar & Sevişler Dams)	7
	PETKİM		23.65
	Seaş-Soma Thermal Power Plant		18.20
Drinking & Potable		Groundwater	37.47
Tourism		-	1.2

In the Susurluk Basin, water has been utilized by several sectors such as, agriculture, husbandry, industry, as well as for domestic purposes. The summary of the water usage for above sectors is presented in Table 5.4.

Table 5.4: Water Usage in the Susurluk Basin[34]

Sector	Water Consumption (hm^3/year)
Domestic	123
Industrial	211
Agricultural	657
Husbandry	17

The southern section of the WPP License Area is located within the borders of Lower North Aegean Sub-basin where the Bakırçay River is the major surface water (Figure 5.4). According to North Aegean Basin Pollution Prevention Action Plan, Bakırçay River constitutes one of the most important rivers of the North Aegean Basin. The length of the river, which is named Bakırçay when Gelenbe Stream originates from the foothills of Kocadağ, passes through the Karakurt Strait and enters the Kırkağaç Plain, is approximately 120 km. Its most important tributary is Yağcılar Stream.

[34] Susurluk River Basin Management Plan, 2018, MoAF; General Directorate of Water Management

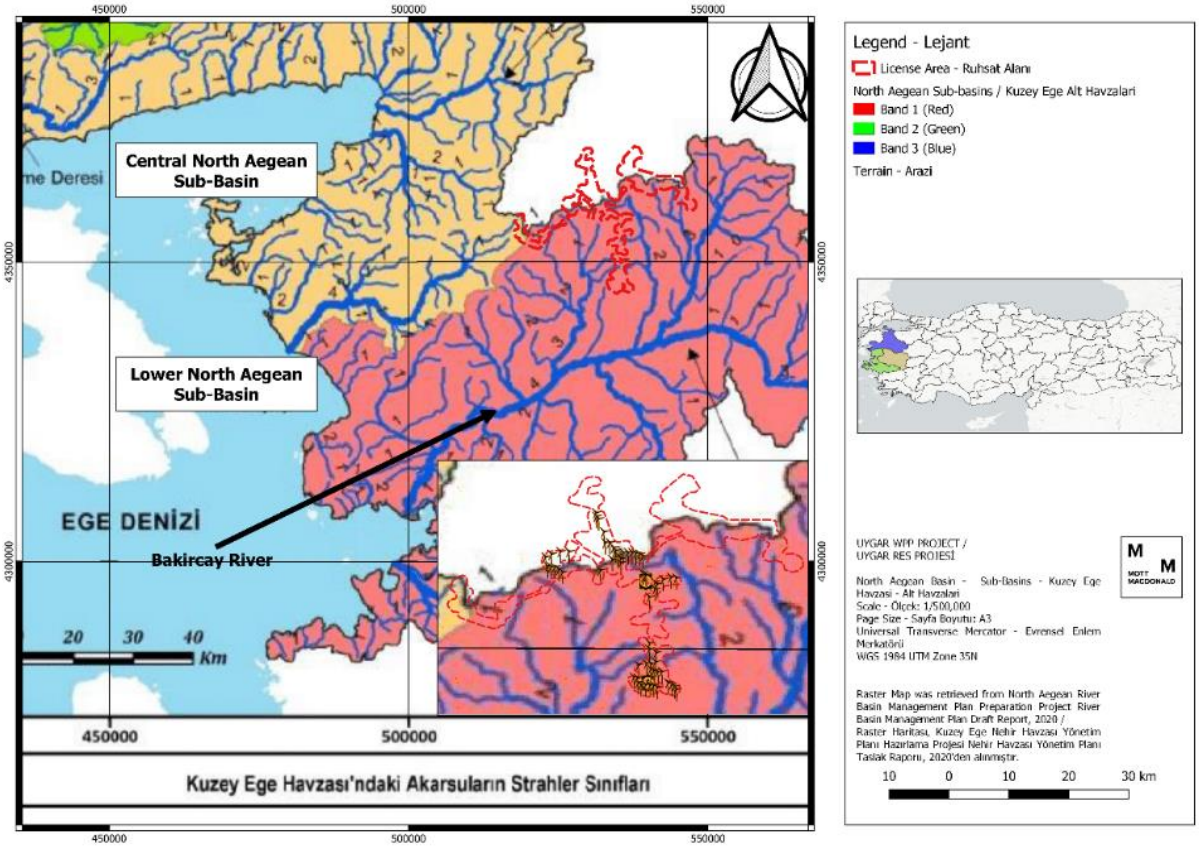


Figure 5.4: Project Location & North Aegean Sub-basins (North Aegean Basin Pollution Prevention Action Plan, 2016, MoEUCC)[35]

Bakırçay River, one of the most important rivers of the North Aegean Basin, is under domestic, industrial and agricultural pressure. One of the industrial activities that is important in terms of environmental pollution in the Bakırçay River, which is an important sub-basin of the North Aegean Basin, is coal mining in the Soma district of Manisa. The Aegean Lignite Enterprise Directorate of the Turkish Coal Enterprises and many private mining enterprises, large and small, have activities in the district. In addition, olive, vegetable and fruit farming is common in the basin. There are quarries and tomato paste factories in Bergama.

Factors that create significant environmental pressure in the basin are as follows:

- Olive oil production, which is carried out intensively throughout the basin,
- Coal mines and private coal processing facilities affiliated with Turkish Coal Enterprises Aegean Lignite Enterprises,
- Dairy products processing facilities,
- Touristic facilities such as hotels, motels, holiday villages, etc.
- Agricultural and livestock activities carried out in the fertile plains of the basin,
- Domestic and industrial wastewater discharges without treatment,
- Solid waste located near superficial streams in unregulated landfills.

The northern section of the WPP License Area is located within the borders of Kocacay-Manyas sub-basin where the Kocacay River is the major surface water (Figure 5.5). Kocaçay, which flows into Kuş Lake, originates from Madra Mountain, passes through the straits around İvrindi

[35] North Aegean Basin Pollution Prevention Action Plan, 2016, MoEUCC

and Balya, and flows into the lake. The tributary of the lake called Karadere mixes with the Susurluk river.

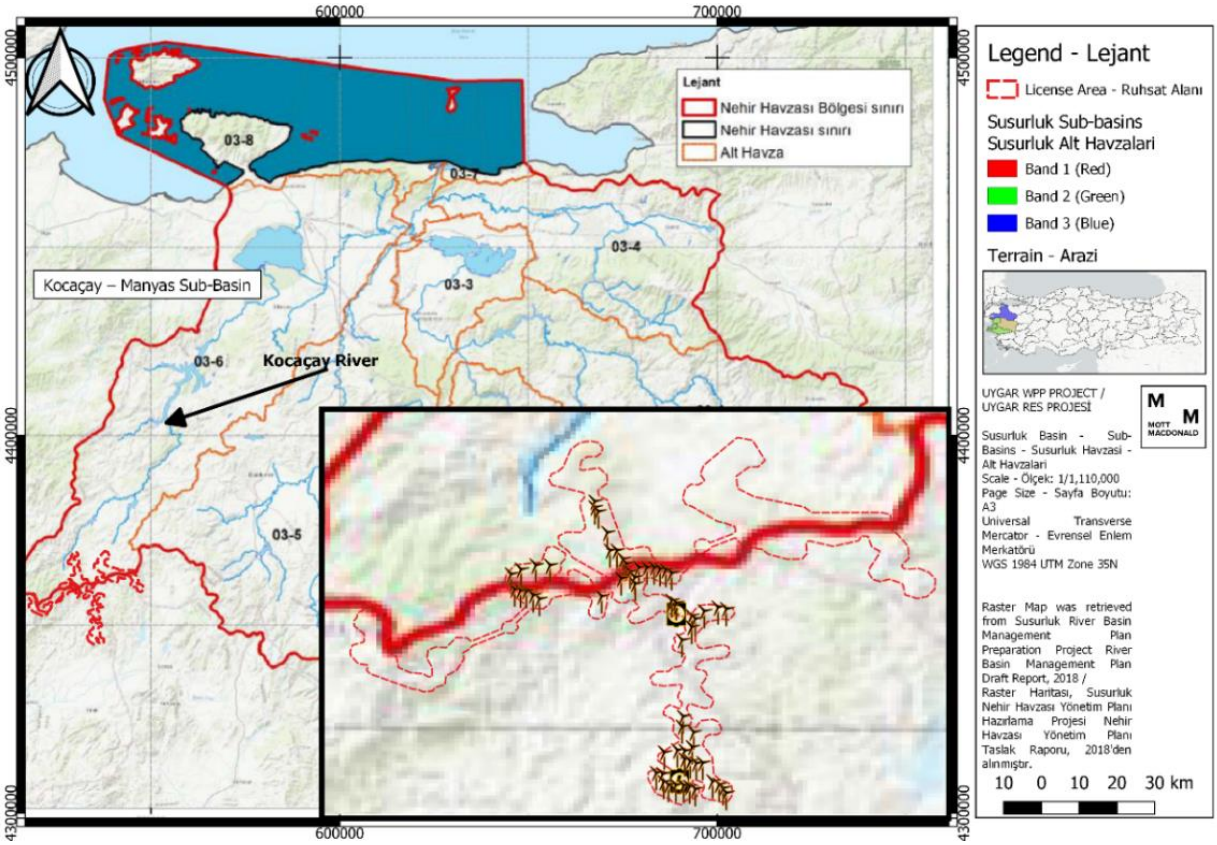


Figure 5.5: Project Location & Susurluk Sub-basins (Susurluk River Basin Management Plan, 2018, MoAF; General Directorate of Water Management)[36]

The closest surface water bodies to the Project area are Korucu and Carkaca Ponds on the northern section and Yortanli, Caltikoru, and Sevisler dam lakes, on the southern section (Figure 5.6). According to Susurluk River Basin Management Plan, which was prepared in 2018, municipal and industrial wastewater discharges, municipal solid waste disposal activities, geothermal power plants, mining discharges, surface runoffs and olive oil production are the main activities that affects the surface water quality of the sub-basin.

[36] Susurluk River Basin Management Plan, 2018, MoAF; General Directorate of Water Management

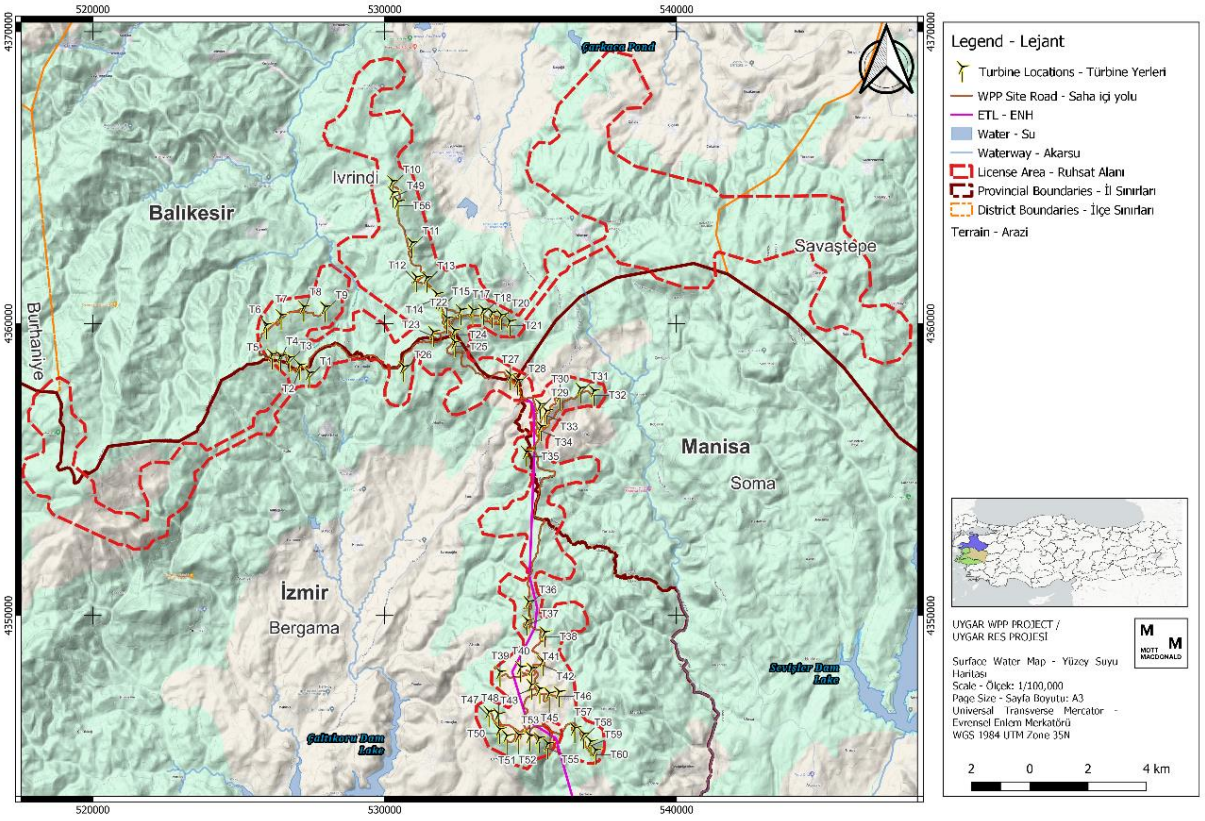


Figure 5.6: Surface Waters near the Project Area

The Project area falls within the jurisdiction area of DSI 2nd Regional and 25th Regional Directorate. Several correspondence have been held between the Project Company and DSI Regional Directorates regarding the turbine and switchyard locations. Accordingly, locations of turbines have been optimized by the Project Company. In this context, turbines and switchyard are not located within any irrigation project area, groundwater protection area or drinking water catchment basin. However, DSI 2nd Regional Directorate has notified that T30, T31, T32, T33, T36, T38, T42, T45, T46, and T60 are located within long-range protection area of Sarıcalar Dam. Nevertheless, construction and operation of wind power plants are allowed within long-range protection areas if proper mitigation measures are in place as per the Regulation on the Protection of Drinking Water Basins.

Additionally, DSI Regional Directorate has mentioned that there is a water source within the topsoil storage area located at east of T49. In this context, the Project Company is expected to take precautions to protect water source and related infrastructure (if exists, i.e., fountain, source, well, etc.) in the topsoil storage area.

It should also be mentioned that there are seasonal creeks near to the access roads of T3, T4, T5, and T6. In addition, there are seasonal creeks near to the T21, T22, T59 and T60. Therefore, to avoid any direct or indirect impact on the stream beds within the Project area, the bed sections of the seasonal creeks should not be altered. Specifically, the bed sections should not be narrowed, and no activities should be carried out that could disrupt the natural flow regime. Figure 5.7 shows the hydrological features around the Project area.

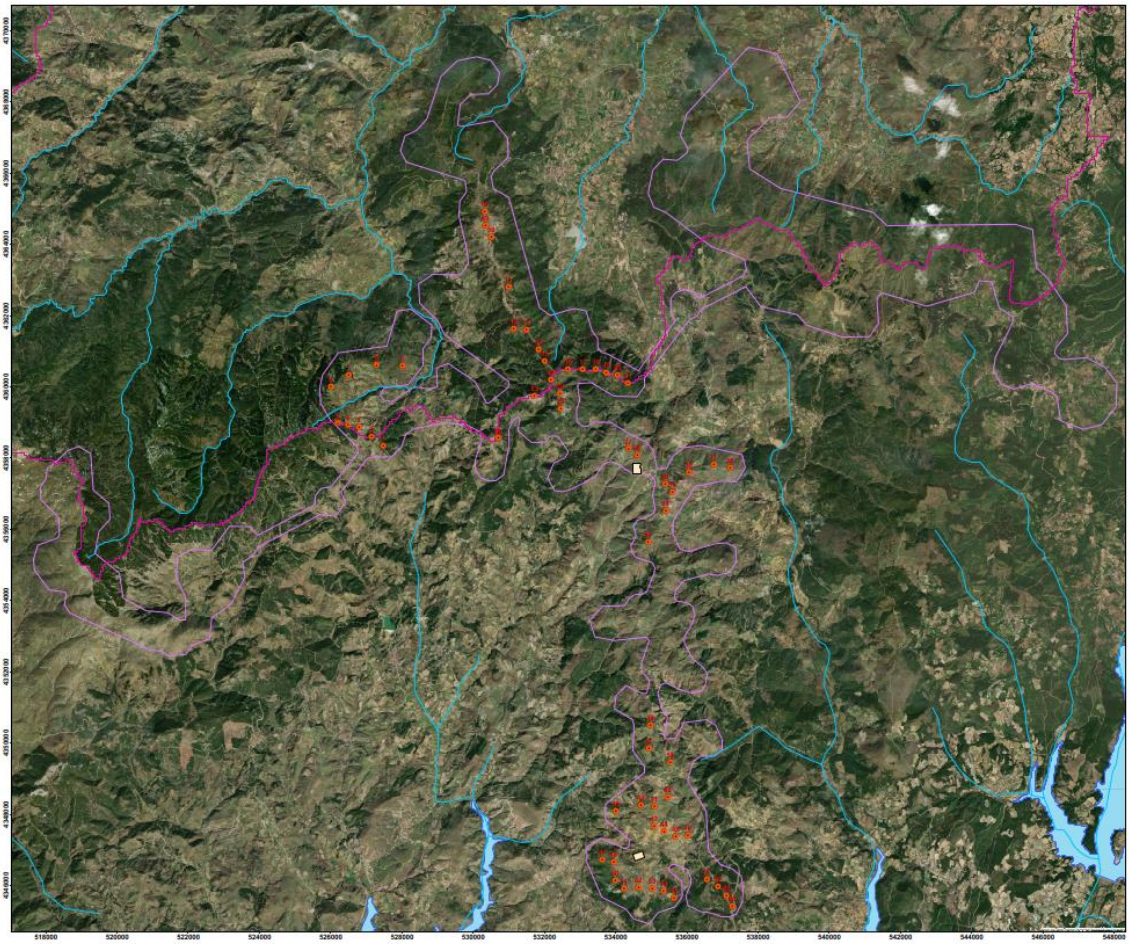


Figure 5.7: Hydrological features in and around the Project area

Source: Uygar WPP National EIA Report, 2023, Nartus (Red dots: Turbines, Purple line: Project area boundary, Blue lines: Creeks, Blue areas: Dam, Yellow box: Switchyard)

Flood Risk

Regarding the flood risk, as reported in the Uygar WPP National EIA Report, the Project area does not fall within any floodplain. Additionally, there is no decision taken by the regulatory authorities indicating that the site is located in an area that may subject to flood.

5.3.2 Hydrogeology

Regarding the hydrogeological features underneath the Project area, Mesozoic Schist is the predominant formation in the north and northwest sections of the Project area. Second dominant formation is Tertiary Volcanic Rocks and is found in southern sections of the Project area. Additionally, Palaeozoic Marble is also found in relatively small area in the south of the Project area. In the middle part of the Project area, Palaeozoic Metamorphic Rocks and Neogene Andesite formations are found[37]. Figure 5.8 shows the hydrogeological features beneath the Project area.

[37] Uygar WPP National EIA Report, 2023, Nartus

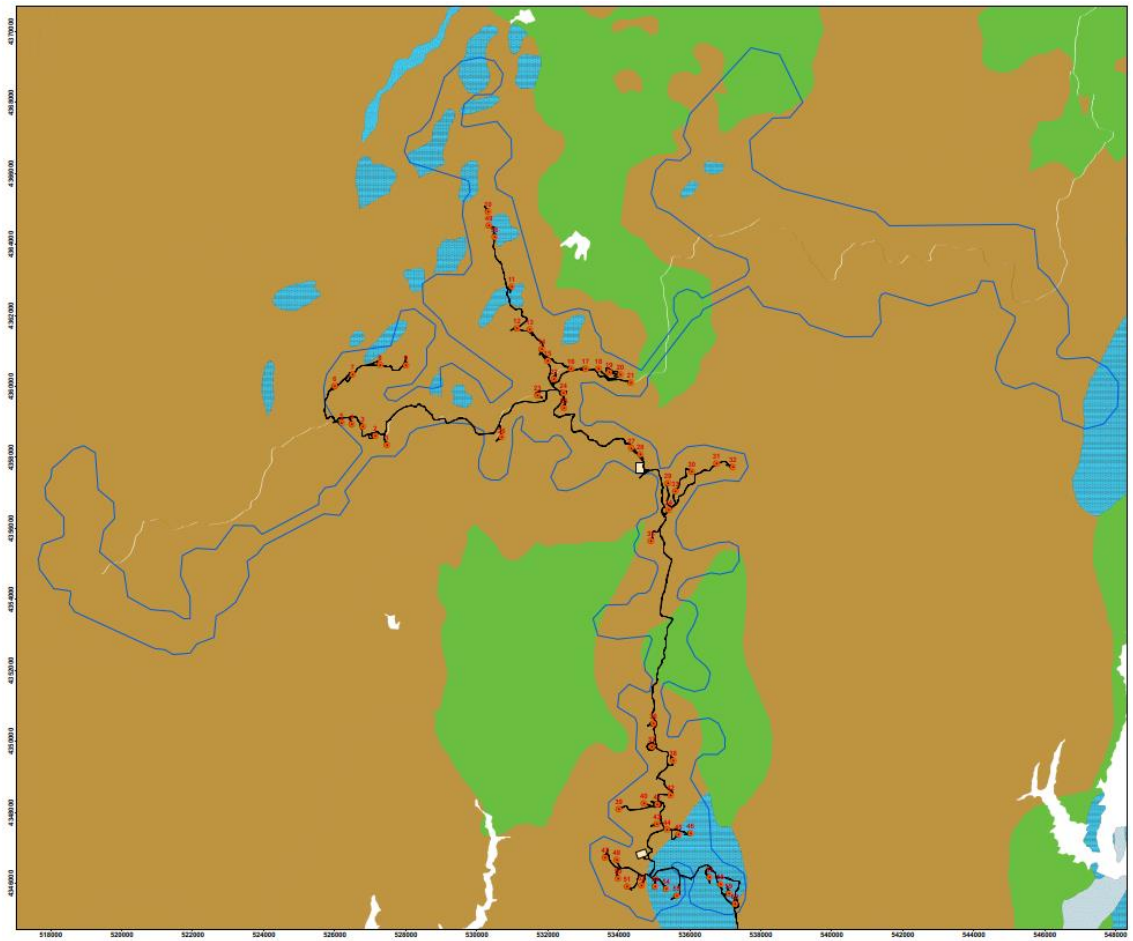


Figure 5.8: Hydrogeological Map of the Project area and its vicinity

Source: Uygar WPP National EIA Report, 2023, Nartus (Red dots: Turbines, Blue line: Project area boundary, Yellow box: Switchyard, Black line: Roads, Green area: n2, Neogene, Unsorted terrestrial sediments, Light blue area (top of the map): Qal, Quaternary, Alluvium, Blue (dashed pattern): P2, Paleozoic, Marble, Brown: v, Neogene, Volcano sediments, a, Neogene, Andesite, Gr, Paleogene, Granite-granodiorite, Mş, Mesozoic, Schist, v, Tertiary, Volcanics, P1, Paleozoic, Metamorphic series)

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 North Aegean Basin and Susurluk basin generate groundwater recharge of 289.4 hm^3/year and 296.96 hm^3/year, respectively.

According to Susurluk River Basin Management Plan, there are 22 groundwater bodies in the basin. MoAF reported that groundwater bodies are utilized for drinking and irrigation purposes in the basin. In addition, it was stated that 21 out of 22 groundwater bodies are classified as "Good", whereas one of them is classified as "Poor" in terms of the quantity. Regarding the quality, 7 out of 22 groundwater bodies are classified as "Good", whereas 15 of them are classified as "Poor".

According to North Aegean River Basin Management Plan, there are 31 groundwater bodies in the basin. MoAF reported that the groundwater reserve is determined as 19 km^3 and groundwater bodies are utilized for drinking and irrigation purposes in the North Aegean Basin. In addition, it was stated that 26 out of 31 groundwater bodies are classified as "Good" in terms of the quantity, whereas 19 out of 31 groundwater bodies are classified as "Poor" in terms of

their quality since they are under anthropogenic pressure, such as agricultural, industrial, and mining activities[38].

The factors that arise largely as a result of 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 extraction of groundwater is one of the pressure factors that will cause a significant decrease in the groundwater body. 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 Uygar WPP National EIA Report, groundwater usage is planned for personnel usage except drinking purposes during construction and operation phase of the Project. It should be noted that turbine locations and switchyard are not located within any irrigation project or groundwater protection area[39]. In addition, it is necessary to obtain relevant permits from Regional Directorates of State Hydraulic Works in order to use groundwater. Groundwater usage should be done according to the amount which is allocated by the State Hydraulic Works in order to prevent excessive withdrawal.

5.3.3 Water Quality

No water quality sampling study was carried out within the scope of National EIA study. Balıkesir, İzmir, and Manisa Province Environmental Status Reports highlight point sources and non-point sources of pollution that may create pressure on the water bodies.

In the scope of ESIA Study, a groundwater sampling study was carried out by the Consultant at Yukarıada, Kiraz, and Göçbeyli Villages whose locations are presented in Figure 5.9.

[38] North Aegean River Basin Management Plan, 2020, MoAF.

[39] Uygar WPP National EIA Report, 2023, Nartus

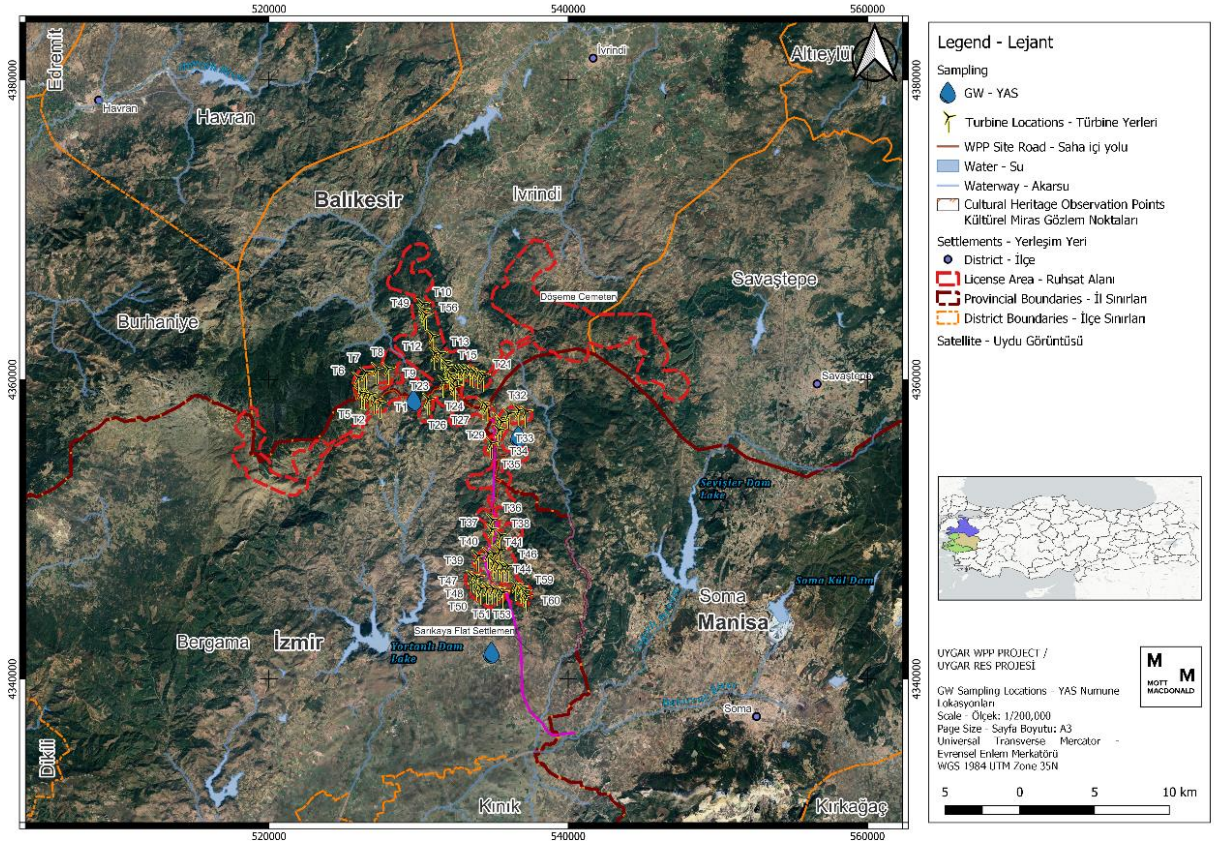


Figure 5.9: Groundwater Sampling Locations

Tap water samples, which are representing the groundwater quality without treatment, were collected from drinking fountains available in the villages (see Figure 5.10, Figure 5.11, and Figure 5.12). Parameters analysed are provided in Table 5.2. The results of these analyses are provided in Table 5.5.

Figure 5.10: Groundwater Sampling at Yukarıada Village

Figure 5.11: Groundwater Sampling at Kiraz Village

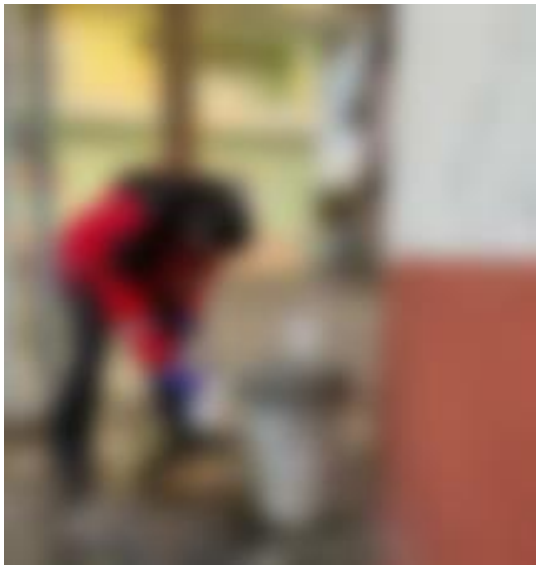


Figure 5.12: Groundwater Sampling at Göçbeyli Village (Note that the photographs are blurred in the publicly disclosed version of this document in compliance with personal data protection regulations)

Table 5.5: 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)	Yukarıada Village	Kiraz Village	Göçbeyli Village
pH	≥ 6.5 & ≤ 9.5	≥ 6.5 & ≤ 9.5	≥ 6.5 & ≤ 9.5	8.04	8.11	7.96
Conductivity	2500 µS / cm at 20°C	-	2500 µS / cm at 20°C	683 µS / cm	870 µS / cm	305 µS / cm
Temperature	-	-	Baseline Level	12.5	12.1	11.8
Saltiness	-	-	Baseline Level	0.34 ‰	0.44 ‰	0.15 ‰
Dissolved Oxygen	-	-	Baseline Level	7.4 mg/L	7.3 mg/L	7.06 mg/L
Nitrate	50 mg/L	50 mg/L	50 mg/L	<0.44 mg/L	<0.44 mg/L	3.03 mg/L
Nitrite	0.50 mg/L	3 mg/L	3 mg/L	<0.33 mg/L	<0.3 mg/L	<0.33 mg/L
Ammonium	0.50 mg/L	-	0.50 mg/L	0.037 mg/L	<0.026 mg/L	<0.026 mg/L
Total Phosphorus	-	-	Baseline Level	<0.01 mg/L	0.326 mg/L	0.091 mg/L
Total Organic Carbon	-	-	Baseline Level	<4 mg/L	<4 mg/L	<4 mg/L
Chloride	-	0.7 mg/L	0.7 mg/L	11.4 mg/L	7.67 mg/L	22.5 mg/L
Sulphate	250 mg/L	-	250 mg/L	14.5 mg/L	12.4 mg/L	14.8 mg/L
Carbonate	-	-	Baseline Level	<10 mg/L	<10 mg/L	<10 mg/L
Bicarbonate	-	-	Baseline Level	309 mg/L	297 mg/L	109 mg/L
Fluoride	1.5 mg/L	1.5 mg/L	1.5 mg/L	<0.1 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	<0.005 mg/L
Calcium	-	-	Baseline Level	102 mg/L	59 mg/L	25 mg/L
Magnesium	-	-	Baseline Level	3.95 mg/L	24.4 mg/L	6.5 mg/L
Sodium	200 mg/L	-	200 mg/L	5.61 mg/L	14 mg/L	17.8 mg/L
Potassium	-	-	Baseline Level	<0.1 mg/L	1.81 mg/L	1.97 mg/L
Chromium +6	-	-	Baseline Level	<0.02 mg/L	<0.02 mg/L	<0.02 mg/L
Suspended Solids	-	-	Baseline Level	<10 mg/L	<10 mg/L	<10 mg/L
Arsenic	10 µg/L	10 µg/L	10 µg/L	<0.001 mg/L	0.049 mg/L	0.007 mg/L
Cadmium	5.0 µg/L	3.0 µg/L	3.0 µg/L	<0.0002 mg/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)	Yukarıada Village	Kiraz Village	Göçbeyli Village
Lead	10 µg/L	10 µg/L	10 µg/L	<0.001 mg/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	<0.001 mg/L
Aluminium	200 µg/L	-	200 µg/L	<0.002 mg/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	<0.002 mg/L
Copper	2 mg/L	2 mg/L	2 mg/L	0.0011 mg/L	<0.001 mg/L	0.0013 mg/L
Barium	-	1.3 mg/L	1.3 mg/L	0.041 mg/L	0.055 mg/L	0.098 mg/L
Beryllium	-	-	Baseline Level	<0.002 mg/L	<0.002 mg/L	<0.002 mg/L
Zinc	-	-	Baseline Level	0.006 mg/L	0.007 mg/L	0.008 mg/L
Total Chromium	50 µg/L	50 µg/L	50 µg/L	0.019 mg/L	0.016 mg/L	0.005 mg/L
Nickel	20 µg/L	70 µg/L	20 µg/L	<0.002 mg/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	<0.001 mg/L
Selenium	10 µg/L	40 µg/L	10 µg/L	<0.001 mg/L	<0.001 mg/L	0.002 mg/L
Boron	1 mg/L	2.4 mg/L	1 mg/L	<0.025 mg/L	<0.025 mg/L	<0.025 mg/L

As can be seen from Table 5.5, 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[40]. 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 21 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. In case utilization of groundwater deemed necessary, the opinion from the 2nd and 25th Regional Directorates of the State Hydraulic Works (DSİ) 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 utility water will be purchased either from municipalities or the market in exchange of a fee. 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.

The amount of drinking and potable water for the personnel planned to work within the scope of the Project is determined as 9.55 m^3/day. It was also found that 5 m^3/day of water will be needed for dust suppression. In total, 32.05 m^3/day of water will be needed during the construction for personal requirements and dust suppression, whereas 2.67m^3/day of water will be needed during the operation for personnel requirements[41].

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

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

[41] Uygar WPP National EIA Report, 2023, Nartus

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

The closest surface water bodies to the Project area are Korucu and Carkaca Ponds on the northern section and Yortanli, Caltikoru, and Sevisler dam lakes, on the southern section. According to Susurluk River Basin Management Plan, municipal and industrial wastewater discharges, municipal solid waste disposal activities, geothermal power plants, mining discharges, surface runoffs and olive oil production are the main activities that affects the surface water quality of the sub-basin. Therefore, sensitivity of surface waters is evaluated as medium.

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 World Bank Group Environmental, Health, and Safety General Guidelines (EHS 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.

Groundwater in the region is one of the main water supply resources for local people especially for their daily activities, including agriculture. Thus, groundwater is an important resource having role in their livelihood. As mentioned above, project affected people are using the groundwater resources for drinking purposes besides the irrigation. It should also be noted that Project area is not located within any groundwater protection zone.

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. Impact magnitude is assessed as minor as described in Table 5.8. Thus, the significance of impact is assessed as minor.

As described earlier, the closest surface water bodies to the Project area are Korucu and Carkaca Ponds on the northern section and Yortanli, Caltikoru, and Sevisler dam lakes, on the southern section. 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 medium. Moreover, 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 anticipated with surface water courses in the scope of the Project. Impact magnitude is assessed as minor as described in the Table 5.6.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 surface 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 and hydrology impacts during the operation phase will be scoped out for future 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.

However, impacts on hydrogeology regarding groundwater usage will be scoped in since groundwater usage is planned for personnel usage except drinking purposes.

5.4.2.1 Impacts on Groundwater

Excessive groundwater abstraction

Groundwater is an important resource having role in local people's livelihood in the region. The sensitivity of the groundwater resource is medium. It should be noted that the Project area is not located within any groundwater protection zone. The magnitude of impact due to increased groundwater use from the same resource is assessed as moderate since the groundwater levels are already under pressure due to excessive withdrawal in the region.

It is anticipated that impacts on the groundwater levels will not cause permanent decrease provided that necessary mitigation measures are taken. Therefore, the magnitude of impact due to groundwater abstraction 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 beyond the Project area. It should also be noted that in case utilization of groundwater deemed necessary, the opinion from the 2nd and 25th Regional Directorates of the State Hydraulic Works (DSİ) will be requested. Only allocated amount of groundwater can be utilized if approval letter is obtained from the relevant regional directorates of DSİ. Thus, the significance of impact is assessed as minor.

5.4.3 Summary

Assessment of impacts on water quality, hydrology and hydrogeology was conducted 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 5.10 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 is provided below.

Table 5.6: 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.

Magnitude	Definition
	• 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 5.7: 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. • 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 5.8: 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 5.9: Groundwater Sensitivity/Value Criteria for Resource/Receptors

Value	Definition
High	• Project area falls within a groundwater 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 5.10: Summary of Construction and Operation Impacts

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Construction Phase									
Use of Water Resources	Surface water bodies	Minor	Construction	AoI	Reversible	Unlikely	Minor	Medium	Minor
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	Medium	Minor
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
Operation Phase									
Excessive groundwater abstraction	Groundwater	Minor	Operation	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.

5.5.1.1 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).
- Relevant permits will be obtained from Regional Directorates of State Hydraulic Works (2nd and 25th Regional Directorates) in order to use groundwater.
- Groundwater abstraction will be done according to the amount which is allocated by the State Hydraulic Works in order to prevent excessive withdrawal.
- 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.
- If any intervention is deemed necessary regarding stream beds, the issues outlined in the circular of the Prime Ministry on Stream Beds and Floods (numbered 2006/27) and the Flood and Sediment Control Regulation (OG Date: 03/05/2019, OG Number: 30793) will be adhered to.
- 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.

5.5.1.2 Mitigation during Operation.

The assessment has shown that groundwater levels could negatively affected due to excessive groundwater abstraction during operation phase of the Project. This section describes specific mitigation measures that will be implemented to prevent and minimise operation impacts on groundwater levels

Specific mitigation measures to avoid and/or mitigate the potential impacts on groundwater during operation phase will need to include the following:

- Relevant permits will be obtained from Regional Directorates of State Hydraulic Works (2nd and 25th Regional Directorates) in order to use groundwater.
- Groundwater abstraction will be done according to the amount which is allocated by the State Hydraulic Works in order to prevent excessive withdrawal.
- Water Quality Management Plan for the Operation Phase will be complied with during operation.

Additionally, a groundwater table monitoring regime will be implemented during the operation phase in case of grievances. The water will be sampled from the already available groundwater wells around the Project site in 1 km distance from the boundary.

5.5.1.3 Residual Impacts

Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. A summary of effects is presented in below in Table 5.11. 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 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 5.11: Summary of Residual Effects, After the Application of Mitigation

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Construction Phase			
Use of Water Resources	Surface water bodies	Minor	Negligible
Use of Water Resources	Groundwater bodies	Minor	Negligible
Water Quality	Surface water bodies	Minor	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
Operation Phase			
Excessive groundwater abstraction	Groundwater	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 Section 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*, 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 or 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[42], which sets out that polluters are liable for damages caused to the environment and natural resources, and for compensation of such damages. Other relevant legislation under the Law on Environment includes the following:

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

- 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 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 contamination 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 vapours 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)
TOX	Baseline Level	-	-	-
TPH	Baseline Level	-	-	-
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 Area of Influence 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 Energy Transmission Line (ETL) route had been considered. A 1 km buffer zone is determined (see Figure 6.1).

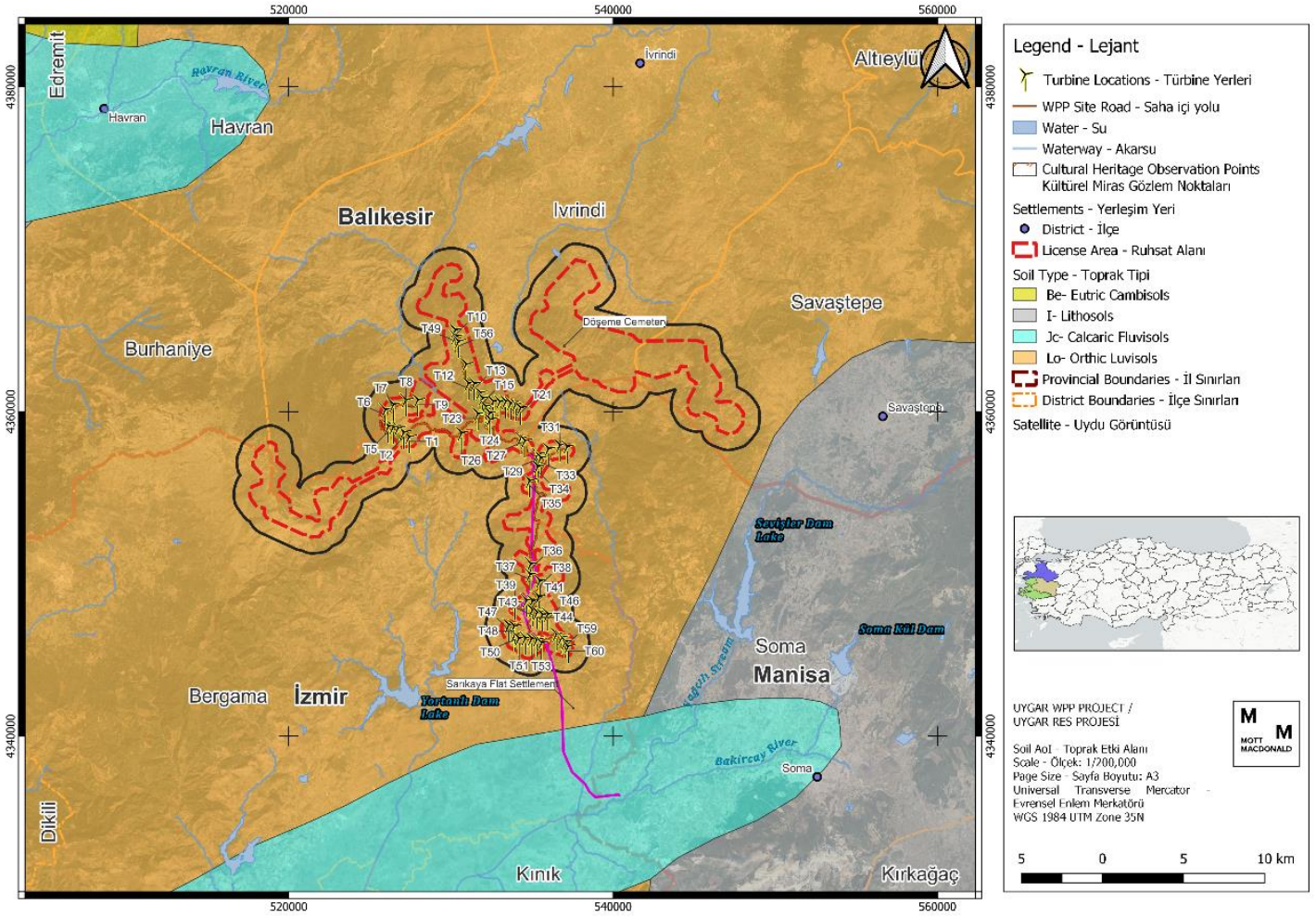


Figure 6.1: Area of Influence for Land Use, Soil and Geology

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.

At this stage of the ESIA, geotechnical, geological and hydrogeological information have been extracted from the sources mentioned in Section 6.3. Nevertheless, verification of the extracted data and further assessment of the geology related items will be done upon the completion of the geotechnical survey report.

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.

- Uygar WPP National EIA Report, 2023, Nartus
- CORINE 2018 Land Cover Database (https://land.copernicus.eu/en/products/corine-land-cover)
- Google Earth Satellite Images
- 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)

Additionally, a site visit has been carried out on 2 October 2023 to gather 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 WPP License Area, which has a 42,541-hectare area, is mainly located on areas with natural habitat, different cultivation patterns and forest areas (Table 6.3). There is almost no built area on or nearby the Project area. Industrial and commercial activities are identified to be located far away from the Project area (Figure 6.2).

Table 6.3: Corine 2018 Land Use & Land Cover

Code	Land Use & Land Cover	Area(ha)	Percentage
211	Non-irrigated arable land	33.38	0.08%
242	Complex cultivation patterns	4209.48	9.90%
243	Land principally occupied by agriculture with significant areas of natural vegetation	7584.49	17.83%
311	Broad-leaved forest	2411.21	5.67%
312	Coniferous forest	8588.98	20.19%
313	Mixed forest	6457.38	15.18%
321	Natural grasslands	3045.70	7.16%

Code	Land Use & Land Cover	Area(ha)	Percentage
323	Sclerophyllous vegetation	2593.23	6.10%
324	Transitional woodland-shrub	7590.75	17.84%
333	Sparsely vegetated areas	26.83	0.06%
Total		**42,541.41**	**100.00%**

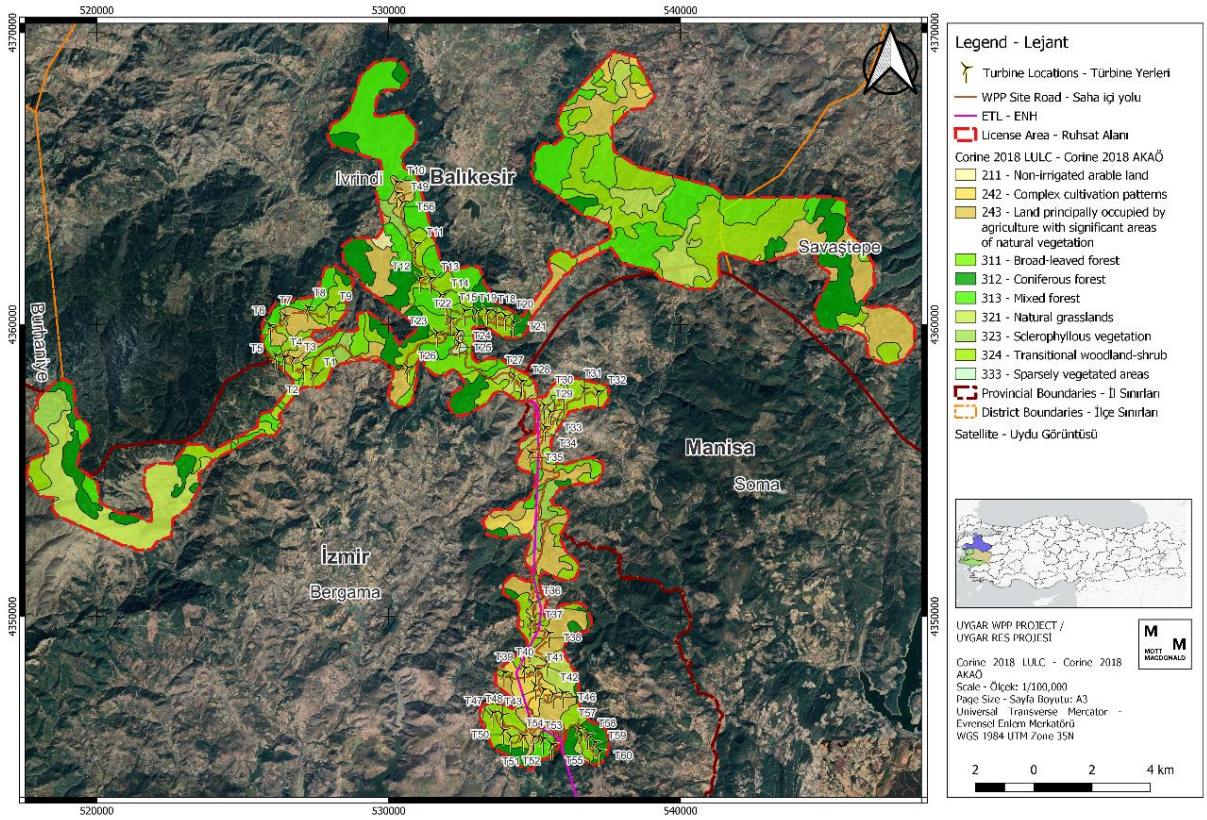
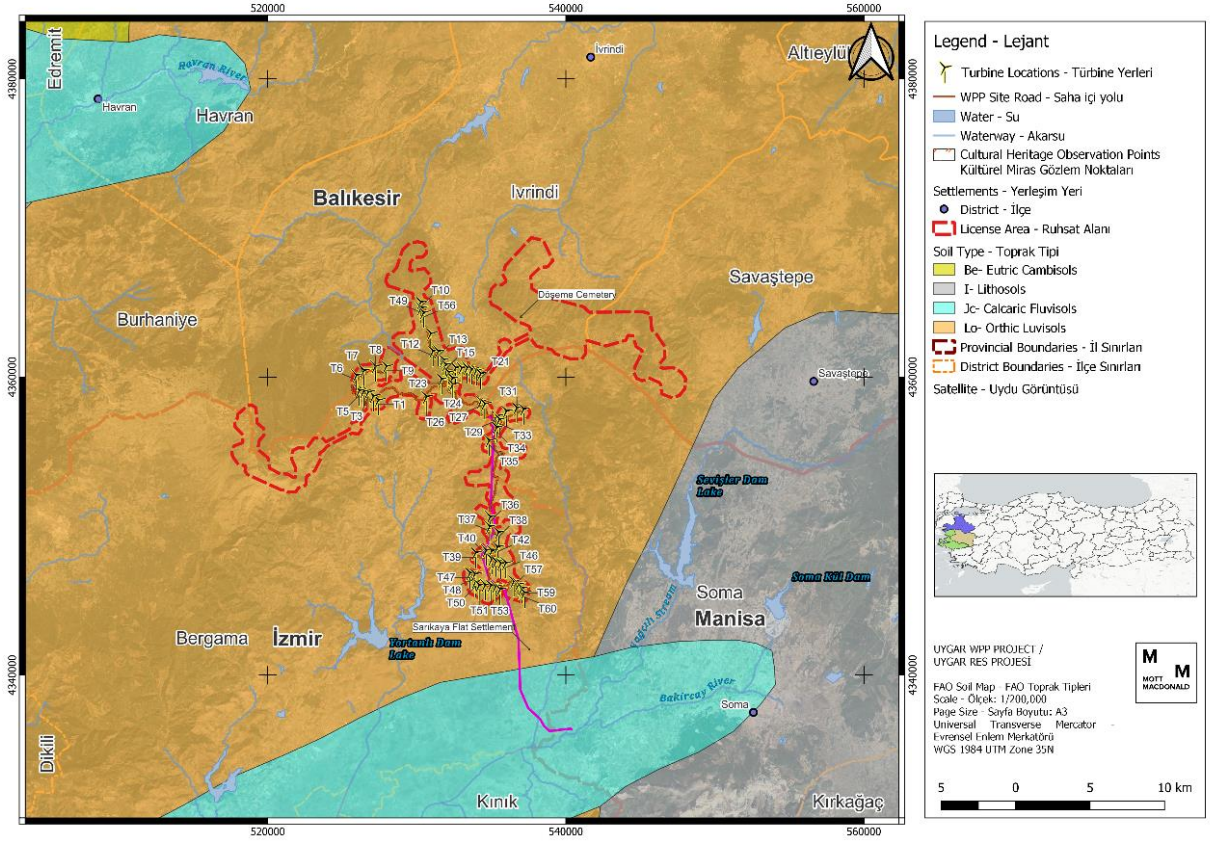


Figure 6.2: Corine 2018 LULC Map

Furthermore, the land use of the turbine & switchyard locations was also examined via the National EIA Report prepared in 2023. Accordingly, it has been seen that majority of the land occupied by the Project is forest. Nevertheless, it has been determined by the National EIA studies that the turbine locations, T3, T31, T32, T34, T45, T36, T38, T42, T43, T44, T45, and T46, are agricultural land. During the site visit, Ivrindi (Balıkesir) District Directorate of Agriculture and Forestry and local people were consulted regarding historical use of the Project area. Although there are agricultural and husbandry activities taking place in the Bergama, Soma, İvrindi districts, it was found that no significant agricultural activities have been conducted within the Project area boundaries.

6.3.2 Soil

Soil texture properties of the Uygar WPP License Area are assessed via FAO Harmonized World Soil Database - The Digital Soil Map of the World Version 3.6. As it can be seen from Figure 6.3, dominant soil type at the Project area is *Orthic Luvisols*. Additionally, on the southern section of the Project area, where a part of the ETL is located, the soil type is identified as *Calcaric Fluvisols.*



[43]

Figure 6.3: Soil Map of Uygar Project area

Properties of *Orthic Luvisols* and *Calcaric Fluvisols* types are described below.

Orthic Luvisols

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. (ISRIC - International Soil Reference and Information Centre, 2023).

Calcaric Fluvisols

Fluvisols are relatively young soils that have no horizon differentiation. They often exhibit AC-profiles and are mostly brown (for aerated soils) or grey (for waterlogged soils) in colour. Their texture might range from thick clays in basin areas to coarse sands in levee soils (ISRIC - International Soil Reference and Information Centre, 2023). Calcaric Fluvisols are a soil type which are calcareous, at least between 20 and 50 cm from the surface (Food and Agriculture Organization of the United Nations (FAO), 2023)

In addition, major soil groups of turbine and switchyard locations had been identified within the scope of the National EIA Report prepared in 2023. Accordingly, majority of the location has the Limeless Brown Forest Soils and Limeless Brown Soils. This information is also in consistency with the FAO classification. According to the information obtained from the Agriculture Sciences

[43]

Journal, limeless brown soils show the features of *Orthic Luvisols*. Thus, it can be concluded that soil properties of the Project Area show good drainage and a favourable air regime feature.

Table 6.4: Correspondence of Major Soil Groups in The Aegean Basin in The FAO/UNESCO (1990) System

Major Soil Group	FAO Classification
Limeless Brown Soils	Orthic Luvisol
Limeless Brown Forest Soils	Orthic Luvisol

The Consultant has carried out soil quality sampling analysis at turbine and switchyard locations (Figure 6.4) The results of these analyses are presented in Table 6.5. As mentioned above Ivrindi (Balıkesir) District 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 6.5, 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 exceedances have been observed except for Arsenic, Cobalt, Lead, and Nickel Parameters, which have higher values than the national limit.

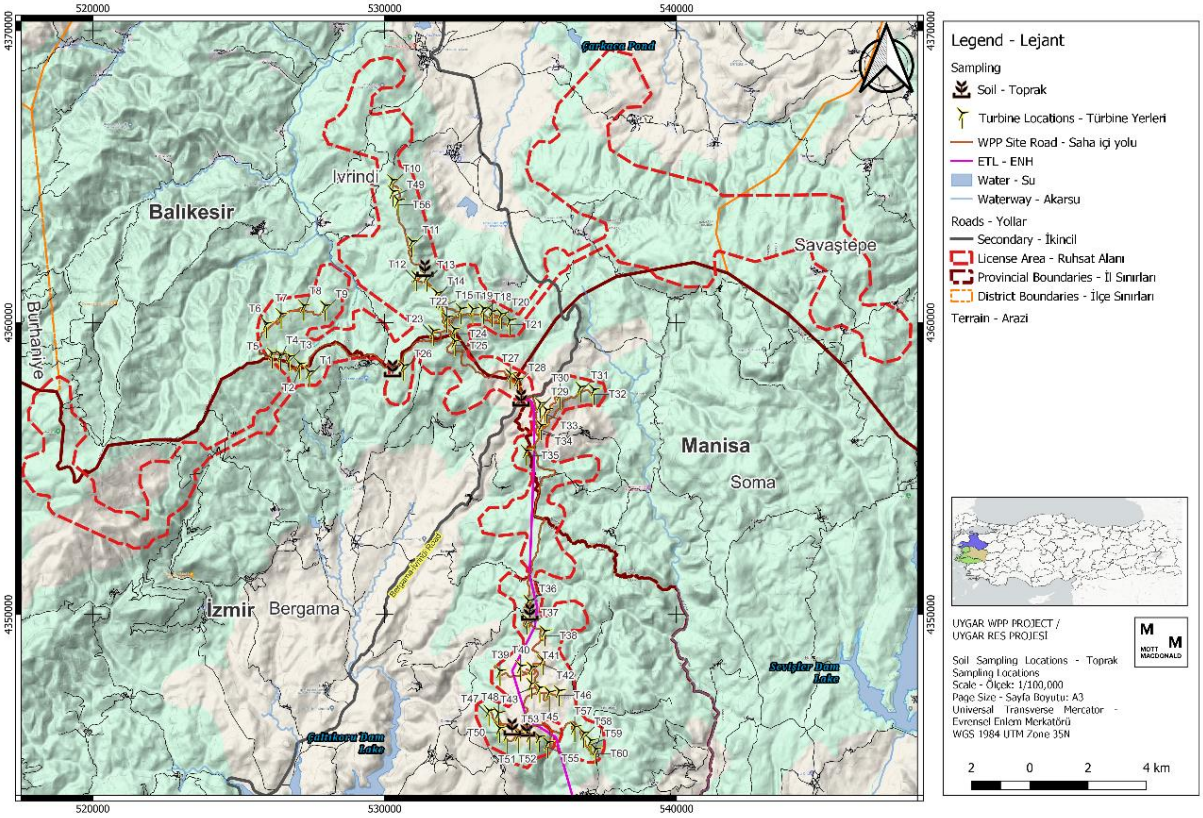


Figure 6.4: Soil Sampling Locations

Figure 6-5 Soil Sampling at Switchyard Area-1

Figure 6-6 Soil Sampling at Switchyard Area-2

Figure 6-7 Soil Sampling at T-36

Figure 6-8 Soil Sampling at T-26

Figure 6-9 Soil Sampling at T-50

Figure 6-10 Soil Sampling at T-12

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

Table 6.5: Soil Sampling Analysis Results

Parameters	Unit	Limit Value National Legislation	Limit Value Dutch Pollution Standards		Switchyard Area-1	Switchyard Area-2	T-36	T-26	T-50	T-12	Method
Total Organic Halogen (TOX)	mg/kg	**Absorption through ingestion of soil and dermal contact**	**Inhalation of fugitive dust outdoors**	**Transport of pollutants to groundwater and drinking of groundwater (DF=10)**	18.1	10.2	19.1	20.8	11.5	<10	Internal Method
Total Petroleum Hydrocarbons (TPH)	mg/kg	_	-	-	<100	<100	<100	<100	<100	<100	TS EN 14039
TVOCs	mg/kg	_	-	-	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	EPA 3051 A EPA 6020 B
Arsenic (mg/kg)	mg/kg	0.4	471	3	6.44	9.55	603.32	31.56	48.81	9.28	EPA 3051 A EPA 6020 B
Barium (mg/kg)	mg/kg	15643	433702	288	43.78	47.50	3619.91	331.88	315.97	204.15	EPA 3051 A EPA 6020 B
Cadmium (mg/kg)	mg/kg	70	1124	27	0.11	0.38	1.28	0.13	<0,02	<0,02	EPA 3051 A EPA 6020 B
Cobalt (mg/kg)	mg/kg	23	225	5	4.28	10.14	82.16	8.33	4.58	4.39	EPA 3051 A EPA 6020 B
Chromium (mg/kg)	mg/kg	235	24	900000	7.94	17.86	167.10	14.04	9.25	6.56	EPA 3051 A EPA 6020 B
Copper (mg/kg)	mg/kg	3129	-	514	5.15	17.76	84.15	9.01	6.64	5.77	EPA 3051 A EPA 6020 B
Nickel (mg/kg)	mg/kg	1564	-	13	10.39	24.59	116.30	11.09	7.36	6.05	EPA 3051 A EPA 6020 B
Lead (mg/kg)	mg/kg	400	-	135	13.31	16.87	184.57	16.93	4.26	5.03	EPA 3051 A EPA 6020 B

Parameters	Unit	Limit Value National Legislation	Limit Value Dutch Pollution Standards		Switchyard Area-1	Switchyard Area-2	T-36	T-26	T-50	T-12	Method
Vanadium (mg/kg)	mg/kg	548	-	2556	7.30	14.50	365.96	32.87	19.78	24.62	EPA 3051 A EPA 6020 B
Zinc (mg/kg)	mg/kg	23464	-	6811	27.09	52.95	263.55	29.61	16.48	15.61	EPA 3051 A EPA 6020 B

6.3.3 Geology

According to the National EIA study carried out in 2023, the general topography of the Project area shows a mountainous structure with altitudes varying between 1,343-412 m. medium height mountains extend in the north-south direction. There are many ridges and hills on the mountainous structure. Turbines and facilities at the Project area are planned to be built on the ridges and hills on the mountains extending between Kozderegüven Village in the northeast and Beyce Village in the southwest. These are starting from the northwest, the highest of which is Maya Hill 1,343 m, Sofu Hill, Karaçukur Hill, Sancaklı Hill, Emiroluk Hill, Karabaş Hill, Adabaşı Hill, Kirazlık Hill, Tavşanlı Hill 733 m, Koca Hill 728 m, Kaklık Hill 734 m, Kocadere Hill and Cemetery. Hill etc. like this.

Regarding the geological features the Project area, Mesozoic Schist is the predominant formation in the north and northwest sections of the Project area. Second dominant formation is Tertiary Volcanic Rocks and is found in southern sections of the Project area. Additionally, Palaeozoic Marble is also found in relatively small area in the south of the Project area. In the middle part of the Project area, Palaeozoic Metamorphic Rocks and Neogene Andesite formations are found.

Geological map of the Project area and its close vicinity is provided in Figure 6.11

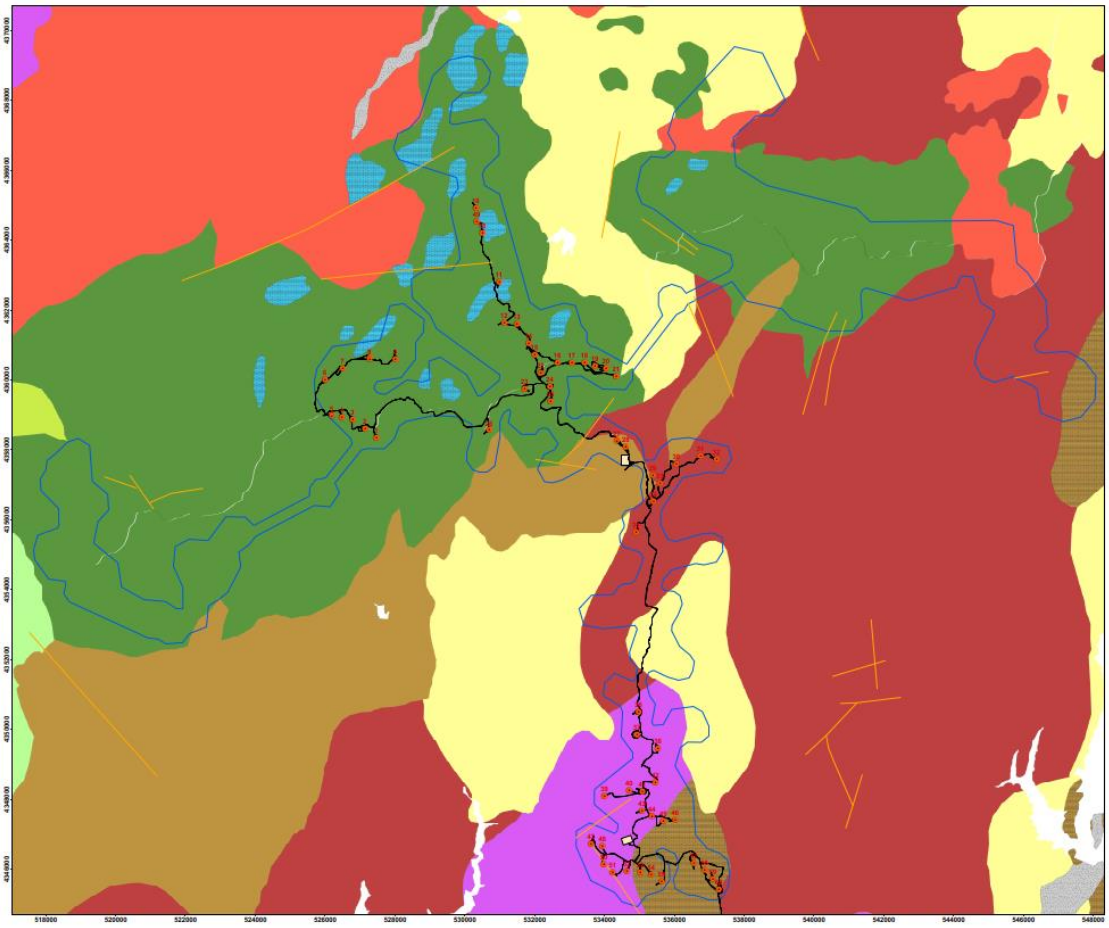


Figure 6.11: Geological features of the Project area and its close vicinity

Source: Uygar WPP National EIA Report, 2023, Nartus (Red dots: Turbines, Blue line: Project area boundary, Yellow box: Switchyard, Black line: Roads, Orange lines: Fault, Brown areas: P1, Paleozoic, Metamorphic series, Red area: a, Neogene, Andesite, Green area: Mş, Mesozoic, Schist, Gray area: Qal, Quaternary, Alluvium, Orange area: V, Neogene, Volcano sediments, Yellow area, n2, Neogene, Unsorted terrestrial sediments Purple area: v, Tertiary, Volcanics)

Within the scope of the National EIA study, earthquake risk has been also assessed. Accordingly, the greatest ground acceleration (PGA) in the area is 423 g. The PGA value in the Project area was determined as 0.373. The Project area and its surroundings are located close to the medium and high hazard group in the hazard grouping.

Moreover, the peak ground acceleration in the Project area was determined as PGA 475 0.373 g. Earthquakes with magnitude M⩾4 that occurred between 01 January 2013 and 01 July 2023 within the 35 km radius circle surrounding the project area were examined. To date, one earthquake with magnitude M⩾4 has occurred nearby the Project area.

Landslides

According to the National EIA studies, the presence of active landslides and old landslides has not been detected within the WPP License area, and there is no movement area formed as a result of slippage, or old landslide surface strength.

Seismicity

In addition to the National EIA Studies, PGA values of Switchyard and turbine locations were identified via Türkiye Earthquake Hazard Maps Interactive Web Application Figure 6-12 Accordingly, the PGA values of the Project components were determined to be around 0.4 (Table 6.6). According to the Türkiye Earthquake Hazard Map PGA values between 0.4 and 0.5 is classified as 1st Degree Earthquake Zone. Considering the PGA values is near 0.4, it can be said that the Project area is located in 1st Degree Earthquake Zone.

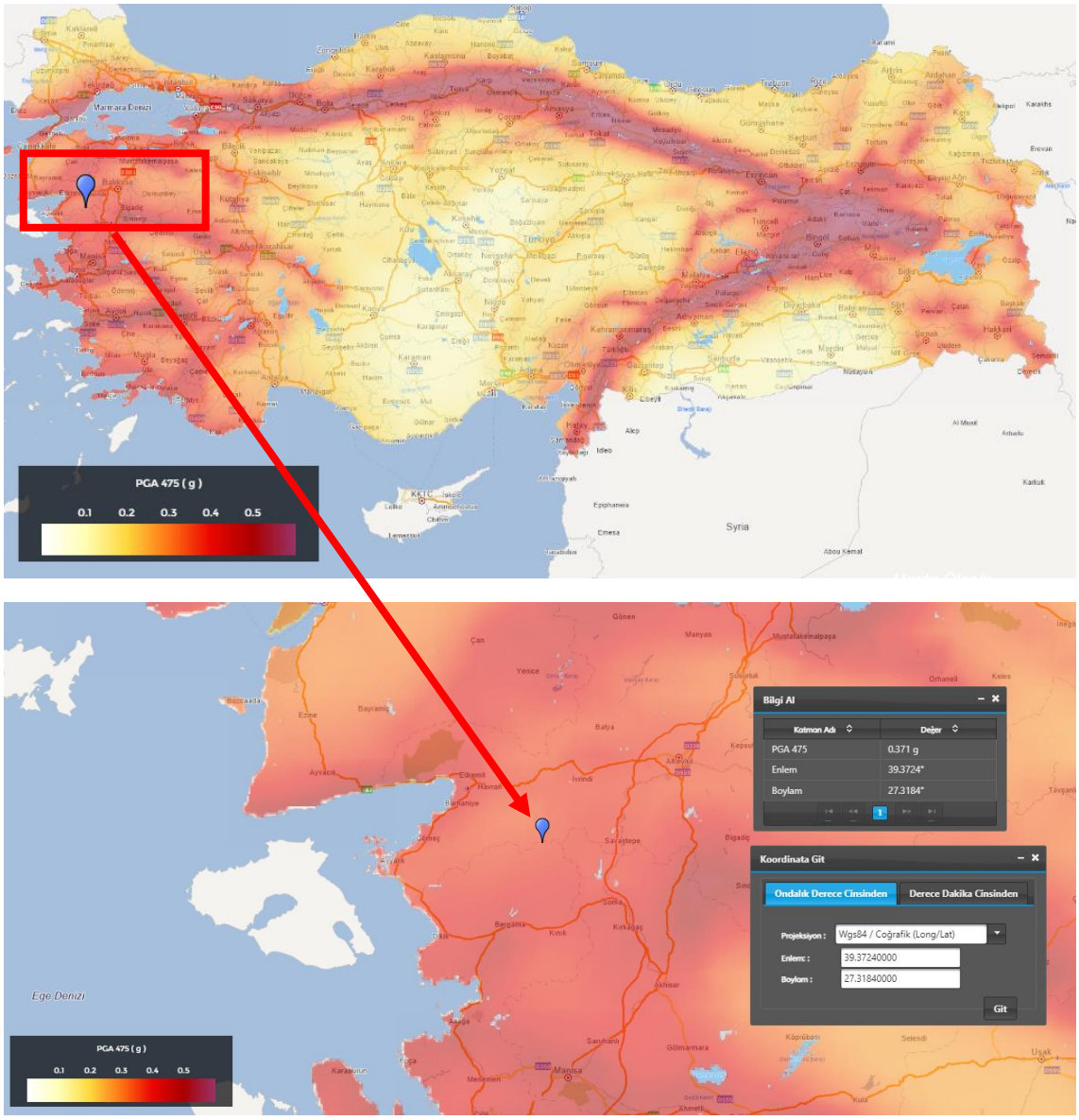


Figure 6-12: Hazard Risk Map of the Switchyard Area (Location is showing T1)

Table 6.6: Peak Ground Acceleration Values for Wind Turbine and Switchyard Locations

Name	X	Y	PGA
T1	27.3184	39.3724	0.371
T2	27.3146	39.3749	0.370
T3	27.3105	39.3773	0.369
T4	27.3069	39.3777	0.368
T5	27.3036	39.3782	0.368
T6	27.3013	39.3874	0.365
T7	27.3072	39.3903	0.365
T8	27.3162	39.3929	0.366
T9	27.3247	39.3928	0.368
T10	27.3517	39.4315	0.368

Name	X	Y	PGA
T11	27.3594	39.4125	0.371
T12	27.361	39.4019	0.372
T13	27.3652	39.4018	0.373
T14	27.3691	39.3967	0.374
T15	27.3711	39.3938	0.375
T16	27.3787	39.3917	0.376
T17	27.3834	39.3917	0.377
T18	27.3877	39.3918	0.378
T19	27.3912	39.3908	0.378
T20	27.3948	39.3901	0.379
T21	27.3982	39.3881	0.380
T22	27.3731	39.3891	0.376
T23	27.3677	39.385	0.376
T24	27.3761	39.3855	0.377
T25	27.3763	39.3818	0.377
T26	27.3559	39.3743	0.376
T27	27.3983	39.3715	0.382
T28	27.4012	39.3699	0.382
T29	27.4102	39.3624	0.384
T30	27.4181	39.3654	0.384
T31	27.4261	39.3674	0.385
T32	27.4315	39.3666	0.385
T33	27.4126	39.3604	0.384
T34	27.4104	39.3557	0.385
T35	27.4046	39.3478	0.385
T36	27.4051	39.3016	0.392
T37	27.4046	39.2957	0.393
T38	27.4115	39.2921	0.394
T39	27.3937	39.2799	0.396
T40	27.4019	39.2814	0.396
T41	27.4063	39.281	0.396
T42	27.4107	39.2833	0.396
T43	27.4061	39.276	0.397
T44	27.4094	39.2747	0.397
T45	27.4132	39.2733	0.397
T46	27.4171	39.2737	0.398
T47	27.3892	39.2677	0.398
T48	27.3929	39.267	0.398
T49	27.352	39.428	0.368
T50	27.3934	39.2623	0.399
T51	27.3963	39.2603	0.400
T52	27.401	39.2604	0.400
T53	27.4054	39.2601	0.400
T54	27.4091	39.2595	0.401

Name	X	Y	PGA
T55	27.4125	39.2577	0.401
T56	27.3539	39.4253	0.369
T57	27.4232	39.2625	0.400
T58	27.4268	39.2607	0.401
T59	27.4296	39.2583	0.401
T60	27.4315	39.2557	0.402
Switchyard-1	27.4032	39.2659	0.399
Switchyard-2	27.4011	39.3664	0.382

Source: Türkiye Earthquake Hazard Maps Interactive Web Application[44]

Erosion

Furthermore, the erosion risk of the turbine locations has been assessed within the scope of National EIA studies as well. According to the National EIA Report, turbine location have Degree 3: Severe level erosion or Degree 4: Very severe erosion risks.

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

The area planned to be occupied due to the Project activities is summarised below.

Turbine Platform Area: The turbines will be placed in a circular area with a radius of 12.45m. Locations of the Turbine Platform Areas were determined by taking into account the topographic condition of the ground and the size of the turbine blades. The area in question is on average 487 m^2 per turbine.

$$\pi \times 12.45^2 = 487\ m^2$$

This section is also the area, where topsoil and excess excavation material to be used for filling purposes after construction, are stored.

[44] Türkiye Earthquake Hazard Maps Interactive Web Application[44] (https://tdth.afad.gov.tr/TDTH/main.xhtml)

There are 60 wind turbines planned to be constructed. As mentioned in Section 2.5, 37 turbines will be installed in the first stage, whereas remaining 23 turbines will be installed in the second stage. Thus, total area to be occupied by the turbine platform areas are as follows:

$$\mathbf{487}\ \boldsymbol{m^2} \times \mathbf{60} = \mathbf{29{,}220}\ \boldsymbol{m^2}$$

Access Roads & Site Roads: Turbine locations have been selected to eliminate the need to construct new roads as much as possible. However, in cases where existing roads do not provide access to turbine points, it will be necessary to open new roads, improve existing ones, or create connecting roads from the existing network. It is expected to construct approximately 65,000 m of site road inside the License Area. Width of the roads are planned to be around 6 meters. As a result, the total area to be occupied by the roads will be:

$$\mathbf{65{,}000}\ \boldsymbol{m} \times \mathbf{6}\ \boldsymbol{m} = \mathbf{390{,}000}\ \boldsymbol{m^2}$$

Therefore, the total footprint of the Project area is calculated as follows:

$$\mathbf{29{,}220}\ \boldsymbol{m^2} + \mathbf{390{,}000}\ \boldsymbol{m^2} = \ \mathbf{419{,}220}\ \boldsymbol{m^2} = \mathbf{419.22}\ \boldsymbol{hectares}$$

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 area, 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

Topsoil stripping will be necessary for site preparation, and it can lead to soil degradation and loss of fertile layers, impacting the ecosystem's ability to support vegetation and wildlife

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 Impact 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.

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.

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

Areas of Concern	Receptor	High	Medium	Low	Negligible
Land Loss / Arable Lands	Agricultural 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.
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

Magnitude	Definition
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 Lands	Medium	Construction	Project footprint	Irreversible	Certain	Moderate	High	Major
	Forest Lands	Medium	Construction	Project footprint	Irreversible	Certain	Moderate	Medium	Moderate
Soil Contamination	Agricultural Lands	Low	Construction	AoI	Reversible	Occurring regularly under typical conditions	Low	Medium	Minor
	Forest Lands	Low	Construction	AoI	Reversible	Occurring regularly under typical conditions	Low	Medium	Minor
Topsoil Stripping	Agricultural Lands	Medium	Construction	Project footprint	Irreversible	Certain	Moderate	High	Major
	Forest Lands	Medium	Construction	Project footprint	Irreversible	Certain	Moderate	Medium	Moderate
Stability of Structures after Earthquake	Project Area Project Components	High	Construction	Regional	Reversible	Possible	Major	Medium	Major
Stability of Structures after Soil Erosion	Areas with Severe Erosion Risk	Medium	Construction	AoI	Reversible	Possible	Moderate	Medium	Moderate
	Areas with Very Severe Erosion Risk	Medium	Construction	AoI	Reversible	Possible	Moderate	High	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 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 Plans (ERPs) 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 as provided in *Chapter 11: Waste and Resources* in detail.

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 AFAD's latest earthquakes list[45] 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.
- 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

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

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 / Impacts on arable lands	Agricultural Lands	Major	Low
	Forest Lands	Moderate	Low
Soil Contamination	Agricultural Lands	Minor	Negligible
	Forest Lands	Minor	Negligible
Topsoil Stripping	Agricultural Lands	Major	Low
	Forest Lands	Moderate	Low
Stability of Structures after Earthquake	Project Area Project Components	Major	Low
Stability of Structures after Soil Erosion	Areas with Severe Erosion Risk	Moderate	Negligible
	Areas with Very Severe 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 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.

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 Area of Influence (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. The significance criteria adopted for the assessment of impacts is provided in Section 7.2.4. 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 Bergama Meteorological Station which is 24 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 1960-2021 meteorological bulletin and this data was compared with each year's prevailing wind directions. Result of this study meteorological data of 2020 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. All other types of emissions from the project (gas emissions) have been calculated and presented in Table 7.8. The calculations have been compared with the threshold values specified in the RCAPOI. In the assessment, all parameters except PM were not included in the modelling study as they 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[46] 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[47].

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[48] 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"

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

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

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

PR3 refers to EU substantive environmental standards[49] 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 following regions:

In Balıkesir Province, within the districts of Burhaniye and Savaştepe, encompassing the neighbourhoods of Haydar, İkizce, Büyükyenice, and Taşdibi.

In İzmir Province, specifically in the Bergama District, covering the neighbourhoods of Oruçlar, Ürkütler, Yukarıada, İneşir, Alhatlı, Durmuşlar, Çamoba, and Kozluca.

In Manisa Province, in the Soma District, specifically in the Kiraz neighbourhood. The study of determining the area of influence 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,

[49] 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 land uses and intensities of sensitive receiver types, and
- Regulations and guidelines.

The turbines planned within the project are situated in the provinces of Izmir, Balıkesir, and Manisa.

Another criterion to determine AoI is Turkish Regulation on the Control of Air Pollution Originating from Industry (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-kilometre area on both sides of the source has been designated as the impact area, while for areal sources, a two-kilometre radius area from the centre of the source has been defined as the impact area.

As can be seen in the Figure 7.1, a total of 2304 receptors are located in 16 polar grid receptor systems, 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 3986 discrete receptor system placed at intervals of 10 to 100 meters from the source centre were used, as shown in the Figure 7.1.

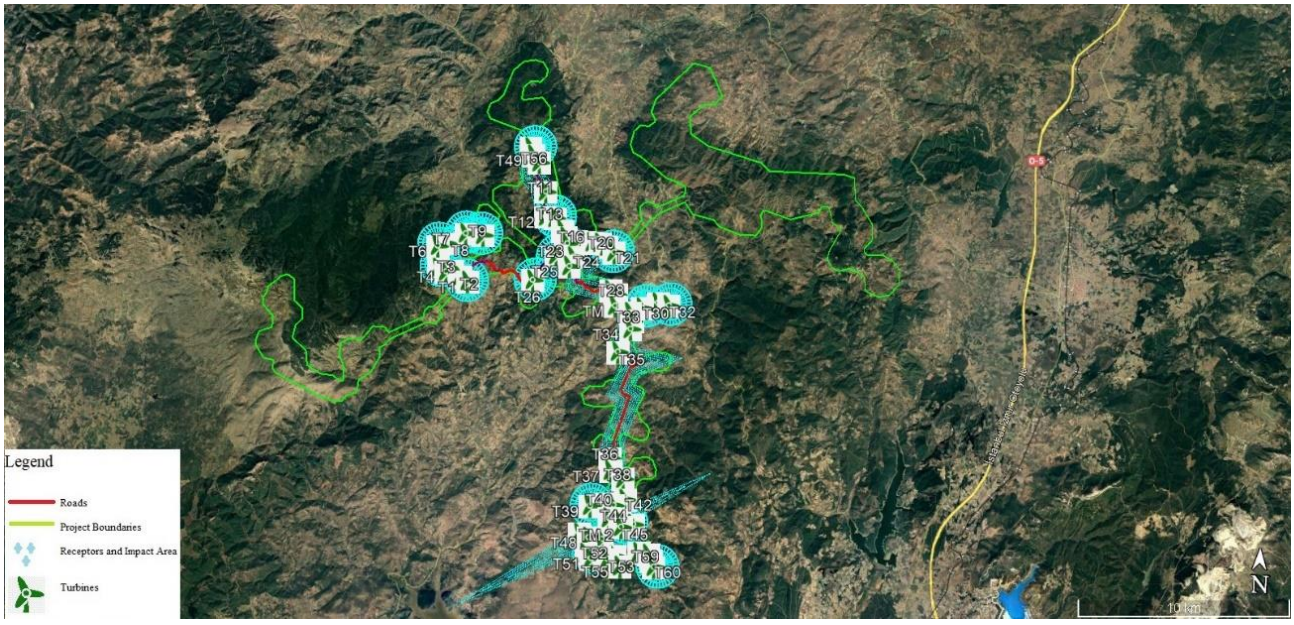


Figure 7.1: Impact Area Selected for the Air Quality Modelling Study

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 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 100 days, and work will be conducted for 8 hours per day.

Blasting will be carried out during the construction phase of the project. Since the blasting pattern is not yet determined, it is assumed that each blasting area will be approximately 1000 m^2.

A mobile crushing and screening plant will be installed as part of the construction activities. Since there is no forecast for the mobile crushing and screening plant, it is assumed that its capacity will be 100 tons/hour.

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. 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. 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. Measurement locations for settlements were selected based on the above-mentioned criteria and representativeness considerations. These locations were selected taking into account their proximity to turbine installations and transportation routes, the impact area of activities, and the population distribution and topographic structure. This will allow for a more accurate assessment of the potential environmental impacts of turbines and other activities on settlements.

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. PM_{10} and $PM_{2.5}$ measurements were carried out at 8 different locations for 30 days between 23 October- 21 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. The only source of emissions during the installation of the ETLs will be the excavation of the foundations for the pylons. Four excavations measuring 3 m x 3 m x 3 m 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 3-3Abatement 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

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

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

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

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

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

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;

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

As material density is 1.5 ton/m^3

E_{PM10} = 0.0046 kg/m^3

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

As material density is 1.5 ton/m^3

$E_{PM2.5}$ = 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[50] states in section VI-D Table-5 that emission measures in these activities provide a 75% reduction.

E_{PM10} = 0.0046 kg/m^3 × 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

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

minerals other than coal- Section 3.3.3 Internal Transport document for unpaved roads. These emission factors are shown below.

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

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

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;

E_{PM10} = 0.422 x $(3.9/12)^{0.9}$ x $(40/2.72)^{0.45}$ x 1 x (1-143/365) = 0.313 kg/h

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

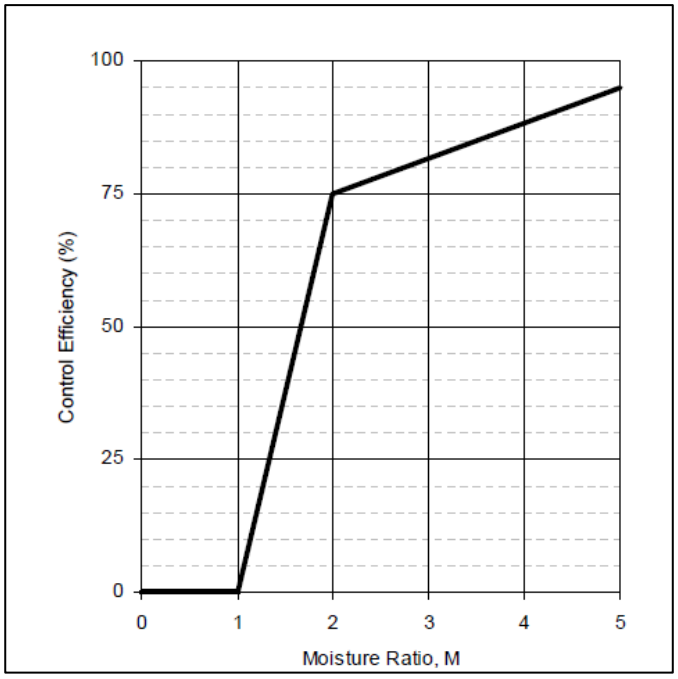
E_{PM10} = 0.313 kg/h / 10 m^3/h =0.0313 kg/m^3

$E_{PM2,5}$= 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 (m^3)	EF ($kg/m^{3)}$		Working Period (WP)	Emissions (EF x TA / WP) (kg/h)	
				PM_{10}	$PM_{2.5}$		PM_{10}	$PM_{2.5}$
Road1-Kub	2637.53	462.88	3100.41				0.01657	0.00185
Road2-Kub	3922.39	2816.86	6739.25				0.03601	0.00402
Road3-Kub	7721.29	16838.17	24559.46				0.13124	0.01466
Road4-Kub	23675.12	17697.08	41372.20				0.22108	0.02469
Road5-Kub	12702.24	14508.80	27211.04				0.14541	0.01624
Road6-Kub	22477.12	21342.19	43819.31				0.23416	0.02615
Road7-Kub	17430.61	3420.92	20851.53				0.11143	0.01245
Road8-Kub	9863.51	13601.59	23465.10				0.12539	0.01401
Road9-Kub	89366.88	83088.97	172455.85				0.92156	0.10293
Road10-Kub	5091.63	440.65	5532.28				0.02956	0.00330
Road11-Kub	16670.61	26114.64	42785.25				0.22863	0.02554
Road12-Kub	88.66	3328.62	3417.28				0.01826	0.00204
Road13-Kub	7881.10	6406.91	14288.01				0.07635	0.00853
Road14-Kub	45206.93	39391.86	84598.79			100 daysx 8	0.45207	0.05049
Road15-Kub	7331.10	2317.57	9648.67	0.004275	0.0004775	hours/day	0.05156	0.00576
Road16-Kub	10232.49	15248.95	25481.44			= 800	0.13617	0.01521
Road17-Kub	34583.73	26125.73	60709.46			hours	0.32442	0.03624
Road18-Kub	21557.43	978.11	22535.54				0.12042	0.01345
Road19-Kub	18921.69	12590.67	31512.36				0.16839	0.01881
Road20-Kub	11716.14	15182.31	26898.45				0.14374	0.01606
Road21-Kub	71267.43	30369.83	101637.26				0.54312	0.06066
Road22-Kub	6664.61	6159.88	12824.49				0.06853	0.00765
Road23-Kub	55089.7	27137.66	82227.36				0.43940	0.04908
Road24-Kub	34187.99	57436.45	91624.44				0.48962	0.05469
Road25-Kub	5098.85	5726.86	10825.71				0.05785	0.00646
Road26-Kub	56847.69	42856.26	99703.95				0.53279	0.05951
Road27-Kub	14049.16	8.15	14057.31				0.07512	0.00839
Road29-Kub	31065.20	15520.67	46585.87				0.24894	0.02781
Road30-Kub	12534.52	30059.94	42594.46				0.22761	0.02542

Road Name	Excavation Area (m^3)	Fill Area (m^3)	Total Area (m^3)	EF (kg/m^3)		Working Period (WP)	Emissions (EF x TA / WP) (kg/h)	
				PM_{10}	$PM_{2.5}$		PM_{10}	$PM_{2.5}$
Road31-Kub	38115.34	48613.33	86728.67				0.46346	0.05177
Road-32-Kub	1262.93	2979.98	4242.91				0.02267	0.00253
Road33-Kub	13953.77	6449.89	20403.66				0.10903	0.01218
Road35-Kub	19105.67	1448.24	20553.91				0.10983	0.01227
Road34-Kub	8038.05	11010.51	19048.56				0.10179	0.01137
Road-49-Kub	4599.28	23.01	4622.29				0.02470	0.00276
Road-D-Kub	4274.20	409.97	4684.17				0.02503	0.00280
Road-E-Kub	107533.83	38965.44	146499.27				0.78286	0.08744
Road-F-Kub	28818.71	23765.99	52584.70				0.28100	0.03139
Road-H-Kub	40328.04	21143.12	61471.16				0.32849	0.03669
Road-K-Kub	87021.84	67892.09	154913.93				0.82782	0.09246
Road-L-Kub	29735.72	33823.15	63558.87				0.33964	0.03794
Road-M-Kub	33685.88	34132.29	67818.17				0.36240	0.04048
Road-N-1-Kub	42030.33	18493.47	60523.80				0.32342	0.03613
Road-O-Kub	1086.40	0.02	1086.42				0.00581	0.00065
Road-37	4968.76	13128.24	18097.00				0.09671	0.01080
Road-38	222.50	7459.32	7681.82				0.04105	0.00459
Road-39	7497.46	15081.56	22579.02				0.12066	0.01348
Road-40	16501.70	9320.73	25822.43				0.13799	0.01541
Road-41	204.15	3113.42	3317.57				0.01773	0.00198
Road-42	9129.11	5593.23	14722.34				0.07867	0.00879
Road-42_1	3830.32	2428.82	6259.14				0.03345	0.00374
Road-43	3966.46	5684.22	9650.68				0.05157	0.00576
Road-44	1764.21	3128.15	4892.36				0.02614	0.00292
Road-45	3225.26	786.53	4011.79				0.02144	0.00239
Road-46	2416.30	4524.63	6940.93				0.03709	0.00414
Road-47	16531.95	6048.31	22580.26				0.12066	0.01348
Road-48	7203.38	4841.01	12044.39				0.06436	0.00719
Road-50	1294.41	36.64	1331.05				0.00711	0.00079

Road Name	Excavation Area (m^3)	Fill Area (m^3)	Total Area (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-51	2760.30	1609.00	4369.30				0.02335	0.00261
Road-52	4520.90	1722.96	6243.86				0.03337	0.00373
Road-53	4491.43	3924.57	8416.00				0.04497	0.00502
Road-54	3952.44	756.78	4709.22				0.02516	0.00281
Road-55	13831.09	17939.62	31770.71				0.16977	0.01896
Road-56	1369.63	3194.39	4564.02				0.02439	0.00272
Road-57	17702.37	3695.21	21397.58				0.11434	0.01277
Road-58	8809.52	15060.67	23870.19				0.12756	0.01425
Road-59	5349.99	11545.60	16895.59				0.09029	0.01008
Road-60	7856.47	31324.18	39180.65				0.20937	0.02339
Road-A	11128.75	21812.79	32941.54				0.17603	0.01966
Road-B	12630.24	15898.56	28528.80				0.15245	0.01703
Road-N_2	7464.07	4604.99	12069.06				0.06449	0.00720
Road Switchyard - 2	2658.73	0.09	2658.82				0.01421	0.00159

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^2)	Fill Area (m^2)	Total Area (m^2)	EF (kg/m^3)		Working Period (WP)	Emissions (EF x TA / WP) (kg/h)	
				PM_{10}	$PM_{2.5}$		PM_{10}	PM_{10}
T1-KUB	9139.50	5635.87	14775.37				0.07896	0.00882
T2-KUB	32978.15	4096.88	37075.03				0.19812	0.02213
T3-KUB	22802.54	7288.30	30090.84			100 daysx 8 hours/day = 800 hours	0.16080	0.01796
T4-KUB	35124.68	10035.52	45160.20	0.004275	0.0004775		0.24132	0.02695
T5-KUB	28398.46	2963.97	31362.43				0.16759	0.01872
T6-KUB	40491.42	5922.09	46413.51				0.24802	0.02770
T7-KUB	26718.38	17344.16	44062.54				0.23546	0.02630

Turbine No	Excavation Area (m^2)	Fill Area (m^2)	Total Area (m^2)	EF (kg/m^3)		Working Period (WP)	Emissions (EF x TA / WP) (kg/h)	
				PM_{10}	$PM_{2.5}$		PM_{10}	PM_{10}
T8-KUB	47232.26	3656.83	50889.09				0.27194	0.03037
T9-KUB	43196.79	4931.90	48128.69				0.25719	0.02873
T10-KUB	31011.30	3055.05	34066.35				0.18204	0.02033
T11-KUB	7911.97	9294.45	17206.42				0.09195	0.01027
T12-KUB	7006.80	4190.05	11196.85				0.05983	0.00668
T13-KUB	37585.31	19431.94	57017.25				0.30469	0.03403
T14-KUB	17035.99	3184.70	20220.69				0.10805	0.01207
T15-KUB	33370.45	11352.99	44723.44				0.23899	0.02669
T16-KUB	42518.99	25340.86	67859.85				0.36263	0.04050
T17-KUB	99380.21	1041.20	100421.41				0.53663	0.05994
T18-KUB	59875.69	15484.15	75359.84				0.40270	0.04498
T19-KUB	30790.53	373.97	31164.50				0.16654	0.01860
T20-KUB	66932.92	183.09	67116.01				0.35865	0.04006
T21-KUB	20755.04	3761.57	24516.61				0.13101	0.01463
T22-KUB	49939.67	4764.40	54704.07				0.29232	0.03265
T23-KUB	41384.23	10027.25	51411.48				0.27473	0.03069
T24-KUB	40003.71	1905.46	41909.17				0.22395	0.02501
T25-KUB	13598.53	7320.92	20919.45				0.11179	0.01249
T26-KUB	19099.85	17025.57	36125.42				0.19305	0.02156
T27-KUB	18152.01	27803.56	45955.57				0.24558	0.02743
T28-KUB	6313.54	16448.62	22762.16				0.12164	0.01359
T29-KUB	35906.33	11943.52	47849.85				0.25570	0.02856
T30-KUB	31854.2	5990.34	37844.54				0.20223	0.02259
T31-KUB	24372.33	21207.46	45579.79				0.24357	0.02721
T32-KUB	9316.19	4095.34	13411.53				0.07167	0.00801
T33-KUB	11116.72	13793.73	24910.45				0.13312	0.01487
T34-KUB	16618.24	3655.44	20273.68				0.10834	0.01210
T35-KUB	33496.28	7232.81	40729.09				0.21765	0.02431
T49-KUB	15596.18	5247.42	20843.60				0.11138	0.01244
T56-KUB	11655.44	915.59	12571.03				0.06718	0.00750

Turbine No	Excavation Area (m^2)	Fill Area (m^2)	Total Area (m^2)	EF (kg/m^3)		Working Period (WP)	Emissions (EF x TA / WP) (kg/h)	
				PM_{10}	$PM_{2.5}$		PM_{10}	PM_{10}
TM-1-KUB	46806.12	22162.22	68968.34				0.36855	0.04117
T36	14294.00	2894.38	17188.38				0.09185	0.01026
T37	19637.90	19882.70	39520.60				0.21119	0.02359
T38	52802.01	22028.99	74831.00				0.39988	0.04466
T39	26478.12	3934.71	30412.83				0.16252	0.01815
T40	21691.98	736.53	22428.51				0.11985	0.01339
T41	11262.21	7538.39	18800.60				0.10047	0.01122
T42	4779.74	21012.79	25792.53				0.13783	0.01539
T43	18323.67	1638.63	19962.30				0.10667	0.01191
T44	3592.83	1516.28	5109.11				0.02730	0.00305
T45	12824.15	3551.04	16375.19				0.08750	0.00977
T46	12410.30	2420.72	14831.02				0.07925	0.00885
T47	11498.68	2020.24	13518.92				0.07224	0.00807
T48	14626.04	2350.01	16976.05				0.09072	0.01013
T50	9912.03	3309.30	13221.33				0.07065	0.00789
T51	6988.99	6649.77	13638.76				0.07288	0.00814
T52	6365.42	4041.47	10406.89				0.05561	0.00621
T53	5132.73	2233.14	7365.87				0.03936	0.00440
T54	15540.59	3685.47	19226.06				0.10274	0.01148
T55	30642.82	55039.93	85682.75				0.45787	0.05114
T57	9389.46	5327.83	14717.29				0.07865	0.00878
T58	43417.21	5261.71	48678.92				0.26013	0.02906
T59	37544.53	7896.42	45440.95				0.24283	0.02712
T60	36151.49	13764.26	49915.75				0.26674	0.02979
Switchyard-2	136966.66	11909.68	148876.34				0.79556	0.08886

Blasting Emissions

According to the blasting design, 1000 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:

E_{PM10}= 0.52 x 0.00022 x $(1000)^{1,5}$ = 3.61 kg/blast

$E_{PM2.5}$= 0.03 x 0.00022 x $(1000)^{1,5}$ = 0.21 kg/blast

Crusher Emissions

The Project will include a mobile crushing and screening plant with a capacity of 100 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 100 (t/h) = 0.012 kg/h

$PM_{2.5}$= 0.00006 (kg/t) x 100 (t/h) = 0.006 kg/h

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 site. 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
Bulldozer	10
Excavator	12
Path Grader	10
Path Roller	5
JBC (Backhoe Loader)	10
Truck	40
Trailer	5
Pickup Trucks	25
Grand Total (Equipment/Day)	**117**

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/tons fuel	20,000 x 10^{-6}	0.15326	117	17.93	40
CO	7352 g/tonnes fuel	0.02	0.14704	117	17.20	500
PM	116 g/tonnes fuel	0.02	0.00232	117	0.27	10
SO_2	14 g/kg fuel	0.02	0.28	117	32.76	60
VOC	930 g/tonnes fuel	0.02	0.0186	117	2.18	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.

7.2.4.3 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 area is located on the 1/25,000 scale Türkiye map sheets, specifically in the J18-b1, J18-b2, J18-b3, J18-b4, J18-a3, J19-a1 map sheets, according to the Land Use Plan. The project area is designated for forest, agriculture, and pasture uses in terms of land use classifications. Within the scope of the project, there will be a total of 60 turbines. According to the updated query made through the Land Registry and Cadastre General Directorate Parcel Inquiry System on February 15, 2023, taking into account the footprint of the turbine units, 29 turbines (T1, T2, T25, T26, T28, T35-48, T50-55, and T57-60) will be located in Bergama district, Izmir Province; 25 turbines (T3-24, T27, T49, T56) in İvrindi district, Balıkesir Province; and 6 turbines (T29-34) in Soma district, Manisa Province.

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)[51]. After macro level determination, a field 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.

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

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

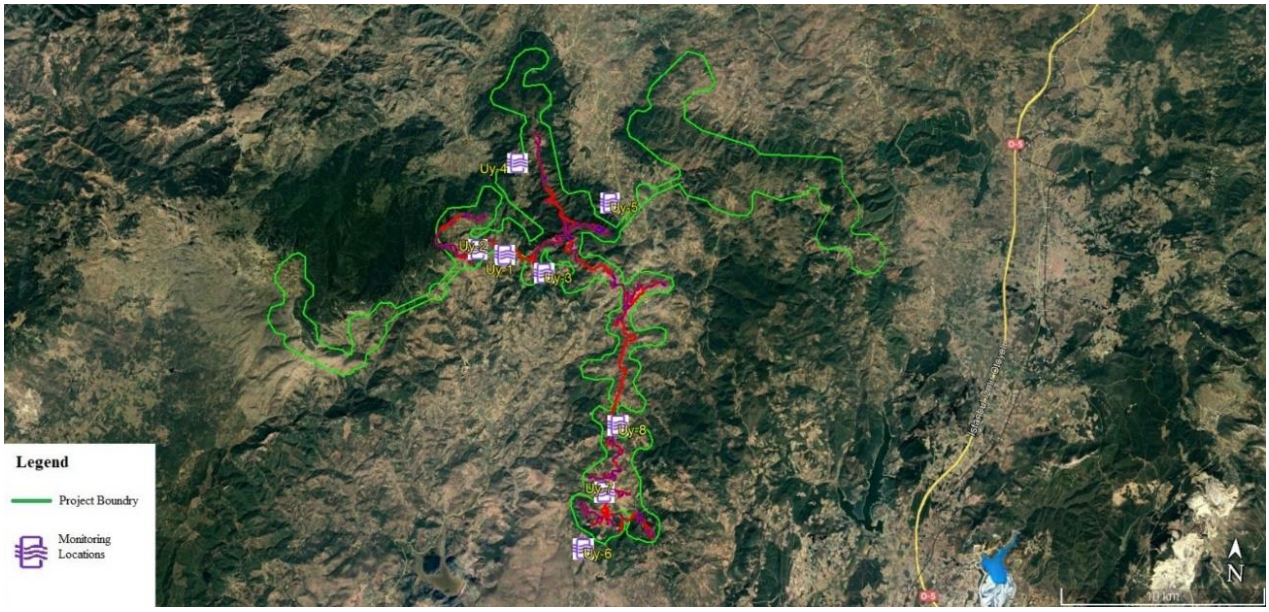


Figure 7.2: PM Sampling Points

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

Measurment Location	Representative Area	Representative Sources
UY1	This is a residential location and represents Yukariada village	T1-, T-2, T3, T-4, T-5, T-26 And Road-K, Road-3, Road-4
UY2	This location represents all forest and agricultural areas around. Also Due to its spatial, topographic, and resource distance characteristics, UY-2 also exhibits great similarity to location T-26/182/178/274 receptors, and it will also represent these receptors since background emissions are expected to be similar due to its geographical characteristics.	From T-1 To T-9 And Road-K, Road-3, Road-4, Road-5, Road-6.
UY3	Forest and agricultural areas. Because of the similarities, also it can also represent T-10 184 as receptor	From T-12 To T-25 And Road-12/13/15/16/17/1821//22/23/25
UY4	This is a residential location and represents İkizce village	T-10, T-11, T-49, T-50 And Road-11
UY5	This is a residential location and represents Taşdibi village	Similar To Uy-3
UY6	This is a residential location and represents Çayoba village	From T-47 To T-55 And Road Tm-2, Road 47 To 55
UY7	Agricultural areas and background , T-45/272	From T-40 To T-45 And Road 40-45
UY8	Agricultural areas and background, T-36/160/195/268, T-38/318-370	From T36 To T38 And Road-A/B/38-40

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 are located to the south and north of the Project. To the east and west 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	
		PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
UY1	Settlements	16.16	8.78
UY2	Settlements and agricultural areas	14.74	11.50
UY3	Forest Land	13.64	9.65
UY4	Settlements	21.13	10.91
UY5	Settlements	18.64	11.81
UY6	Agricultural areas	12.58	10.35
UY7	Forest Land	13.73	9.86
UY8	Settlement	11.47	9.78
	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

According to Table 7.13, it is seen that in UY1, UY4, and UY5 locations, both PM_{10} and $PM_{2.5}$ results exceed both long-term and short-term project standards. However, in UY2, UY3, UY6, UY7, and UY8 locations, there is only an exceedance in project standards for the $PM_{2.5}$ parameters. As previously indicated in the preceding sections, values recommended by the World Health Organization (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.

From an expert standpoint, considering the diverse sources of dust and the prevalence of dust transport in the region, even in isolated areas in Turkey, 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 also crucial to note that these standards are advisory in nature for lawmakers and do not have direct legal binding. On the other hand, 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 and gas emissions.

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	30.40 (534511,4346313)	45 µg/m^3
	Annual	5.93 (534587,4346467)	15 µg/m^3
$PM_{2,5}$ (µg/m^3)	Daily	3.56 (534511,4346313)	15
	Annual	0.68 (534587,4346467)	5 µg/m^3

As seen in Table 7.14, PM2.5 and PM10 parameter comply with project standards. The cumulative assessment of air quality contribution values resulting from the construction. 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
UY1	16.16	8.78	4.57	0.37	0.52	0.04	20.73	16.53	9.30	8.82
UY2	14.74	11.50	1.46	0.19	0.18	0.03	16.20	14.93	11.68	11.53
UY3	13.64	9.65	3.60	0.16	0.43	0.03	17.24	13.80	10.08	9.68
UY4	21.13	10.91	1.26	0.11	0.14	0.01	22.39	21.24	11.05	10.92
UY5	18.64	11.81	2.08	0.08	0.24	0.01	20.72	18.72	12.05	11.82
UY6	12.58	10.35	5.03	0.13	0.62	0.01	17.61	12.71	10.97	10.36
UY7	13.73	9.86	9.87	1.99	1.16	0.24	23.60	15.72	11.02	10.10
UY8	11.47	9.78	2.66	0.10	0.29	0.01	14.13	11.57	10.07	9.79
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. On the other hand, cumulative emissions exceed the long-term values of Project standards for PM_{10} parameter in UY 1, UY 4, UY 5, and UY 7 locations. Additionally, in UY 1, UY 2, UY 3, UY 4, UY 5, UY 6, UY 7, and UY 8 locations, the long-term values for $PM_{2.5}$ parameter in cumulative emissions surpass the 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 to Table 7.19.

Table 7.16: Impact Significance for the Construction Phase

Activity	Receptor	Project Standard	Receptor Sensitivity			Impact Magnitude			Impact Significance
			Baseline Air Quality (µg/m^3)	Relation to Standard	Sensitivity Score	Cumulative Emission Values (µg/m^3)	Change in Conc. as % of Standard	Magnitude Score for	
Construction Activities	**UY1**	**45**	16.16	Below 50% of the Standard	Negligible	20.73	Increase 5-15%	Minor	Insignificant
	UY2	**45**	14.74	Below 50% of the Standard	Negligible	16.20	Increase <5%	Negligible	Insignificant
	UY3	**45**	13.64	Below 50% of the Standard	Negligible	17.24	Increase 5-15%	Minor	Insignificant
	UY4	**45**	21.13	Below 50% of the Standard	Negligible	22.39	Increase <5%	Negligible	Insignificant
	UY5	**45**	18.64	Below 50% of the Standard	Negligible	20.72	Increase <5%	Negligible	Insignificant
	UY6	**45**	12.58	Below 50% of the Standard	Negligible	17.61	Increase 5-15%	Minor	Insignificant
	UY7	**45**	13.73	Below 50% of the Standard	Negligible	23.60	Increase 15-25%	Moderate	Insignificant
	UY8	**45**	11.47	Below 50% of the Standard	Negligible	14.13	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	**UY1**	**15**	16.16	Above Standard	High	16.53	Increase <5%	Negligible	Insignificant
	UY2	**15**	14.74	75 to 100% of the Standard	Medium	14.93	Increase <5%	Negligible	Insignificant
	UY3	**15**	13.64	75 to 100% of the Standard	Medium	13.80	Increase <5%	Negligible	Insignificant
	UY4	**15**	21.13	Above Standard	High	21.24	Increase <5%	Negligible	Insignificant
	UY5	**15**	18.64	Above Standard	High	18.72	Increase <5%	Negligible	Insignificant
	UY6	**15**	12.58	75 to 100% of the Standard	Medium	12.71	Increase <5%	Negligible	Insignificant
	UY7	**15**	13.73	75 to 100% of the Standard	Medium	15.72	Increase <5%	Negligible	Insignificant
	UY8	**15**	11.47	75 to 100% of the Standard	Medium	11.57	Increase <5%	Negligible	Insignificant

Table 7.18: Impact Significance of Daily $PM_{2.5}$

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	**UY1**	**15**	8.78	50 to 75% of the Standard	Low	9.30	Increase <5%	Negligible	Insignificant
	UY2	**15**	11.50	75 to 100% of the Standard	Medium	11.68	Increase <5%	Negligible	Insignificant
	UY3	**15**	9.65	50 to 75% of the Standard	Low	10.08	Increase <5%	Negligible	Insignificant
	UY4	**15**	10.91	50 to 75% of the Standard	Low	11.05	Increase <5%	Negligible	Insignificant
	UY5	**15**	11.81	75 to 100% of the Standard	Medium	12.05	Increase <5%	Negligible	Insignificant
	UY6	**15**	10.35	50 to 75% of the Standard	Low	10.97	Increase <5%	Negligible	Insignificant
	UY7	**15**	9.86	50 to 75% of the Standard	Low	11.02	Increase 15-25%	Moderate	Minor
	UY8	**15**	9.78	50 to 75% of the Standard	Low	10.07	Increase <5%	Negligible	Insignificant

Table 7.19: Impact Significance of Yearly $_{2.5}$

Activity	Receptor	Project Standard	Receptor Sensitivity			Impact Magnitude			Impact Significance
			Baseline Air Quality (µg/m^3)	Relation to Standard	Sensitivity Score	Cumulative Emission Values (µg/m^3)	Change in Conc. as % of Standard	Magnitude Score for	
Construction Activities	**UY1**	**5**	8.78	Above Standard	High	8.82	Increase <5%	Negligible	Insignificant
	UY2	**5**	11.50	Above Standard	High	11.53	Increase <5%	Negligible	Insignificant
	UY3	**5**	9.65	Above Standard	High	9.68	Increase <5%	Negligible	Insignificant
	UY4	**5**	10.91	Above Standard	High	10.92	Increase <5%	Negligible	Insignificant
	UY5	**5**	11.81	Above Standard	High	11.82	Increase <5%	Negligible	Insignificant
	UY6	**5**	10.35	Above Standard	High	10.36	Increase <5%	Negligible	Insignificant
	UY7	**5**	9.86	Above Standard	High	10.10	Increase <5%	Negligible	Insignificant
	UY8	**5**	9.78	Above Standard	High	9.79	Increase <5%	Negligible	Insignificant

The significance relies on the approach outlined in Section 9.2.4 and 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. According to impact significance of the locations, $PM_{2,5}$ parameter for daily term has a minor impact. All other locations have insignificant impact for both parameters.

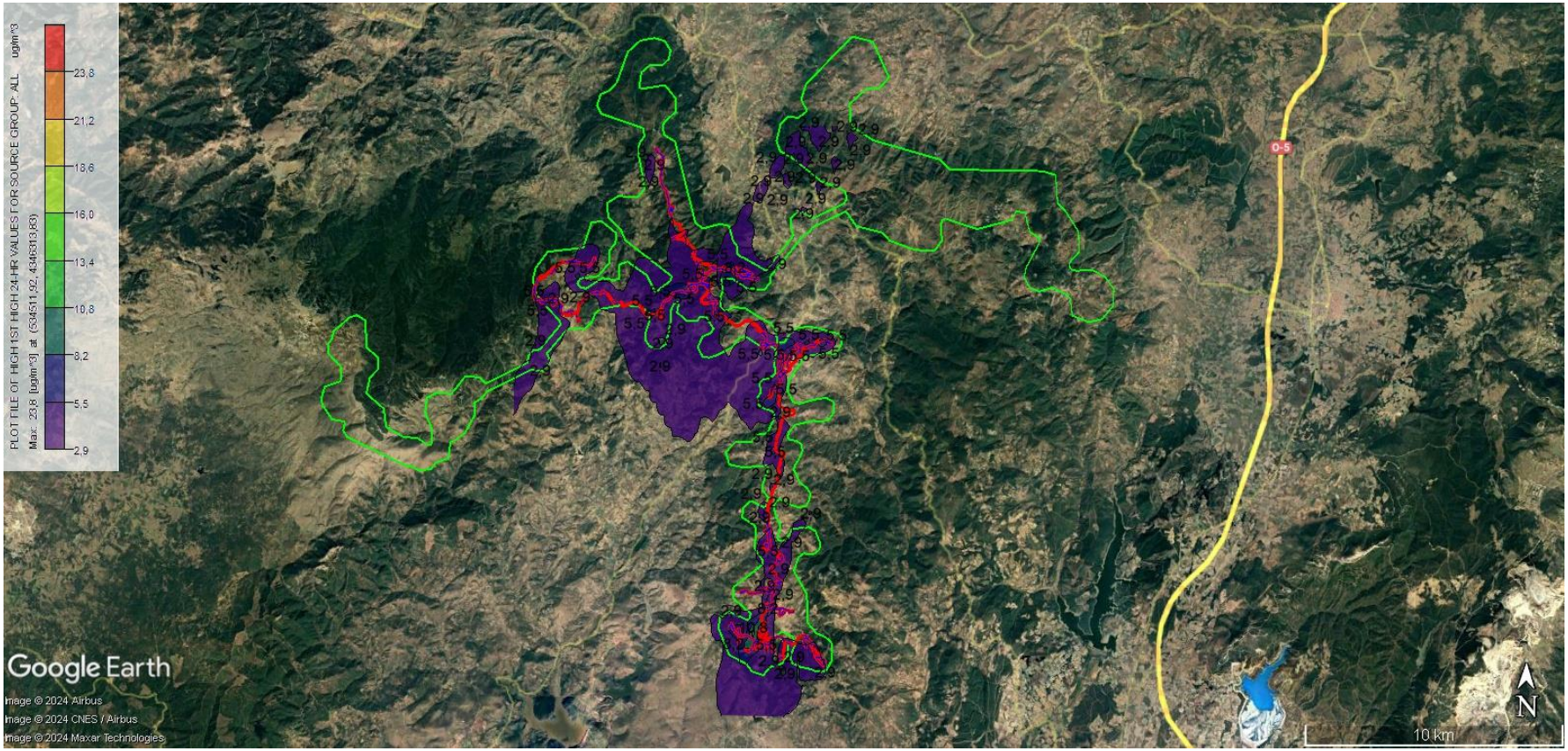


Figure 7.3: Maximum Daily Average PM_{10} Emissions for Construction Phase

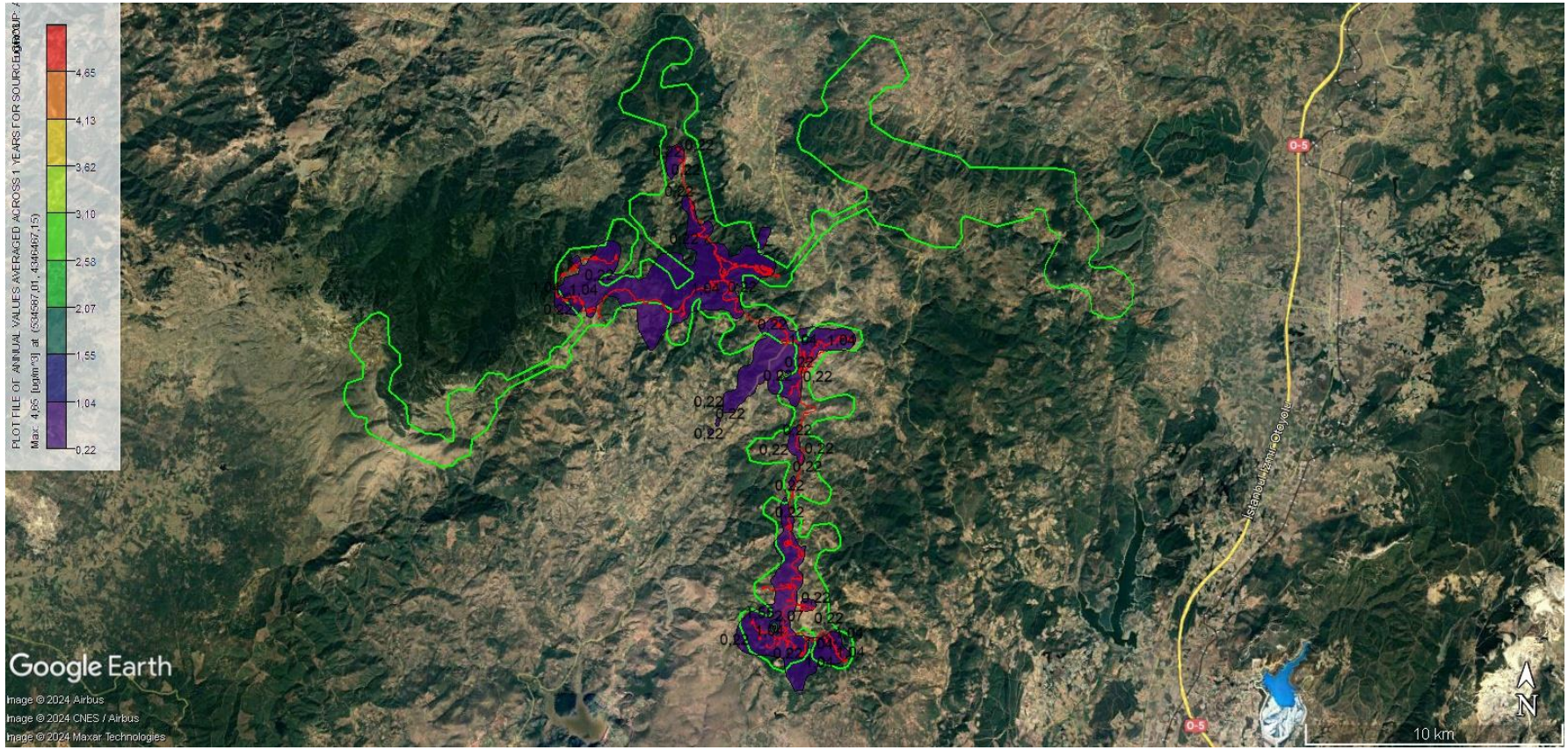


Figure 7.4: Maximum Annual Average PM_{10} Emissions for Construction Phase

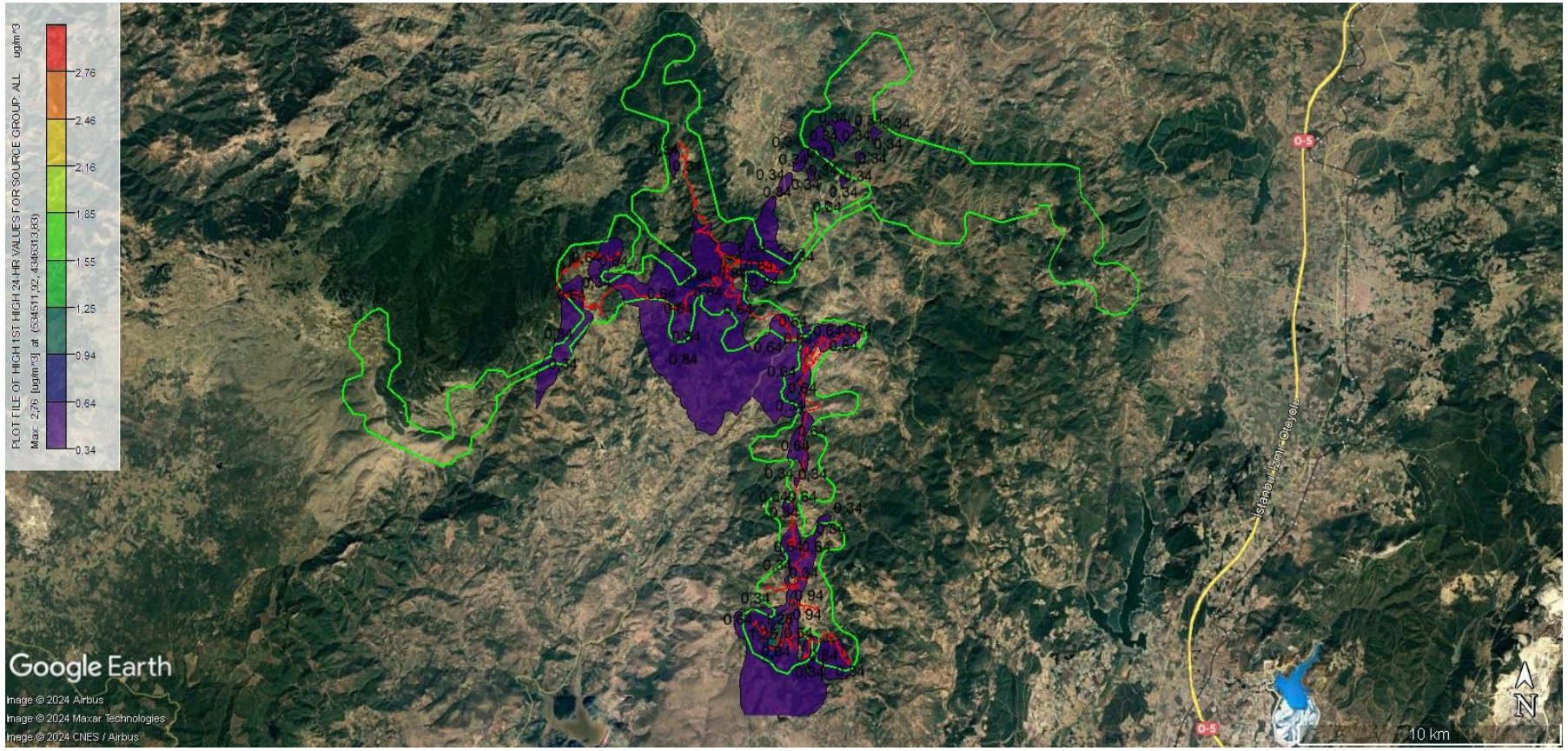


Figure 7.5: Maximum Daily Average $PM_{2.5}$ Emissions for Construction Phase

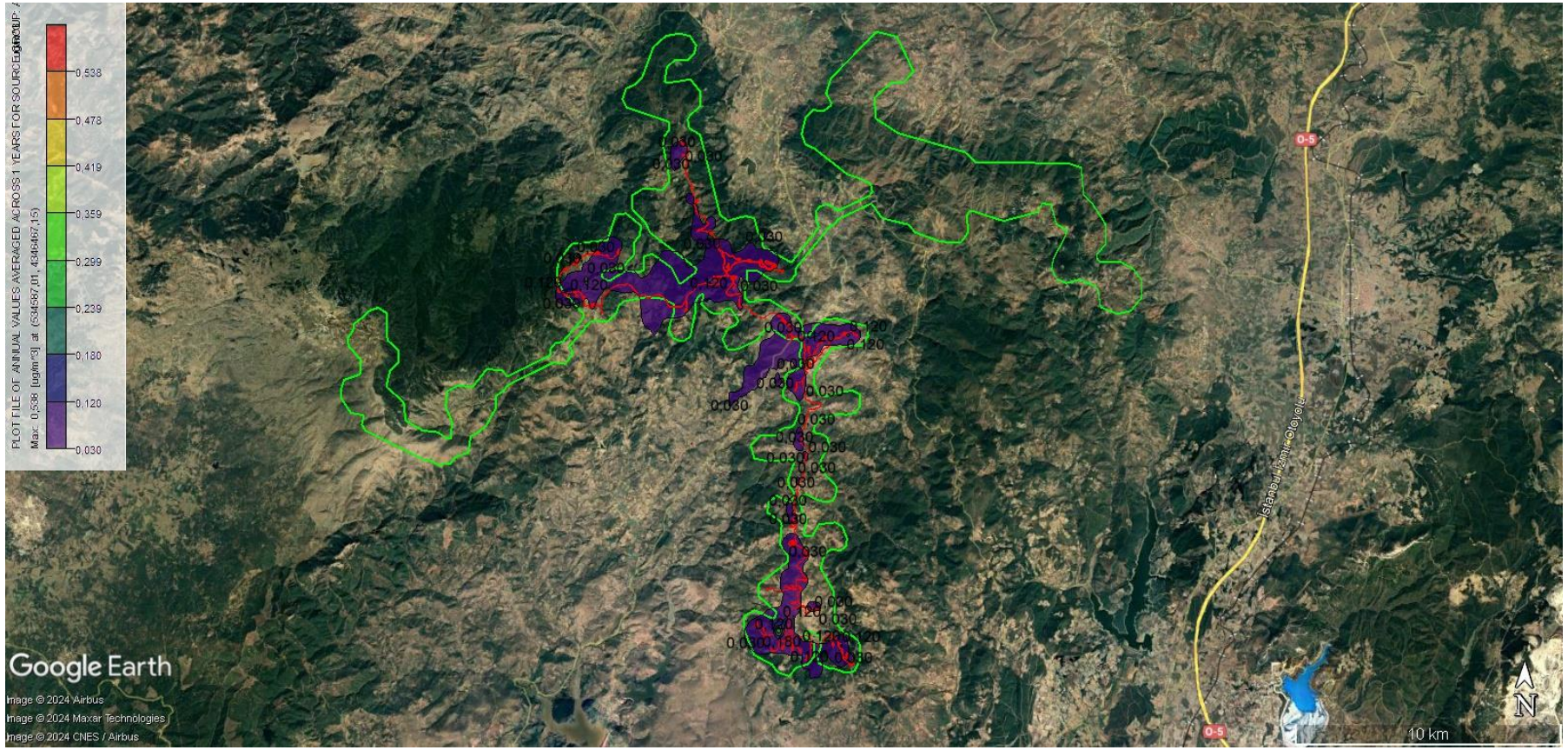


Figure 7.6: Maximum Annual Average $PM_{2.5}$ Emissions for Construction Phase

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:

- 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.
- 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 must 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 PM_{10} and $PM_{2.5}$ 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 Equator Principles IV (Principle 2 and Annex A)[52] 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, Equator Principles 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[53], 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[54] requires construction-related emissions 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 EBRD requirements is evaluated in line with the results of construction phase GHG emissions assessment and provided in relevant section of this chapter.

8.2 Methodology

8.2.1 Applicable Standards and Guidelines

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.

[52] Equator Principles IV (2020), Guidance Note on Climate Change Risk Assessment. Last accessed in November 2023 here: Guidance CCRA_May 2023 (equator-principles.com)

[53] 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.

Equator Principles IV (EP IV)[55]

The Equator Principles IV (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 climate change risk assessment (CCRA) and GHG emissions.

International Finance Corporation (IFC): Performance Standards (PSs) on environmental and social sustainability[56]

The IFC Performance Standards (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)[57]

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.
- 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

[55] Equator Principles. EP4. Last accessed in March 2024 here:The Equator Principles_EP4_July2020 (equator-principles.com).

[56] International Finance Corporation. Performance Standards on Environmental and Social Sustainability. Last accessed in March 2024 here: 2012-ifc-performance-standards-en.pdf.

[57] 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).

- Use stage: B1-9
- End-of-life stage: C1-4

RICS: Whole life carbon assessment for the built environment[58]

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[59]

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 climate change risk assessment (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 far-future (2060-2079)
  - SSP2-4.5 for the mid-future (2040-2059) and far-future (2060-2079)
  - 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).

[58] 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).

[59] 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).

- 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 energy transmission line (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

Rating	Likelihood of recurring events
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.
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 each sub 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 onsite 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[60],
- Moata Carbon Portal (Mott MacDonald's in-house carbon calculator),
- ICE v3.0[61],
- Department for Energy Security and Net Zero[62],
- Emissions factors developed from project experience,
- The International Energy Agency[63],
- JBA consulting[64],
- Forest Research[65].

[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] Circular ecology. Embodied Carbon – The ICE Database. Last accessed in March 2024 here: Embodied Carbon Footprint Database - Circular Ecology.

[62] 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).

[63] The International Energy Agency. Emissions factors 2022. Last accessed in March 2024 here: Emissions Factors 2022 - Data product - IEA

[64] 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.

[65] 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).

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[66] 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.

[66] 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)

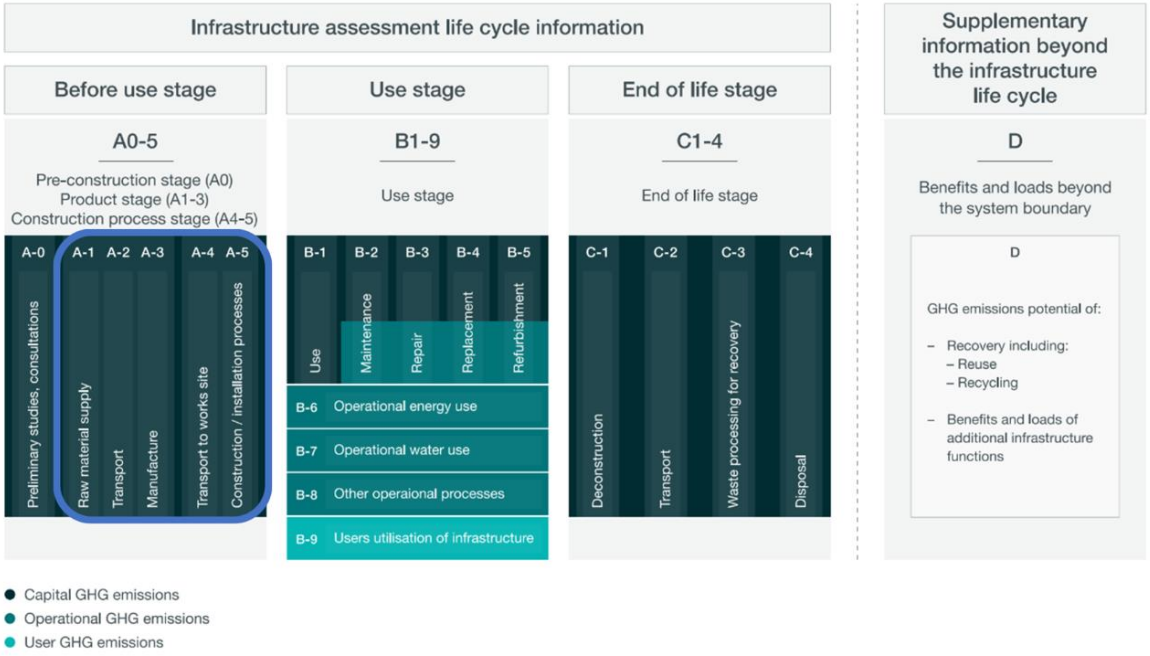


Figure 8.1: PAS 2080: 2016 Lifecycle stages for infrastructure[67]

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

[67] PAS2080:2016 Carbon Management in Infrastructure. Available at: https://www.mottmac.com/climate-change/pas-2080

- 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.

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 Turkey 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.
	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

Category	Asset / Component	Assumption	Further comments
			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.
	Turbine components	Material assumptions are made for: • Hub (Iron) • Pitch bearing (engineering steel) • Bearing system (steel, finished cold-rolled coil)	The materials for components are assumed based on literature and industry common practice. Specific materials e.g., engineering steel is assumed

Category	Asset / Component	Assumption	Further comments
		• 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)	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 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.	

Category	Asset / Component	Assumption	Further comments
		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 Guidance68,
- Turkish national electricity grid emissions factors[69],
- Turkish electricity generation and electricity consumption point emissions factors information form[70]

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.

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

[68] Emissions factors obtained from the GHG Protocol Calculation Tools and Guidance. Last accessed in February 2024 here: https://ghgprotocol.org/calculation-tools-and-guidance.

[69] 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.

[70] 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.

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 located at the intersection of the provincial borders of Balıkesir, Izmir, and Aydın. Based on the Project location, climatic conditions in Izmir is considered to be best representing the Project area. This is because the Project area is close to the Aegean Sea and hence its climate conditions are affected by the sea. Moreover, two ETLs will be constructed within the scope of the Project. The one extending from the north of the Project area passes through multiple provinces (i.e., Izmir, Balıkesir, and Çanakkale) and is connected to the Bayramiç Havza TS in Canakkale. Since the route passes through a line affected by the sea in terms of climate, climatic conditions in Izmir are considered to be valid for the ETL as well. Therefore, the coastal nature of Izmir means that the projections for this region is more representative for the Project location than Balıkesir and Çanakkale regions. Please note that the physical climate change risk assessment has been carried out for one Project site (that is located at the intersection of three provinces), as the physical characteristics of the Project area most closely match the physical characteristics of İzmir, hence data for İzmir 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 Izmir. 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 Equator Principles IV (EP4), 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[71]. This data is recent, using the latest climate science, and is also available at the subnational level (specific to Izmir); 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.

[71] 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[72] for the period 1938 – 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 average mean, maximum summer, and minimum winter temperatures for this period are 17.94 ºC, 33.20 ºC in July, and 5.8 ºC in January, respectively. The maximum and minimum temperatures measured in this period are 43.0 ºC in August and -8.2 ºC in January, respectively.

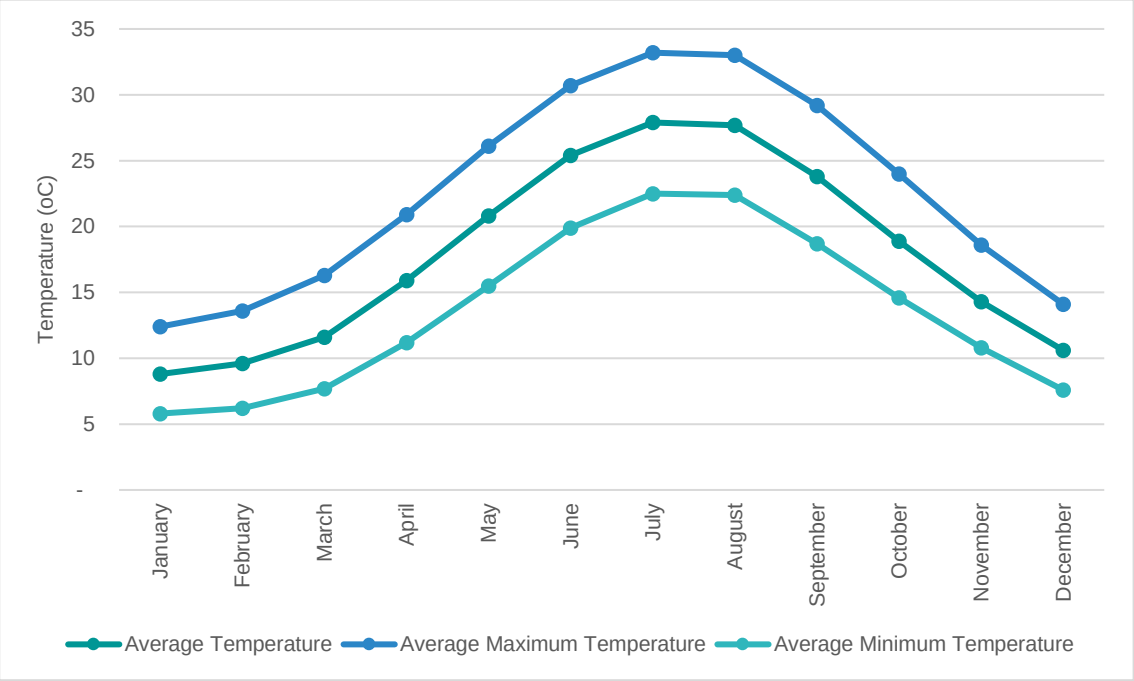


Figure 8.2: Monthly average mean, maximum and minimum temperatures, Izmir, present-day (1938 – 2022)[73]

The highest recorded average precipitation is 146.2 mm in December for the period 1938 - 2022, whereas the lowest recorded one is 4.1 mm in July (Figure 8.3). For this period, the annual mean of total precipitation is 709.9 mm.

[72] Obtained from Meteoroloji Genel Müdürlüğü (mgm.gov.tr). Last accessed in December 2023.

[73] Produced by Mott MacDonald based on the temperature data obtained from the Turkish State Meteorological Service

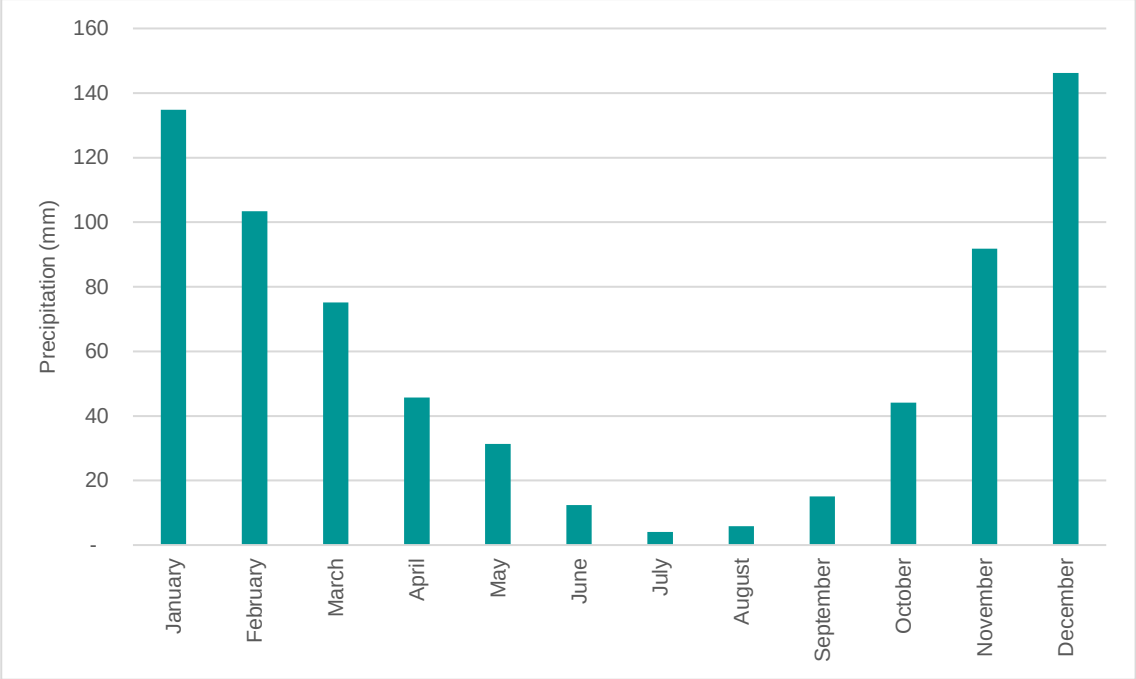


Figure 8.3: Monthly average precipitation data, Izmir, present-day (1938 – 2022)[74]

The present-day (1938-2022) climate in Izmir is summarised in Table 8.8 as follows:

Table 8.8: Present-day (1938 – 2022) climate

Climate variable	Value
Mean temperature	17.94 ºC
Max. summer temperature (July)	33.20 ºC
Min. winter temperature (January)	5.80 ºC
Average annual precipitation	59.16 mm per month
Average summer precipitation (June / July / August)	7.47 mm per month
Average winter precipitation (December / January / February)	140.50 mm per month

8.3.1.2 Future climate baseline

The mid-future and far-future projected climate for Izmir according to the World Bank CCKP SSP1-2.6, SSP2-4.5, and SSP5-8.5 scenarios are presented in Table 8.9. These are projected values calculated for SSP1-2.6, SSP2-4.5, and SSP5-8.5 climate change scenarios as a departure from the modelled climate for a reference period (1995-2014) and are specific for the Izmir region.

Table 8.9: Future climate baseline, SSP2-4.5 & SSP5-8.5, reference period 1995-2014 (50th percentile)[75]

Climate variable	Future scenario	Reference value (1995-2014)	Climate value for the mid-future (2040-2059)	Climate value for the far-future (2060-2079)
Mean average temperature	SSP5-8.5	16.64 ºC	18.18 ºC	18.75 ºC
	SSP2-4.5		18.76 ºC	20.01 ºC

[74] Produced by Mott MacDonald based on the precipitation data obtained from the Turkish State Meteorological Service

[75] Obtained from https://climateknowledgeportal.worldbank.org/. Last accessed in October 2023.

Climate variable	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		18.07 ºC	18.20 ºC
Max. temperature (July)	SSP5-8.5	32.10 ºC	34.14 ºC	35.04 ºC
	SSP2-4.5		35.23 ºC	36.84 ºC
	SSP1-2.6		34.23 ºC	34.34 ºC
Min. temperature (January)	SSP5-8.5	4.40 ºC	5.20 ºC	5.80 ºC
	SSP2-4.5		5.60 ºC	6.50 ºC
	SSP1-2.6		5.20 ºC	5.30 ºC
Mean precipitation (August)	SSP5-8.5	4.92 mm	4.02 mm	3.43 mm
	SSP2-4.5		3.60 mm	2.86 mm
	SSP1-2.6		3.58 mm	3.99 mm
Mean precipitation (December)	SSP5-8.5	141.32 mm	137.67 mm	130.79 mm
	SSP2-4.5		129.92 mm	122.20 mm
	SSP1-2.6		135.65 mm	144.09 mm

The present-day climate is established using the climate data covering the period 1938 - 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 far-future are shown in figures below.

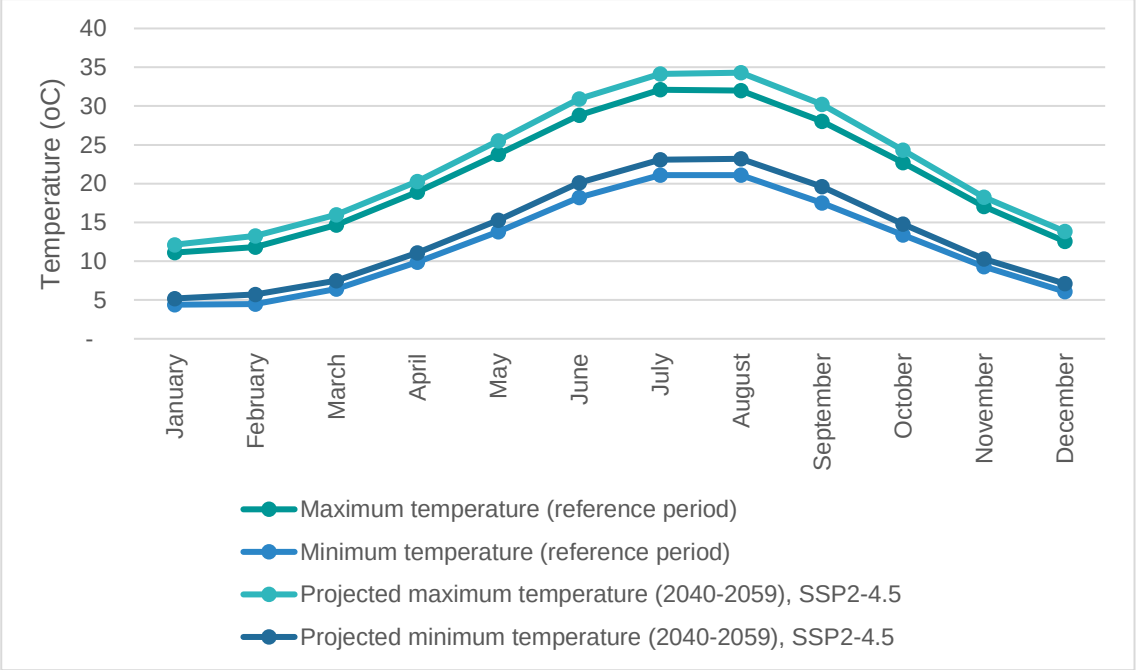


Figure 8-4: Projected changes in maximum and minimum air temperatures for the mid-future, İzmir, SSP1-2.6, 1995-2014 reference period (50th percentile)[76]

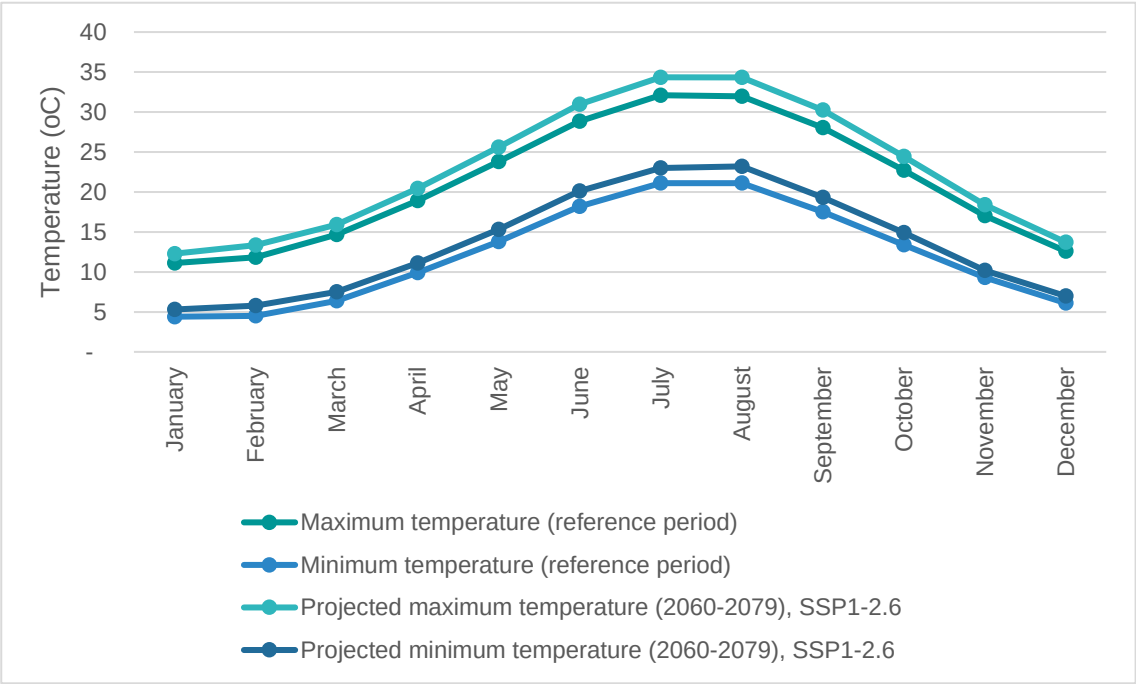


Figure 8-5: Projected changes in maximum and minimum air temperatures for the far-future, İzmir, SSP1-2.6, 1995-2014 reference period (50th percentile)

[76] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

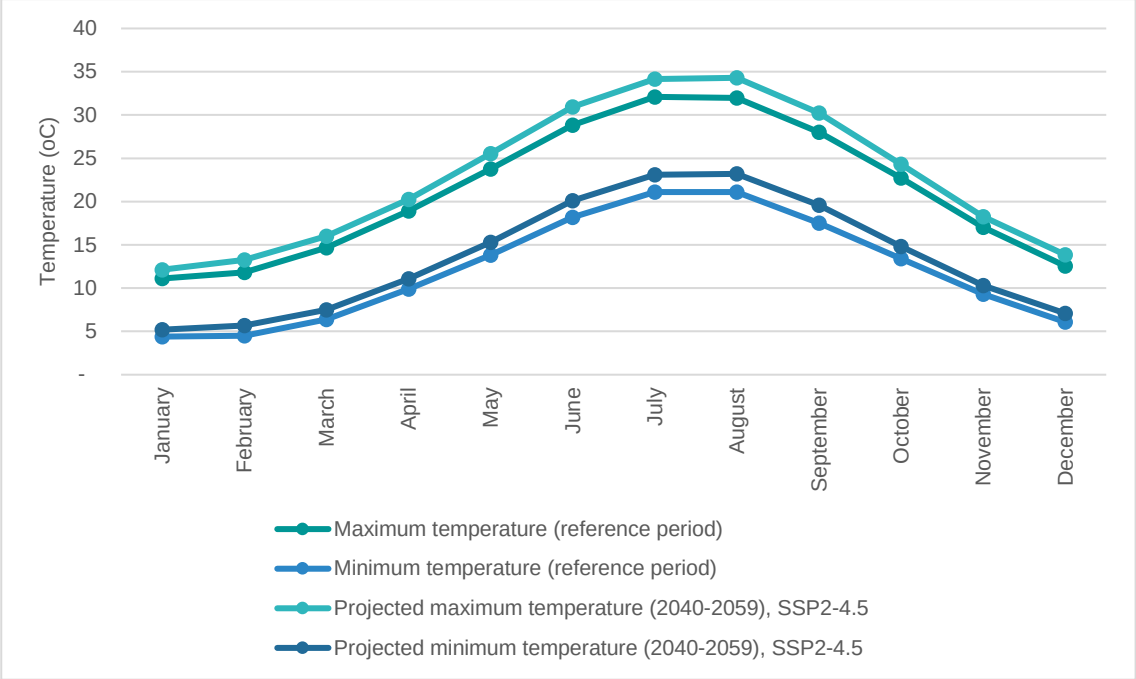


Figure 8.6: Projected changes in maximum and minimum air temperatures for the mid-future, Izmir, SSP2-4.5, 1995-2014 reference period (50th percentile)[77]

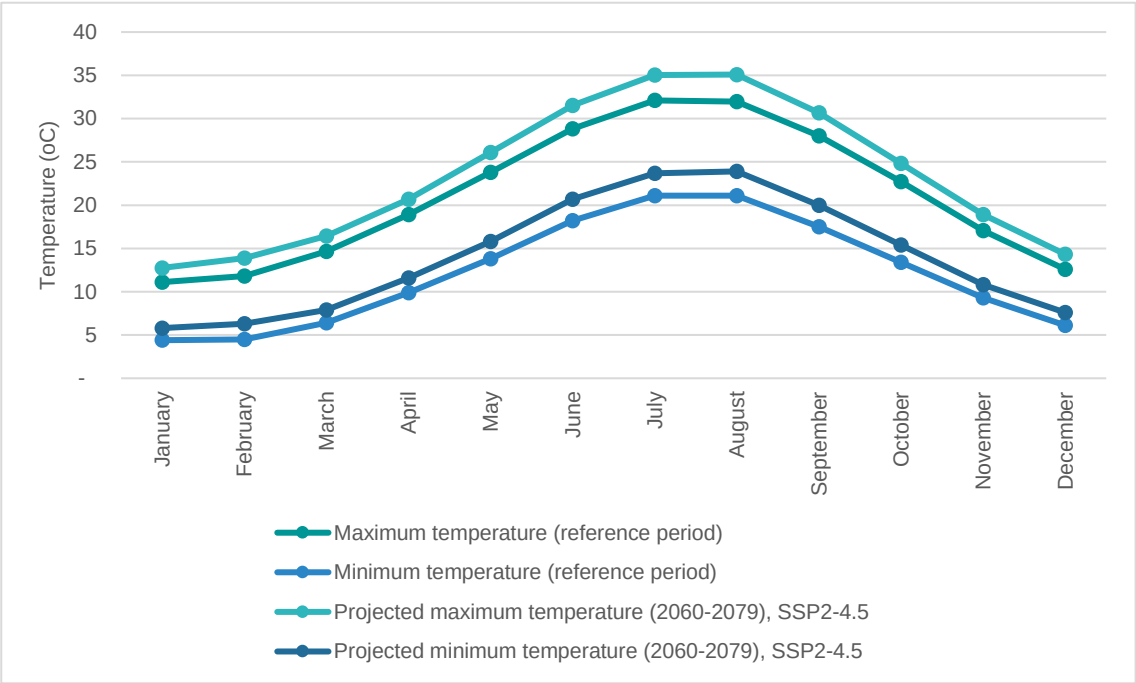


Figure 8.7: Projected changes in maximum and minimum air temperatures for the far-future, Izmir, SSP2-4.5, 1995-2014 reference period (50th percentile)[78]

[77] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

[78] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

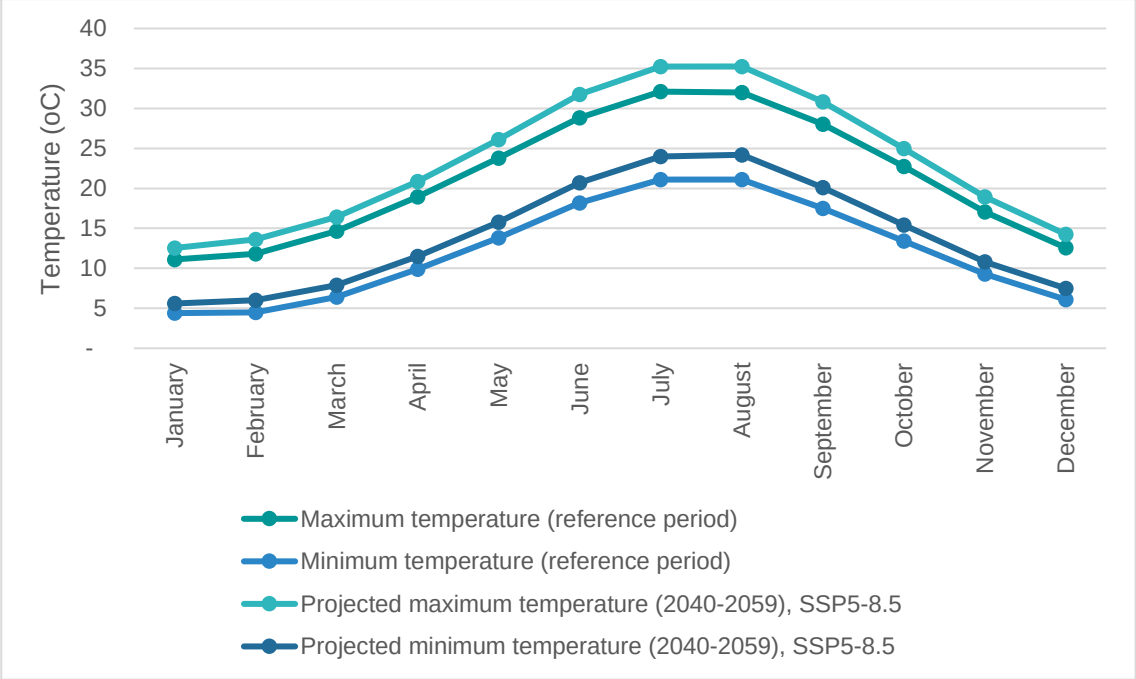


Figure 8.8: Projected changes in maximum and minimum air temperatures for the mid-future, Izmir, SSP5-8.5, 1995-2014 reference period (50th percentile)[79]

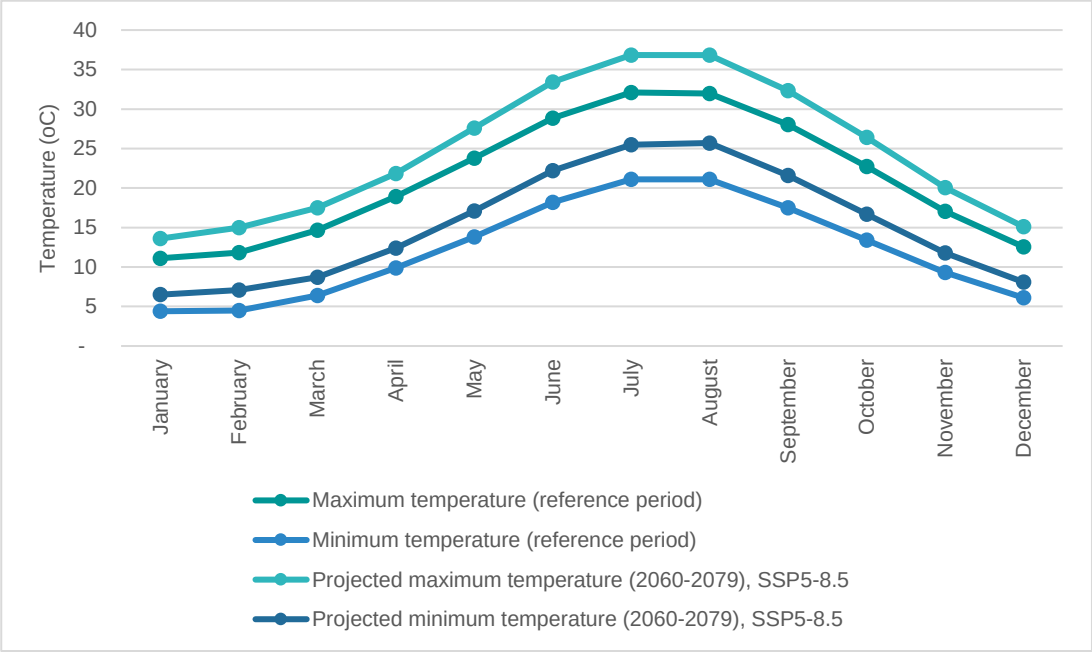


Figure 8.9: Projected changes in maximum and minimum air temperatures for the far-future, Izmir, SSP5-8.5, 1995-2014 reference period (50th percentile)[80]

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 SSP2-4.5 and SSP5-8.5 climate change scenarios, respectively, based on the data accessed via the World Bank CCKP.

[79] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

[80] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

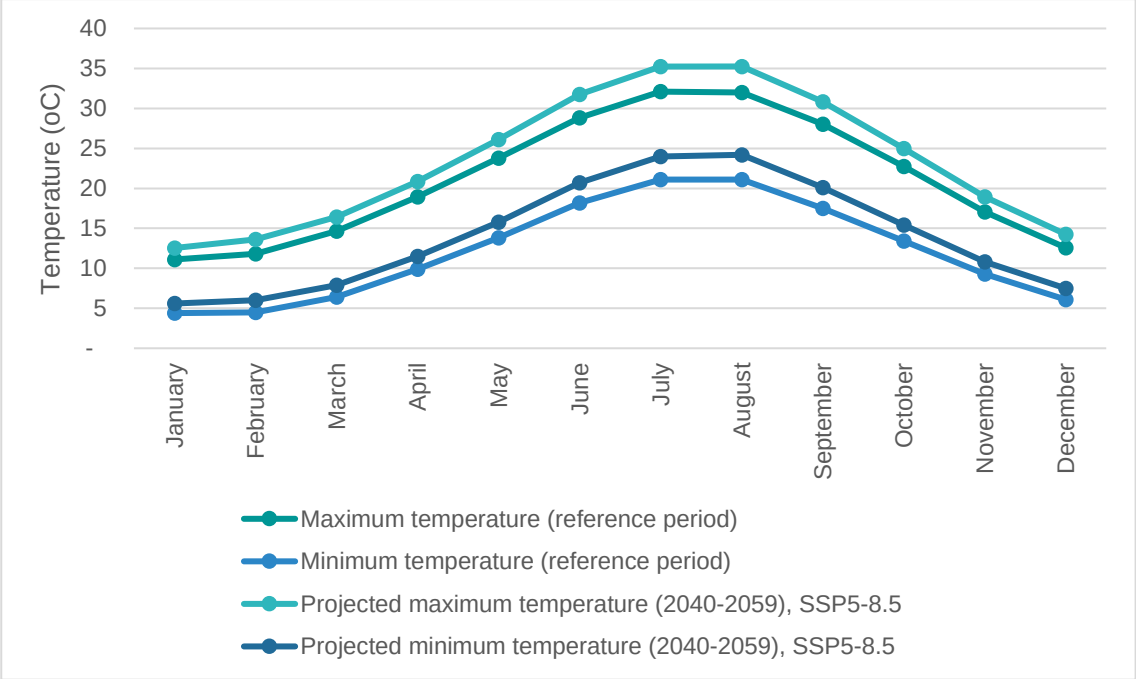


Figure 8-10: Projected changes in monthly average precipitation for the mid-future and far-future, Izmir, SSP1-2.6, 1995-2014 reference period (50th percentile) [81]

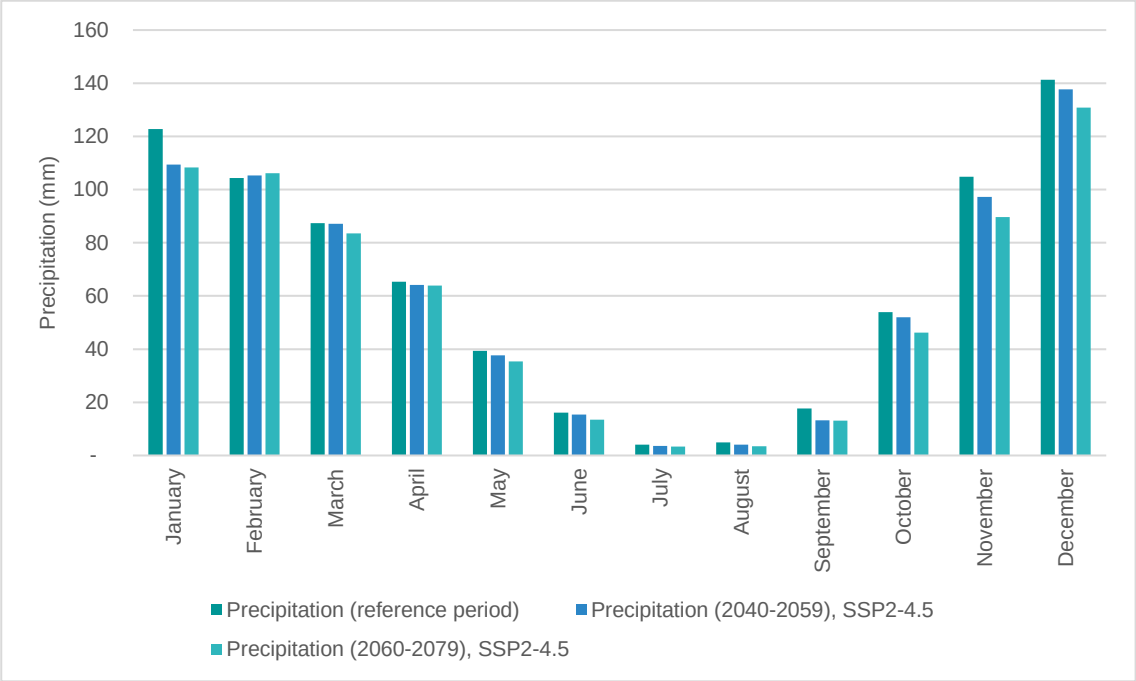


Figure 8.11: Projected changes in monthly average precipitation for the mid-future and far-future, Izmir, SSP2-4.5, 1995-2014 reference period (50th percentile)[82]

[81] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

[82] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

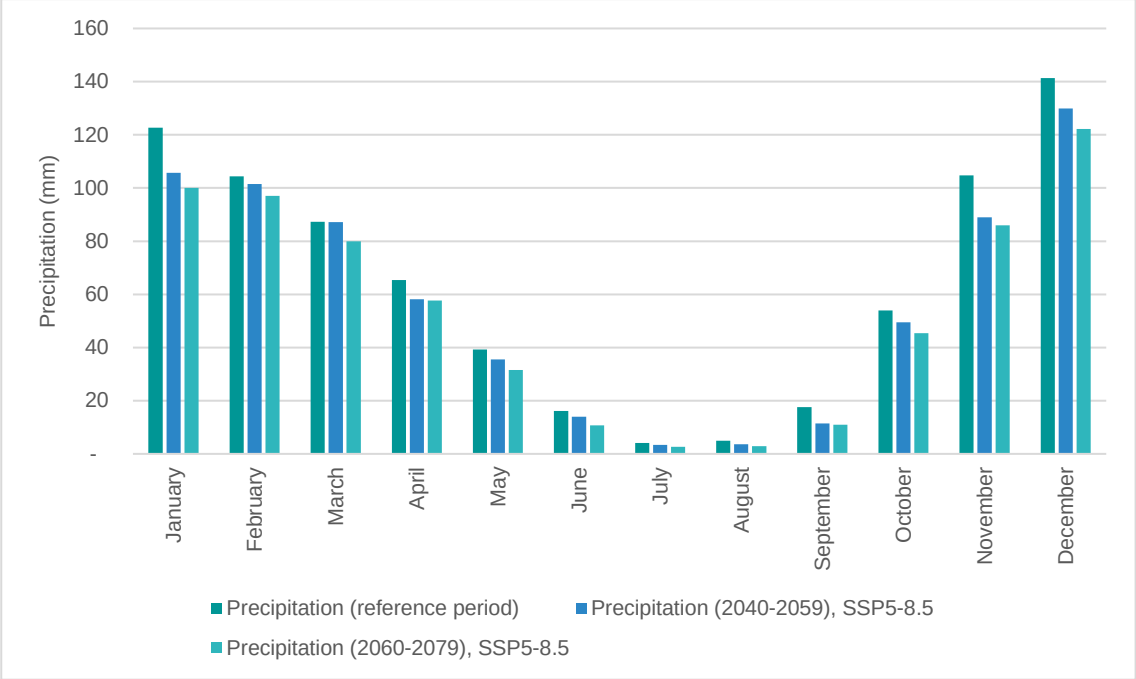


Figure 8.12: Projected changes in monthly average precipitation for the mid-future and far-future, Izmir, SSP5-8.5, 1995-2014 reference period (50th percentile)[83]

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 scenarios for Izmir 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, Izmir, SSP1-2.6, SSP2-4.5 & SSP5-8.5, 1995-2014 reference period (50th percentile)[84]

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	115 mm	113 mm	130 mm
SSP2-4.5	115 mm	122 mm	116 mm
SSP5-8.5	115 mm	115 mm	117 mm

[83] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP

[84] 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, Izmir, SSP1-2.6, SSP2-4.5 & SSP5-8.1135, 1995-2014 reference period (50th percentile)[85]

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	1.7 days	1.6 days	1.8 days
SSP2-4.5	1.7 days	1.7 days	1.5 days
SSP5-8.5	1.7 days	1.7 days	1.6 days

Although Table 8.11 shows a slight change from the baseline for all scenarios for both timeframes, projections provided in Table 8.10 follow an increasing trend for all climate change scenario and for both time frames. Thus, intense rainfall events are likely to increase in magnitude or frequency.

Heatwaves

Figure 8-13, Figure 8.14, and Figure 8.15 show projected changes in number of hot days with temperature greater than 35 °C for SSP1-2.6, SSP2-4.5, and SSP5-8.5 scenarios, respectively, for the mid-future and the far-future based on the data accessed via the World Bank CCKP.

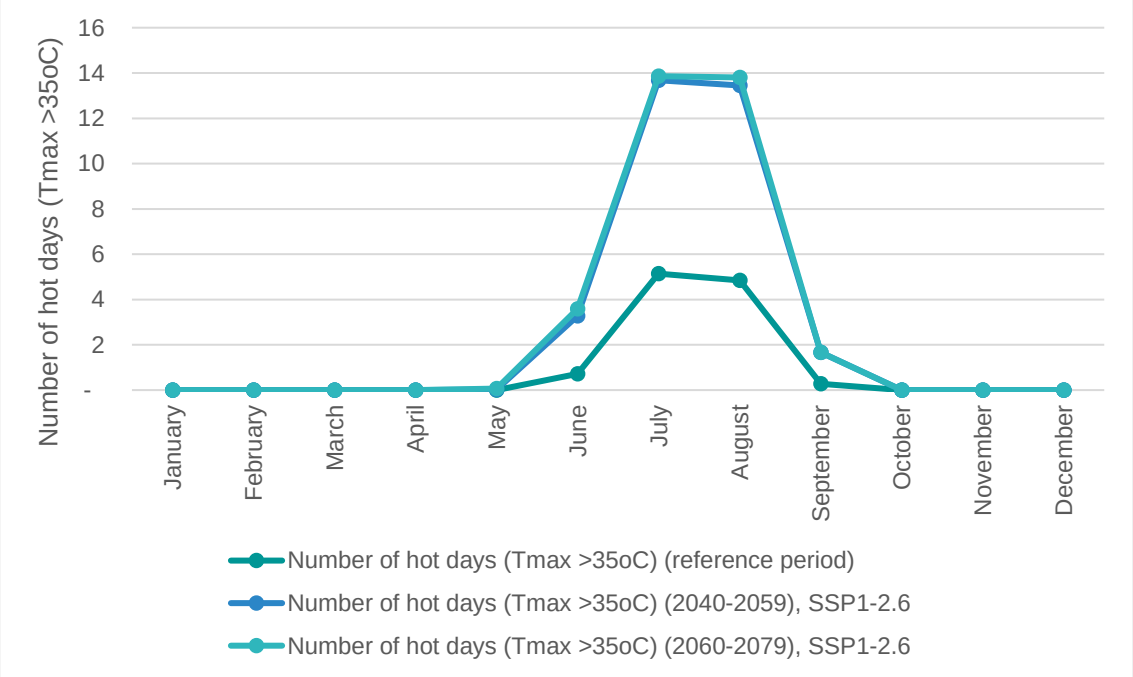


Figure 8-13: Projected changes in number of hot days (Tmax >35 °C) for the mid-future and far-future, Izmir, SSP1-2.6, 1995-2014 reference period (50th percentile)[86]

[85] Produced by Mott MacDonald based on the data available in the World Bank CCKP

[86] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP.

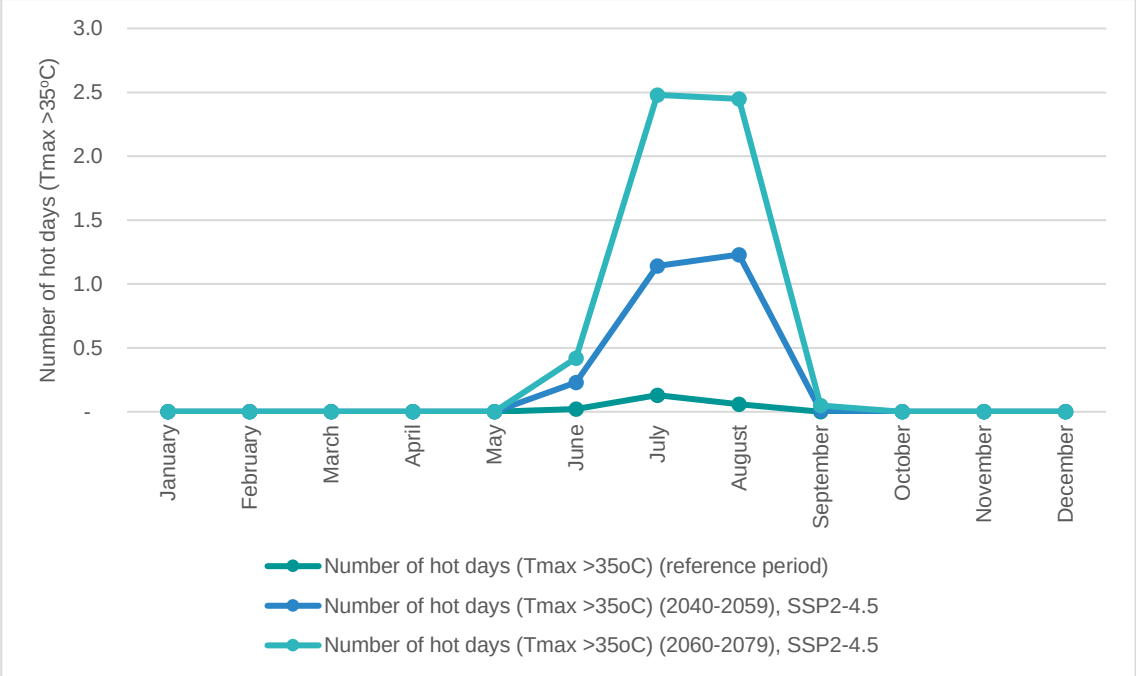


Figure 8.14: Projected changes in number of hot days (Tmax >35 °C) for the mid-future and far-future, Izmir, SSP2-4.5, 1995-2014 reference period (50th percentile)[87]

[87] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP.

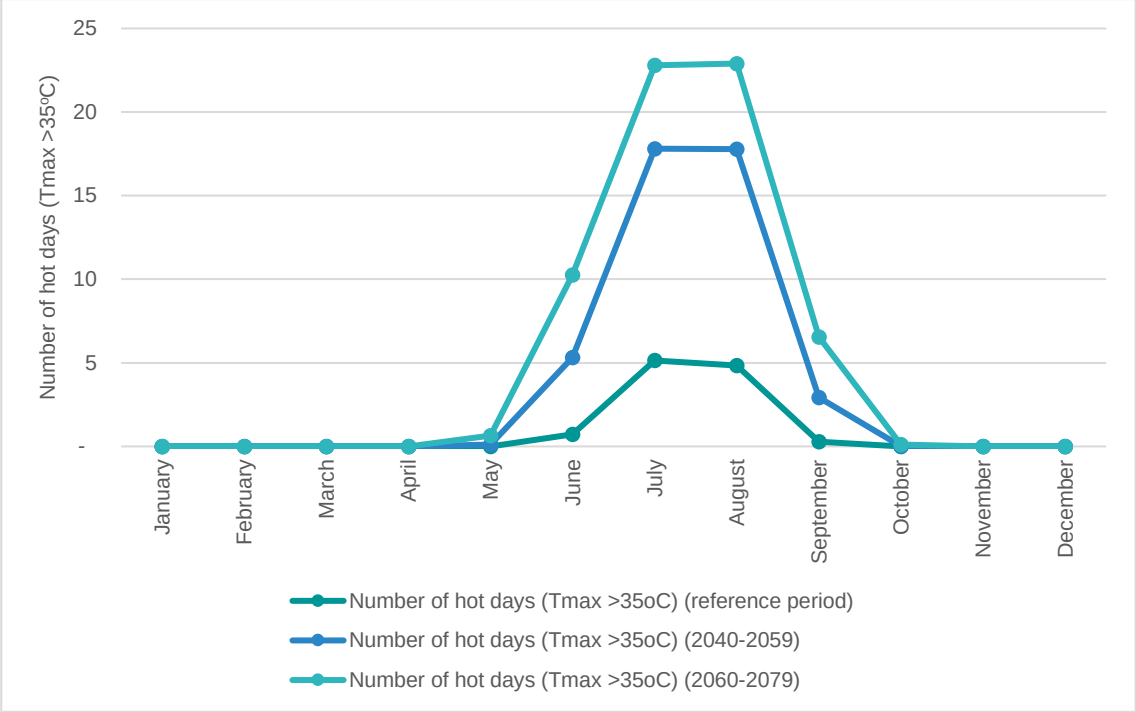


Figure 8.15: Projected changes in number of hot days (Tmax >35 ºC) for the mid-future and far-future, Izmir, SSP5-8.5, 1995-2014 reference period (50th percentile)[88]

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 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 the 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, Izmir, SSP1-2.6, SSP2-4.5 & SSP5-8.5, 1995-2014 reference period (50th percentile)[89]

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	5 days	4 days	5 days
SSP2-4.5	5 days	4 days	3 days
SSP5-8.5	5 days	3 days	2 days

[88] Produced by Mott MacDonald based on the data obtained from the World Bank CCKP.

[89] Produced by Mott MacDonald based on the data available in the World Bank CCKP

Table 8-13: Projected changes in the number of ice days (Tmax <0°C) in January for the mid-future and the far-future, Izmir, SSP1-2.6, SSP2-4.5 & SSP5-8.5, 1995-2014 reference period (50th percentile)[90]

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	0.1 days	0 days	0 days
SSP2-4.5	0.1 days	0 days	0 days
SSP5-8.5	0.1 days	0 days	0 days

Based on the temperature projections presented before, alongside the projected number of frost days (Tmin <0°C) and ice days (Tmax <0°C) (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. Based 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.

The Project components (turbines, switchyard, and administrative building) are located in a high mountain area (500-950m above the ground), therefore any risk associated with the flooding is not anticipated. Also, there are two ETLs to be constructed within the scope of the Project. One of the ETLs extending towards the north of the Project area will enable the connection between the switchyard and the Bayramiç Havza TS. It is located at 1km south of Kursaklı Stream and 1.8 km north of Karamenderes River. The second route extending towards the south of the Project area will enable the connection between the switchyard and the İzmir Havza TS. It is located at 300 south of the stream where Bakırçay River and Yağcılar Stream meet. Considering their locations, fluvial flooding of substations and nearby areas (such as access roads and utilities infrastructure) could be a potential treat. It is likely to occur considering the projected changes in the extreme precipitation events provided above.

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.

Although some portion of the Project components is surrounded by forestry areas, the majority are located in bare mountainous areas. In addition, ETLs to be constructed within the scope of the Project passes through routes dominated by shallow vegetation. Considering the location

[90] Produced by Mott MacDonald based on the data available in the World Bank CCKP

specific information outlined here, potential forest fire in the region might 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 National EIA studies, the presence of active landslides and old landslides has not been detected within the Project are, and there is no movement area formed as a result of slippage, or old landslide surface strength (More detailed information on the subject has been provided in *Chapter 6: Land Use, Soil, and Geology*.). Additionally, the Project is located in a straight area (not in an area with the steep slope) and any risk associated with landslides is not anticipated for the Project.

Sea level rise

The Project is not located on a coastal area (the nearest turbine is around 35km 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[91]. Türkiye's latest national GHG inventory to the UNFCCC disclosed annual emissions of around 524 Mt of CO_2e based on 2020 data[92]. 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
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.

[91] 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.

[92] UNFCC (2022) Turkey. 2022 National Inventory Report (NIR), Last accessed in November 2023 here: https://unfccc.int/documents/461926.

Table 8.15: The share of resources in energy production[93]

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 Equator Principles (EP IV)[94], and 25,000 tonnes of CO_2 equivalent annually as stated in the IFC performance standards[95]. 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 Greenhouse Gas (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 all climate change scenarios for Izmir include the following:

- Increase in both average and extreme temperatures particularly during summer
- Increase in minimum temperatures in particular during winter
- Decrease in monthly average precipitation
- 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.

[93] 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.

[94] Equator Principles, Implementation Note, 2020. Last accessed November 2023 here: https://equator-principles.com/app/uploads/Implementation_Note_Sept2020.pdf

[95] 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

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.

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	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
													dry storage areas or underneath tarps or trees.			
				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	Low		

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
										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.			
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.	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
													Stockpiles will be watered on a regular basis to keep its moisture content at a certain level. 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		

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
				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	Likely			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			Medium			Erosion Control Management Plan will be prepared and implemented.	Negligible		
				Construction equipment and machinery	Waterlogging of sites restricting ability of machinery to operate on wet ground	N/A	Minor			Medium			Emergency Response Plan will be prepared and implemented.	Low		
Precipitation changes and flooding	Likely			Access roads and site roads,	Restricted site access/ staff being unable to make it to work leading to delays.	N/A	Minor			Medium			Emergency Response Plan will be prepared and implemented.	Low		
				Construction equipment and machinery	Loss of mains power supply or communications, may not be able to operate machinery causing delays to the schedule.	The electricity will be supplied from the national grid or diesel-fired generators to be used in the construction site. On-site generators will be used in case of electricity cut.	Minor			Medium			Given that there will be available on-site generators for electricity supply, the risk due to climate change is low. No further action is anticipated.	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
					Damage to construction equipment	N/A	Moderate			Medium			Construction equipment and machinery will be stored in covered and dry storage areas.	Low		
				Earthworks	Material have potential to runoff into watercourses leading to pollution.	As stated above, necessary permission will be obtained from the State Hydraulic Work (DSI) for the material storage / stockpiles / laydown area.	Minor			Medium			Erosion Control Management Plan will be prepared and implemented.	Low		
				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		

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

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					
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
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,	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 equipmen	Negligible			Low		
								Expansion of metallic or plastic components and joints of		Insignificant			Minor			Low			Medium				Negligible			Low		

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					
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
								moving parts	blade load, etc.													t that may be					
								Increased failure rate of mechanical and electrical equipment, including safety critical equipment	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.	Minor			Minor			Medium			Medium			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	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		Insignificant			Minor			Low			Medium				Negligible			Low		

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						
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
								capacity of the cable to transmit energy														heatwaves to identify any damage or deterioration and maintenance requirement. Ongoing monitoring of power production will be ensured during extremes to identify losses if any.						
Increased risk of wildfires, particularly associated with droughts	Possible		Likely				Building structure, Access roads and site roads,	Significant structural damage	Fire protection and suppression system will be included in the design.	Moderate			Moderate Although some portion of the Project components is surrounded by forestry areas, the			Medium			Medium			Emergency Response Plan will be prepared and	Medium			Medium		

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					
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
and heatwaves							Associated facility							majority are located in bare mountainous areas. In addition, ETLs to be constructed within the scope of the Project passes through routes dominated by shallow vegetation. In this regard, the severity of impact is considered as moderate.									implemented.						
							Staff access and health and safety	Significant risks to workers health		Moderate			Moderate			Medium			Medium				Low			Low		
Reduced number of days with ice and frost (when	Almost certain						Building structure Machinery and	Ice shedding and ice throw-related damage to	Ice shedding and ice throw assessments will be conducted for	Insignificant			Insignificant Risk of ice-shedding and ice throw related			Low			Low			Regular maintenance activities will not be performe	Insignificant			Insignificant		

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					
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
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.							equipment	structures or equipment	the final plant layout.						damage will decrease with reduced number of days with temperatures below zero. Therefore, severity of impact is considered as insignificant.							d when temperatures are below zero.						
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		

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					
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
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 parts and joints	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. In extreme wind speeds, • When nominal speed is exceeded by more than 15%, the wind energy converter is to be stopped automatically. In addition, overspeed switches are to	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 wind energy converters and substation will be reviewed and the need to upgrade equipment as part of	Insignificant			Insignificant		
								Damage to infrastructure due to extreme high wind speeds, fallen trees		Moderate			Moderate			Low			Medium				Low			Low		

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					
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
									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.													operation and maintenance of the Project will be taken into account, in line with projected wind speeds for the lifetime of the Project.						

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					
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
									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																		

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						
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
									wind energy converter stops.																			
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		
Precipitation changes and increase in rainfall intensity during extreme events	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			Medium			Medium			Weather data will be monitored, and equipment and infrastructure will be inspected during	Low			Low		
							Electrical equipment	Damage to electrical equipment, resulting in risk of failures in		Moderate			Moderate			Medium			Medium				Low			Low		

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						
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
								the system/integrity														and after extremes.						
Precipitation changes and flooding	Likely						Associated facility	Flooding on the substation platform (if the drainage capacity of the substation is exceeded), which leads to damage	Substation platform will be raised above projected flood level, Drainage will be included as needed and designed the system based on projected rainfalls.	Minor			Minor			Minor			Minor			Ponding of water on any flat substation structure will be monitored to avoid inundation of equipment.	Low			Low		
							Access roads and site roads	Restrictions to access for maintenance and repair due to effects on access roads and site roads during fluvial floods		Moderate			Moderate			Moderate			Moderate			Weather and flood conditions will be monitored prior to maintenance and inspection site visits to wind energy convertors, and safe exit and	Low			Low		

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					
	Mid-future			Far-future						Mid-future			Far-future			Mid-future			Far-future				Mid-future			Far-future		
	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5				SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5		SSP 1-2.6	SSP 2-4.5	SSP 5-8.5	SSP 1-2.6	SSP 2-4.5	SSP 5-8.5
																						access will be planned.						
							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			Emergency Response Plan will be prepared and implemented.	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	3,430	1.90%
Scope 2	240	0.13%
Scope 3	176,430	97.96%
Total	180,100	100%

The construction phase of the Project will last 18 months according to the construction schedule. Therefore, total Scope 1 and Scope 2 emissions arising from the construction phase are 2,090 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	140,630	78.08%
A4	22,430	12.45%
A5	17,040	9.46%
Total	180,100	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	49,310	27.38%
Tower	34,509	19.16%
Material transport to site	22,429	12.45%
Turbine hub	12,605	7.00%
Bearing System	8,772	4.87%
Total	180,100	-

Table 8.21: Project emissions by material / activity

Material / activity	tCO_2e	% of total emissions
Fiberglass	52,850	29.34%
Steel	51,466	28.58%
Fuel consumption (indirect emissions)	23,966	13.31%
Iron	12,605	7.00%
On-site waste	11,834	6.57%
Gravel	9,628	5.35%

Material / activity	tCO_2e	% of total emissions
Transmission cables	8,295	4.61%
Concrete	5,783	3.21%
Fuel consumption (direct emissions)	3,430	1.90%
On site power consumption	236	0.13%
Total	180,100	-

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 250 tCO_2e loss in sequestration potential per year resulting from around 52 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	250*	4,770**
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	250	0
B2	0	4,770

GHG emissions associated with the Project construction phase arise through 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 are suggested to be implemented to minimise these sources of GHG emissions as far as possible:

- Appropriate waste management will be implemented, 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 minimized 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[96]	CH_4[98]	N_2O[98]	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[97]	1.18559*10^{-5} kg/L[94]	1.11585*10^{-5} kg/L[94]	-
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[98]	4.27955*10^{-6} kg/L[95]	6.41933*10^{-6} kg/L[95]	-
2.2	Fuel consumption	L/km					

[96] 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.

[97] 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.

[98] 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[96]	CH_4[98]	N_2O[98]	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[99]

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[100].

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)
1,000,000	0.6488	648,800

The avoided emissions shown in Table 8.25 above equate to approximately 0.1% 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 as well as the potential greenhouse gas (GHG) effects 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, drier summers associated with increased drought and high

[99] 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.

[100] 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.

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, flooding, 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 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.

With the inclusion of both embedded mitigations and additional mitigation measures, there are no potential significant effects (i.e., residual impacts) upon the Project identified because of climate change during construction and operation phases.

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, 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)
- 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 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 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.

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 policy 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 accepted 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 centres.

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[101] document is used.

Mentioned document defines sensitivity of receptors to noise level exposure's relative change as a similar approach.

Vibration impacts need to be evaluated for construction and operation.

[101] Guidelines for Environmental Noise Impact Assessment, Institute of Environmental Management & Assessment, IEMA Noise Guidelines Second Edition VERSION 1.2 (November 2014)

Construction Vibration

Vibration assessment criteria are presented in Table 9.15.

Table 9.15: Scale of Construction Vibration Impact

Category of construction 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 (construction is limited between 10:00-20:00) and that no construction will take place during the night period,
- 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.

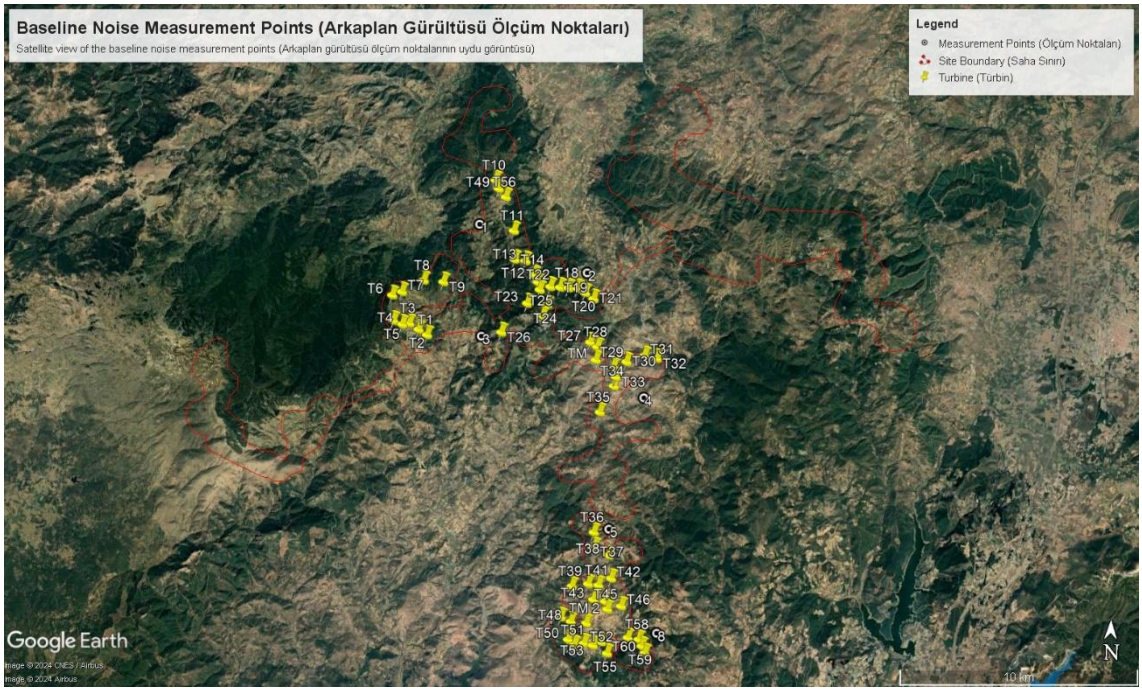


Figure 9.1: Baseline Measurement Locations

Table 9.17: Information of Measurement Locations

Points	Latitude	Longitude	Designated Land Use
Point 1	39.418936°	27.344174°	Residential
Point 2	39.402079°	27.397239°	Residential
Point 3	39.376973°	27.346887°	Residential
Point 4	39.355895°	27.426763°	Residential
Point 5	39.306203°	27.411900°	Residential
Point 6	39.267742°	27.436756°	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 in this region as shown 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 in this region as shown in Figure 9.4.

Figure 9.4: Measurement Point 3

Point 4 was located at a residential building. 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 9-5.

Figure 9-5: Measurement Point 4

Point 5 was located at a residential building. 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 9.6.

Figure 9.6: Measurement Point 5

Point 6 was located at a residential building. 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 9.7.

Figure 9.7: Measurement Point 6

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	48,7	45,6	37,5
Point 2	52,0	47,8	44,2
Point 3	54,4	44,8	39,0
Point 4	50,7	40,8	40,0
Point 5	42,6	40,9	35,1
Point 6	38,5	38,5	36,5

Table 9.19: Baseline Noise Measurement Results for International Standards (L_{dn})

Measurement Location	Lday (dBA)	Lnight (dBA)
Point 1	48,3	39,0
Point 2	51,9	49,7
Point 3	53,6	38,9
Point 4	49,8	39,7
Point 5	42,5	35,0
Point 6	38,6	36,5

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	İkizce, Haydar, Kılcılar
Point 2	Taşdibi, Büyükyenice, Döşeme
Point 3	Yukarıada, Oruşlar, Ürkütler, İneşir
Point 4	Kiraz, Duğla, Kaplan
Point 5	Göçbeyli, Sarıcaoğlu, Alhatlı, Durmuşlar, Çamoba
Point 6	Kozluca, Yalnızadam, Muratlar, Alibeyli

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 Building	Local	Medium	Medium
AP 2	2	Residential Building	Local	Medium	Medium
AP 3	3	Residential Building	Local	Medium	Medium
AP 4	3	Residential Building	Local	Medium	Medium
AP 5	3	Residential Building	Local	Medium	Medium
AP 6	3	Residential Building	Site	Medium	Medium
AP 7	5	Residential Building	Local	Medium	Medium
AP 8	5	Residential Building	Local	Medium	Medium
AP 9	5	Residential Building	Local	Medium	Medium
AP 10	5	Residential Building	Site	Medium	Medium
AP 11	6	Residential Building	Local	Medium	Medium
AP 12	6	Residential Building	Local	Medium	Medium
AP 13	5	Residential Building	Local	Medium	Medium
AP 14	4	Residential Building	Local	Medium	Medium
AP 15	4	Residential Building	Local	Medium	Medium
AP 16	4	Residential Building	Local	Medium	Medium

Satellite view of the assessment points are presented in Figure 9.8.

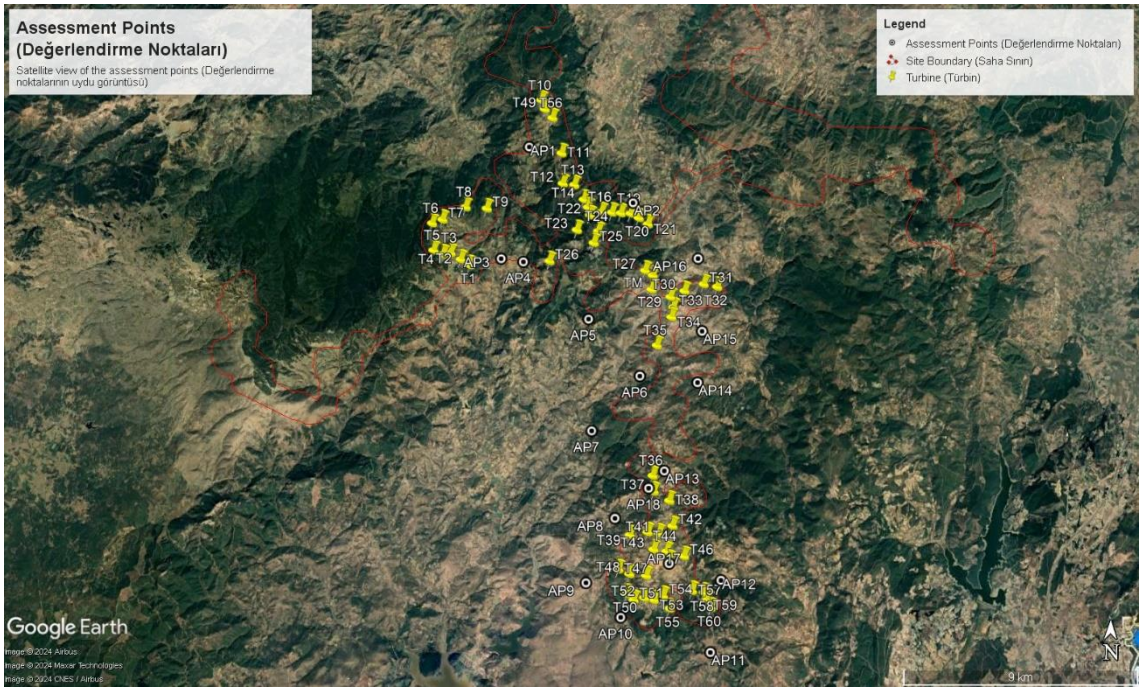


Figure 9.8: Satellite View of the Assessment Points

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	T11-T49-T56	T10- T11-T49-T56
2	T18-T19-T20 Platform	T14-T15-T16-T17-T18-T19-T20-T21	T14-T15-T16-T17-T18-T19-T20-T21
3	Site Access Road	T1	T1
4	Site Access Road	T26	T26
5	-	-	-
6	T35 Platform	T35	T35
7	-	-	-
8	T37 Platform	T37	T36-T37-T38-T39-T40-T41-T42
9	T47 Platform	T47	T47-T48-T50
10	T50-T51-T52 Platform	T50-T51-T52	T47-T48-T50-T51-T52
11	Site Access Road -T60	T60	T59-T60
12	T57-T58-T59 Platform	T57-T58-T59	T57-T58-T59-T60
13	Site Access Road-T36 Platform	T36	T36
14	-	-	-

Assessment Point	Construction Noise Source	Operation Noise Source	Visual Impact
15	T31-T32-T33-T34 Platform	T31-T32-T33-T34	T31-T32-T33-T34
16	-	T30-T31-T32	T30-T31-T32
17**	-	-	T43-T44-T45-T46
18**	-	-	T36-T37

*T2-T3-T4-T5-T6-T7-T8-T9-T12-T13-T22-T23-T24-T25-T27-T28-T29-T53-T54-T55-T56 These turbines are not expected to have an impact on the assessment points. However, all turbines are included in the calculation and impact assessment process.

**These assessment points have been assessed for visual 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 modelling software CadnaA from Datakustik. The calculation parameters and sound source levels for the modelling 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;

- EIA report suggest only one unit of each type of construction equipment will be used. This means there will not be any simultaneous construction works.
- EIA report suggest that all construction processes for ETL lines (sub structure, super structure and string application) will last for 6 moths in total.
- ETL EIA report suggests that following equipment will be used for construction of ETL; loader, excavator, sweeper, truck, crane, cement mixer/pump and string machine. Total sound power level is calculated as 119 LwA for these equipment according to BS5228. ETL construction noise power level is calculated for most noisy facility of package of 9 facilities in order to create a worst case scenario.
- Following Figure 9.9 shows the ETL line for the specific project.
- 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 with following exceptions.
- For ETL units Northern 1, 2, 3 and Southern 9 there are settlements closer than the safe distance to the construction site.
- Only for these ETL units 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.

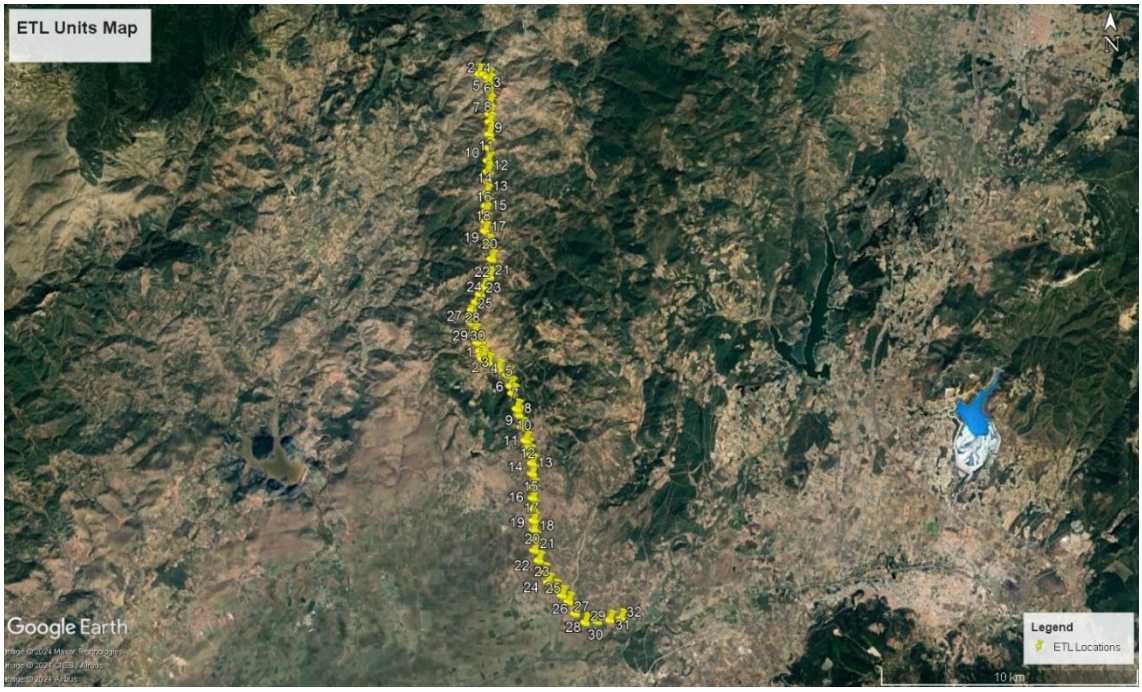


Figure 9.9: ETL Units Specific to The Project

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 Level (dBA)	Total Corrected Sound Power Level (dB)	Referance
		% on-time	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz			
Crawler Dozer	10	30	108	112	104	105	107	109	97	87	113	118	BS 5228: Tab C.6 #28
Excavator	12	40	96	95	91	90	90	89	82	75	95	102	BS 5228: Tab C.4 #14
Grader	10	30	116	115	111	107	112	106	102	93	114	119	BS 5228: Tab C.6 #31
Cyclinder	5	30	117	118	109	101	102	98	96	92	108	110	BS 5228: Tab C.2 #10
JCB	10	30	88	81	77	80	79	76	71	61	83	88	BS 5228: Tab C.2 #9
Truck	40	30	108	107	101	102	101	101	92	83	106	117	BS 5228: Tab C.4 #73
Trailer	5	20	106	101	102	108	98	96	88	84	106	106	BS 5228: Tab C.4 #91
Pickup	25	20	117	108	110	101	98	97	92	85	106	113	BS 5228: Tab C.4 #69
Mobile Crushing and Screening	1	30	108	109	103	107	101	102	98	93	109	104	BS 5228: Tab C.6 #37
Stuff shuttles	10	20	95	112	104	103	103	105	109	108	114	117	BS 5228: Tab C.6 #73
Total Sound Power Level (dBA)			124	101	109	113	115	119	119	115	124		
Sound Power Level per area Lw" (dBA/m2)			74	51	59	63	65	69	69	65	74		
Construction Area(m2)			100000										

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-T60	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 drilling		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 9.25. 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 9.10; whereas construction phase noise assessments are presented in Table 9.26 for IFC Limits.

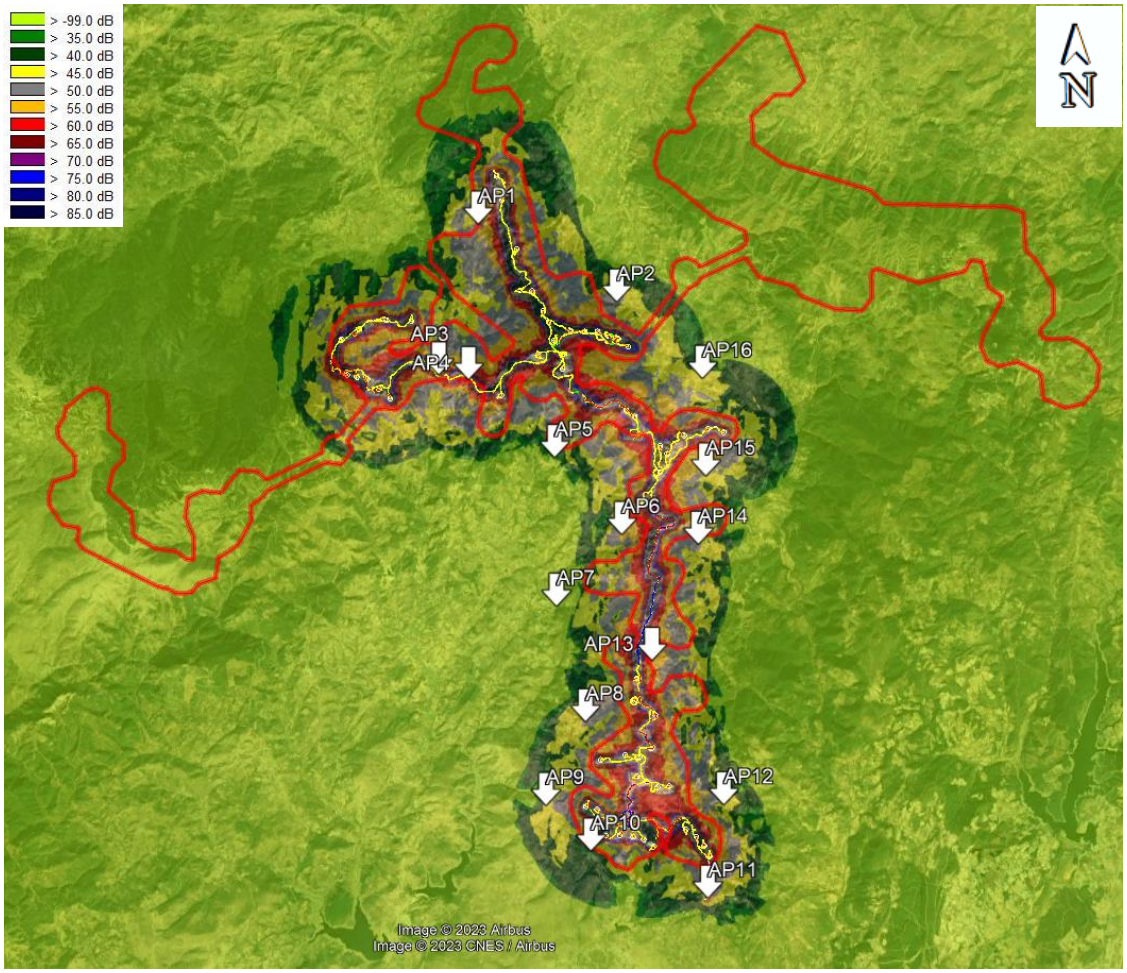


Figure 9.10: Construction Noise Map – Day, dBA

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	53,2	48,3	54,4	55,0	0,0	No Impact	No Impact	No Impact
2	49,7	51,9	53,9	55,0	0,0	No Impact	No Impact	No Impact
3	75,9	53,6	75,9	55,0	20,9	Very large	Large	Major
4	67,5	53,6	67,7	55,0	12,7	Very large	Large	Major
5	25,6	53,6	53,6	55,0	0,0	No Impact	No Impact	No Impact
6	54,5	53,6	57,1	55,0	2,1	Small	Small	Minor
7	Undetected	42,5	42,5	55,0	0,0	No Impact	No Impact	No Impact
8	50,2	42,5	50,9	55,0	0,0	No Impact	No Impact	No Impact
9	47,8	42,5	48,9	55,0	0,0	No Impact	No Impact	No Impact
10	41,1	42,5	44,9	55,0	0,0	No Impact	No Impact	No Impact
11	56,3	38,6	56,4	55,0	1,4	Small	Small	Minor
12	46,5	38,6	47,2	55,0	0,0	No Impact	No Impact	No Impact
13	58,3	42,5	58,4	55,0	3,4	Medium	Medium	Moderate
14	50,4	49,8	53,1	55,0	0,0	No Impact	No Impact	No Impact
15	47,4	49,8	51,8	55,0	0,0	No Impact	No Impact	No Impact
16	46,4	49,8	51,4	55,0	0,0	No Impact	No Impact	No Impact

*Undetected: No impact was detected at the assessment point.

No Impact	**11**
Negligible	**-**
Minor	**2**
Moderate	**1**
Major	**2**

As can be seen from the assessment table related with the construction phase of the Project; two “Major”, two “Minor”, one “Moderate” and eleven “No Impact” final impact significances are observed for IFC-WBG limits out of 16 receiver 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 9.11 and Figure 9.12. Operation phase noise assessments are presented in Table 9.27 for RENC Limits and Table 9.28 for IFC Limits.

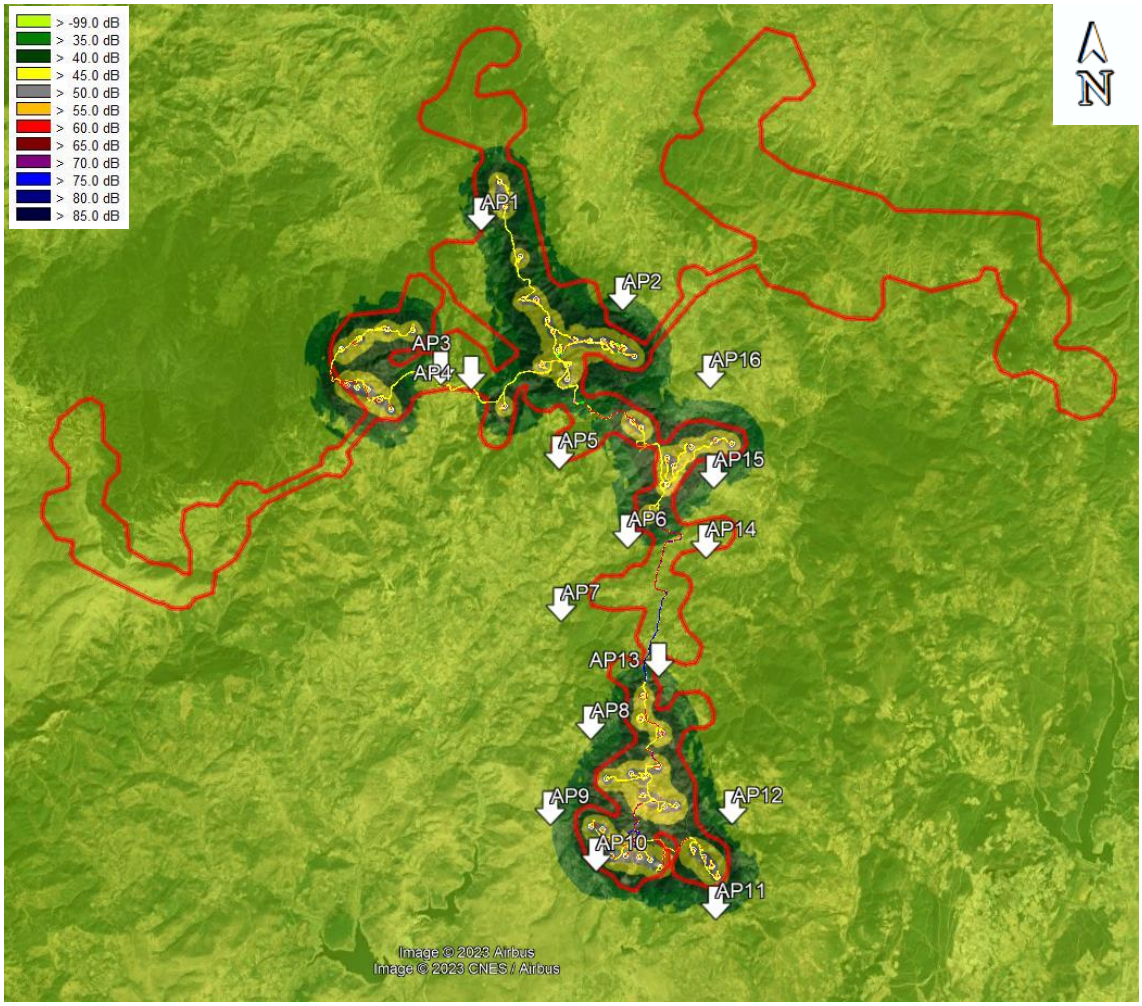


Figure 9.11: Operation Noise Map – Day, dBA

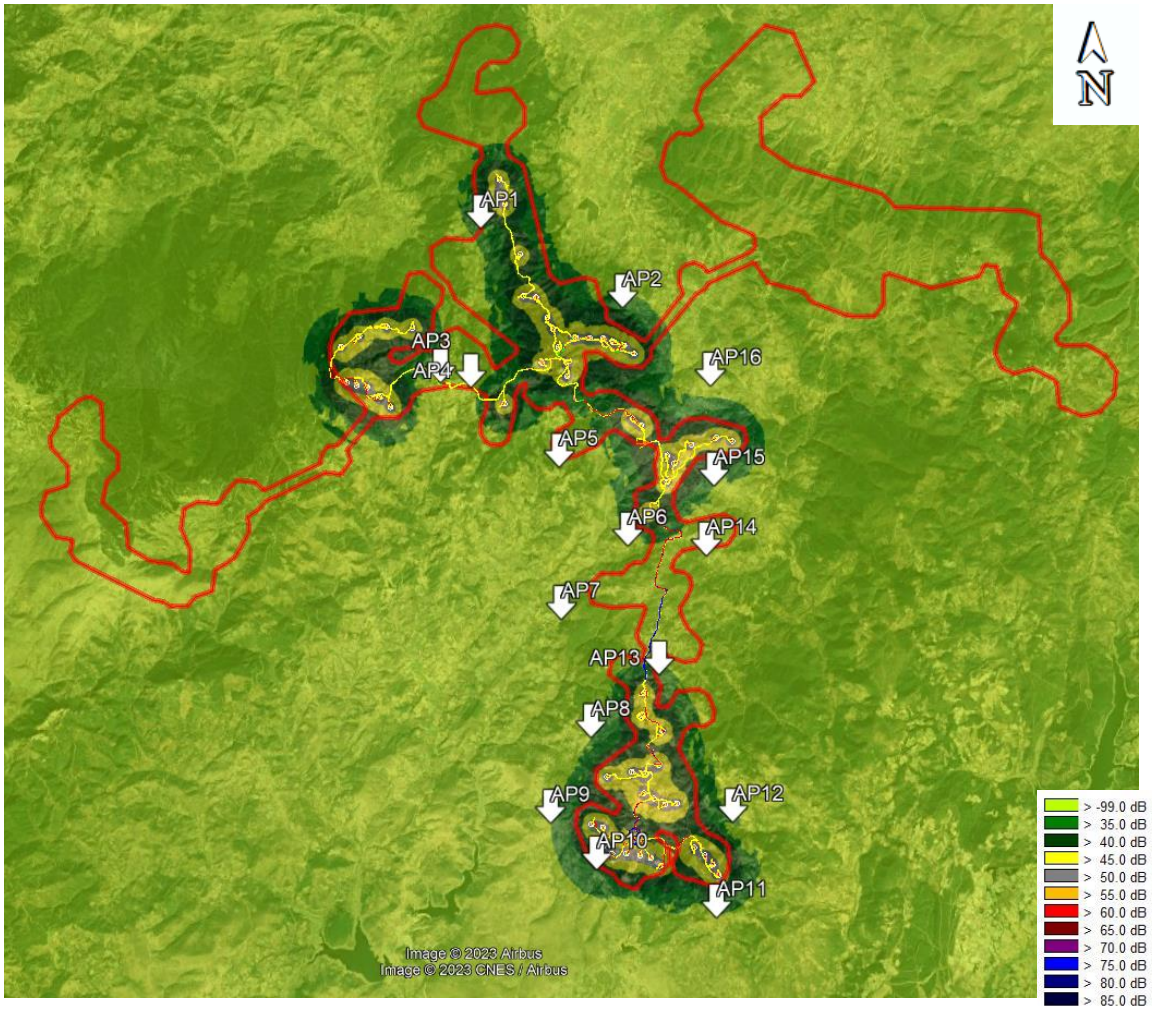


Figure 9.12: Operation Noise Map – Night

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	34,9	34,3	35,0	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
2	37,3	36,7	37,4	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
3	30,0	29,8	30,5	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
4	30,8	30,1	30,8	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	29,5	28,9	29,6	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
8	32,9	32,4	33,1	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
9	32,7	32,2	32,9	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
10	38,3	37,6	38,3	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
11	28,2	27,8	28,5	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
12	32,8	32,3	33,0	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
13	36,6	36,0	36,7	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
14	Undetected	Undetected	Undetected	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
15	32,8	32,3	33,0	65,0	60,0	55,0	0,0	No Impact	No Impact	No Impact
16	30,5	30,2	30,9	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	**16**
Negligible	**-**
Minor	**-**
Moderate	**-**
Major	**-**

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	35,7	35,8	39,6	33,4	41,1	37,8	55,0	45,0	0,0	No Impact	No Impact	No Impact
2	35,7	35,8	39,6	33,4	41,1	37,8	55,0	45,0	0,0	No Impact	No Impact	No Impact
3	34,9	35,1	39,6	33,4	40,9	37,3	55,0	45,0	0,0	No Impact	No Impact	No Impact
4	31,4	31,9	39,6	33,4	40,2	35,7	55,0	45,0	0,0	No Impact	No Impact	No Impact
5	31,4	31,9	39,6	33,4	40,2	35,7	55,0	45,0	0,0	No Impact	No Impact	No Impact
6	33,5	33,5	39,6	33,4	40,6	36,5	55,0	45,0	0,0	No Impact	No Impact	No Impact
7	35,4	35,4	39,6	33,4	41,0	37,5	55,0	45,0	0,0	No Impact	No Impact	No Impact
8	Undetected	Undetected	45,9	40,9	45,9	40,9	55,0	45,0	0,0	No Impact	No Impact	No Impact
9	Undetected	Undetected	45,9	40,9	45,9	40,9	55,0	45,0	0,0	No Impact	No Impact	No Impact
10	Undetected	Undetected	45,9	40,9	45,9	40,9	55,0	45,0	0,0	No Impact	No Impact	No Impact
11	Undetected	Undetected	44,7	39,1	44,7	39,1	55,0	45,0	0,0	No Impact	No Impact	No Impact
12	Undetected	Undetected	44,7	39,1	44,7	39,1	55,0	45,0	0,0	No Impact	No Impact	No Impact
13	38,5	38,6	39,6	33,4	42,1	39,7	55,0	45,0	0,0	No Impact	No Impact	No Impact
14	34,7	34,7	39,6	33,4	40,8	37,1	55,0	45,0	0,0	No Impact	No Impact	No Impact
15	36,4	36,5	39,6	33,4	41,3	38,2	55,0	45,0	0,0	No Impact	No Impact	No Impact
16	38,0	38,1	39,6	33,4	41,9	39,4	55,0	45,0	0,0	No Impact	No Impact	No Impact

*Undetected: No impact was detected at the assessment point.

No Impact	**16**
Negligible	**-**
Minor	**-**
Moderate	**-**
Major	**-**

As can be seen from assessment tables related with the operation phase of the Project; all final impact significances were found to result in “No Impact” in accordance with both national and IFC limits for 16 receiver 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 9.13.

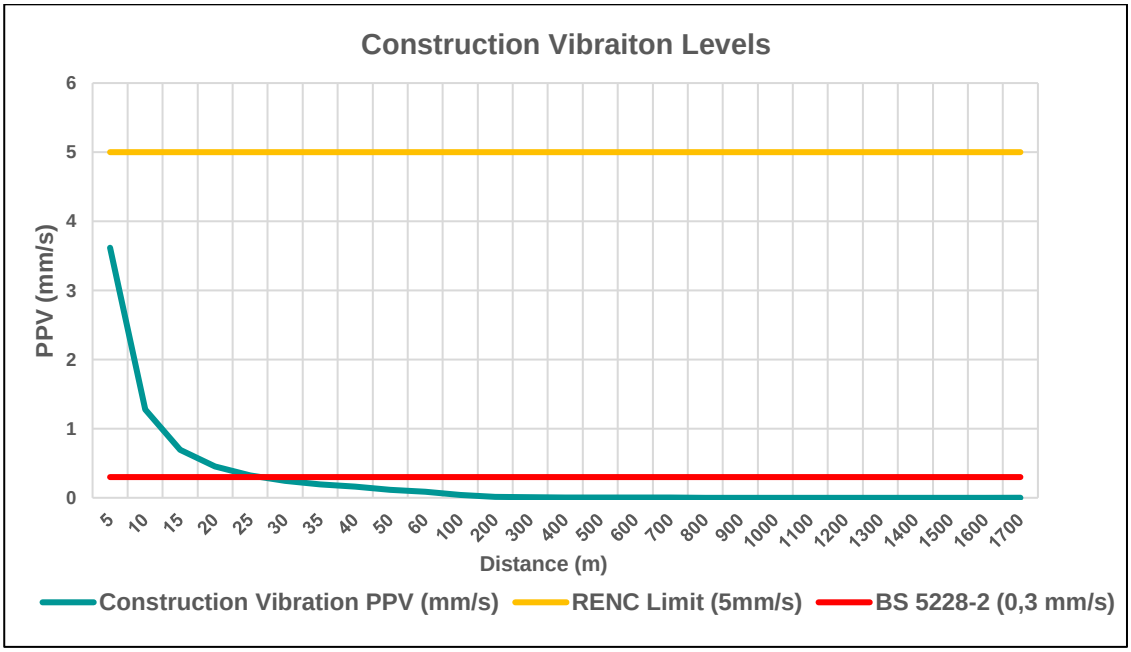


Figure 9.13: Construction Vibration Levels and Limit Values

Critical distances from the construction zone are calculated as 30 meters according to the BS 5225-2:2009 document. As seen in Figure 9.13, 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.

Table 9.29: Construction Vibration Results

Assessment Points	Construction Vibration Level (mm/s)	Distance (m)	Critical Distance (m)	
			RENC	BS5228-2
1	0,002	712	<5	30
2	0,002	870	<5	30
3	1,284	10	<5	30
4	0,063	75	<5	30
5	0,000	1900	<5	30
6	0,001	995	<5	30
7	0,000	2606	<5	30
8	0,001	1080	<5	30
9	0,001	1100	<5	30

Assessment Points	Construction Vibration Level (mm/s)	Distance (m)	Critical Distance (m)	
			RENC	BS5228-2
10	0,003	585	<5	30
11	0,247	30	<5	30
12	0,001	1125	<5	30
13	0,006	360	<5	30
14	0,001	925	<5	30
15	0,001	1110	<5	30
16	0,001	1355	<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	712	0,002	5,000	0,300	0,0	No Impact	No Impact	No Impact
2	870	0,002	5,000	0,300	0,0	No Impact	No Impact	No Impact
3	10	1,284	5,000	0,300	1,0	Small	Medium	Moderate
4	75	0,063	5,000	0,300	0,0	No Impact	No Impact	No Impact
5	1900	0,000	5,000	0,300	0,0	No Impact	No Impact	No Impact
6	995	0,001	5,000	0,300	0,0	No Impact	No Impact	No Impact
7	2606	0,000	5,000	0,300	0,0	No Impact	No Impact	No Impact
8	1080	0,001	5,000	0,300	0,0	No Impact	No Impact	No Impact
9	1100	0,001	5,000	0,300	0,0	No Impact	No Impact	No Impact
10	585	0,003	5,000	0,300	0,0	No Impact	No Impact	No Impact
11	30	0,247	5,000	0,300	0,0	No Impact	No Impact	No Impact
12	1125	0,001	5,000	0,300	0,0	No Impact	No Impact	No Impact
13	360	0,006	5,000	0,300	0,0	No Impact	No Impact	No Impact
14	925	0,001	5,000	0,300	0,0	No Impact	No Impact	No Impact
15	1110	0,001	5,000	0,300	0,0	No Impact	No Impact	No Impact
16	1355	0,001	5,000	0,300	0,0	No Impact	No Impact	No Impact

No Impact	**15**
Negligible	**-**
Minor	**-**
Moderate	**1**
Major	**-**

As can be seen from Table 9.30, there is one “Moderate” and 15 “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.

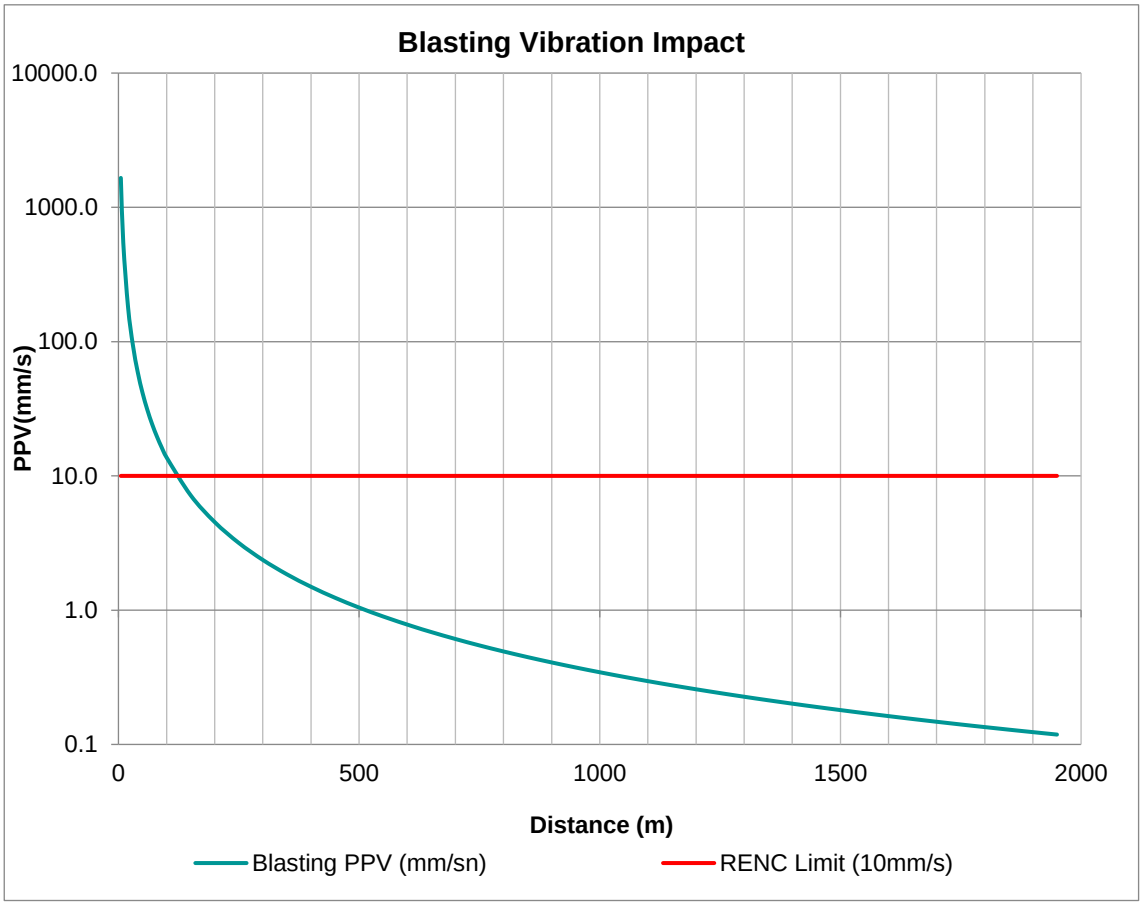


Figure 9.14: Blasting Vibration Level and Limits

Critical distances from the blasting zone are calculated as 122 meters according to the RENC limits. As seen in Figure 9.14, blasting activity closer than the critical distances to the receptors 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	940	122
2	905	122
3	1490	122
4	980	122
5	2330	122
6	1075	122
7	3080	122
8	1080	122
9	1010	122
10	590	122

Assessment Points	Distance (m)	Critical Distance (m)
		RENC
11	1180	122
12	1120	122
13	560	122
14	2010	122
15	1260	122
16	1360	122

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	940	0,381	10,000	0,0	No Impact	No Impact	No Impact
2	905	0,404	10,000	0,0	No Impact	No Impact	No Impact
3	1490	0,182	10,000	0,0	No Impact	No Impact	No Impact
4	980	0,356	10,000	0,0	No Impact	No Impact	No Impact
5	2330	0,089	10,000	0,0	No Impact	No Impact	No Impact
6	1075	0,307	10,000	0,0	No Impact	No Impact	No Impact
7	3080	0,057	10,000	0,0	No Impact	No Impact	No Impact
8	1080	0,305	10,000	0,0	No Impact	No Impact	No Impact
9	1010	0,339	10,000	0,0	No Impact	No Impact	No Impact
10	590	0,802	10,000	0,0	No Impact	No Impact	No Impact
11	1180	0,265	10,000	0,0	No Impact	No Impact	No Impact
12	1120	0,288	10,000	0,0	No Impact	No Impact	No Impact
13	560	0,872	10,000	0,0	No Impact	No Impact	No Impact
14	2010	0,113	10,000	0,0	No Impact	No Impact	No Impact
15	1260	0,238	10,000	0,0	No Impact	No Impact	No Impact
16	1360	0,211	10,000	0,0	No Impact	No Impact	No Impact

No Impact	**16**
Negligible	**-**
Minor	**-**
Moderate	**-**
Major	**-**

As can be seen from assessment table above, 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

Construction

Assessment Point 3, Point 4 and Point 13 are found to have major and moderate final impact significances in terms of construction noise and vibration. However, detected impacts include a great extent of uncertainty.

Detected noise impact sourced from rare 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 and possible 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 as much as possible 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 levels 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 as much as possible 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 maintenance of equipment is properly done and operation is 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.
  - 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 till completion of the truck traffic for construction activities.

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)

Operation

In terms of both construction and operation noise and vibration there is no significant impact detected at any of the assessment points. Thus, there is no need for any kind of mitigation measures and no residual impacts expected.

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 60 wind turbines with a hub height of 111m and turbine tip height of up to 180m. Proposed ancillary assets include access roads and two ETLs; one 400 kV single-circuit internal ETL of approximately 13.1 km for connection to existing İzmir Havza Transformer Substation (TS) and one 400kV single-circuit ETL of approximately 123 km for connection to existing Bayramiç Havza TS, which is currently operated by the Turkish Electricity Transmission Corporation (TEIAS). 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 impact, 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 diameter (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).. 18 assessment points have been identified in and around the identified AoIs (Figure 10.1).

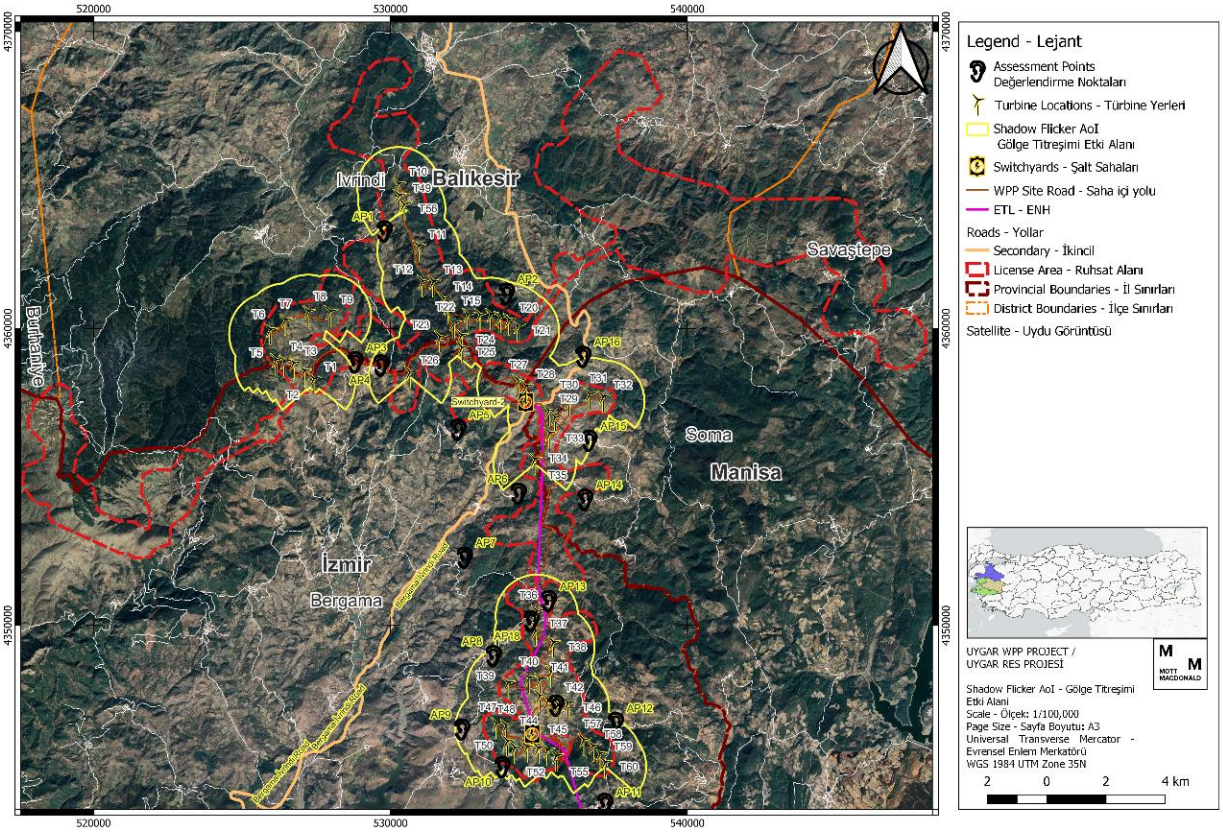


Figure 10.1: Shadow Flicker AoI (θ=260°C)

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.

Level of Sensitivity	**Definition of Sensitivity** (Sensitivity considers the value of receptors and their susceptibility to change)
	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 10.2 below.

Table 10.3: Sensitivity Matrix

		Susceptibility to Change		
		Low	**Medium**	**High**
Value	**Low**	Low	Low/Medium	Medium
	Medium	Low/Medium	Medium	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 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 below.

Table 10.6: Levels of Significance and Typical Descriptors

Level of Significance	**Definition of Descriptors** 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 improvement of views from more sensitive receptors. Adverse – Obvious deterioration of views from low to medium sensitivity receptors or perceptible deterioration of views from more sensitive receptors.
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.

Since, any potential impact from turbines in terms of landscape solely visual and no critical or hazardous impact is expected visually, in any case “Major” impact significance is not expected.

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.

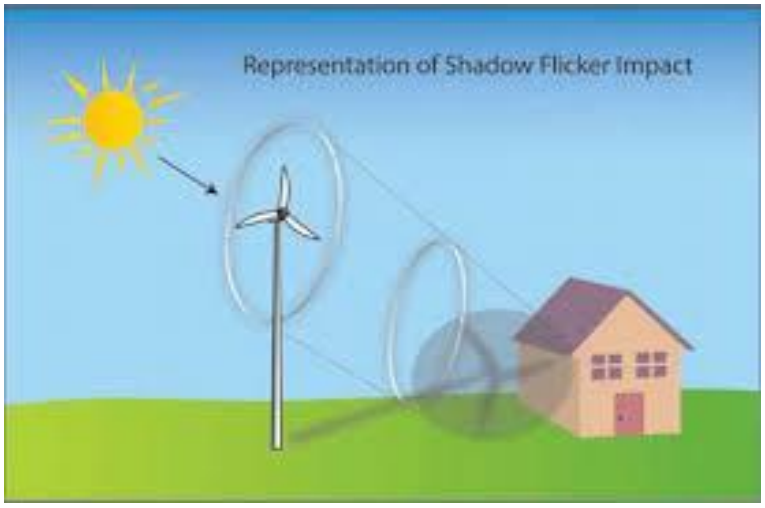


Figure 10.2: Shadow Flicker Representation

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…)

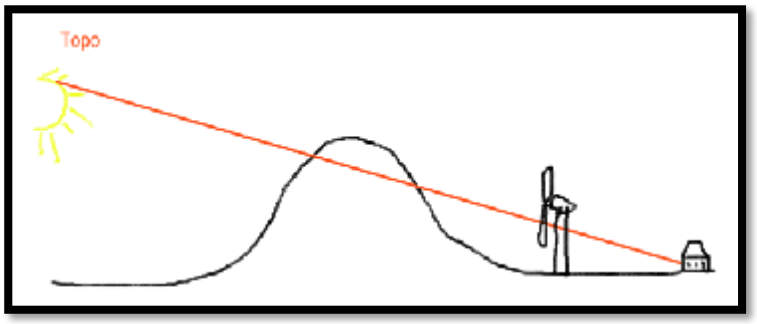


Figure 10.3: Topographic Shadow

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-T60	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[102] data of the project region;

[102] 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.

- The topography of the Project area.

10.3 Baseline Conditions

During field trips and spatial surveys landscape identification conducted for current situation around planned facility 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 rocky mountainous areas.
- As a consequence of the hilly terrain, very close distances can be shadowed by terrain fluctuations.

During filed trips none of the followings; recognised viewpoint locations, UNESCO sites, landscape fabric/ character/ designations are observed.

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.

10.3.2 Visual Amenity

The initial baseline analysis undertaken in country identified a 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: Assessment Points of the Project

Assessment Points	Representative Measurement Points	Description	Comments	Extent	Sensitivity	Importance
AP 1	1	View looking east and south across intervening vegetation, over rising ground towards mountain peaks and ridgelines.	Residential Building	Local	Medium	Medium
AP 2	2	View looking west and south across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 3	3	View looking west, north and south across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 4	3	View looking west, north and south across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 5	3	View looking west, north and south across intervening vegetation, over rising ground	Residential Building	Local	Medium	Medium

Assessment Points	Representative Measurement Points	Description	Comments	Extent	Sensitivity	Importance
		towards mountain peaks and ridgelines				
AP 6	3	View looking north and south across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Site	Medium	Medium
AP 7	5	View looking north and south across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 8	5	View looking north and south across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 9	5	View looking north and east across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 10	5	View looking north and east across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Site	Medium	Medium
AP 11	6	View looking north across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 12	6	View looking west across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 13	5	View looking north and south across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 14	4	View looking west across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 15	4	View looking west across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 16	4	View looking west across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 17	4	View looking north and south across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium
AP 18	4	View looking east and south across intervening vegetation, over rising ground towards mountain peaks and ridgelines	Residential Building	Local	Medium	Medium

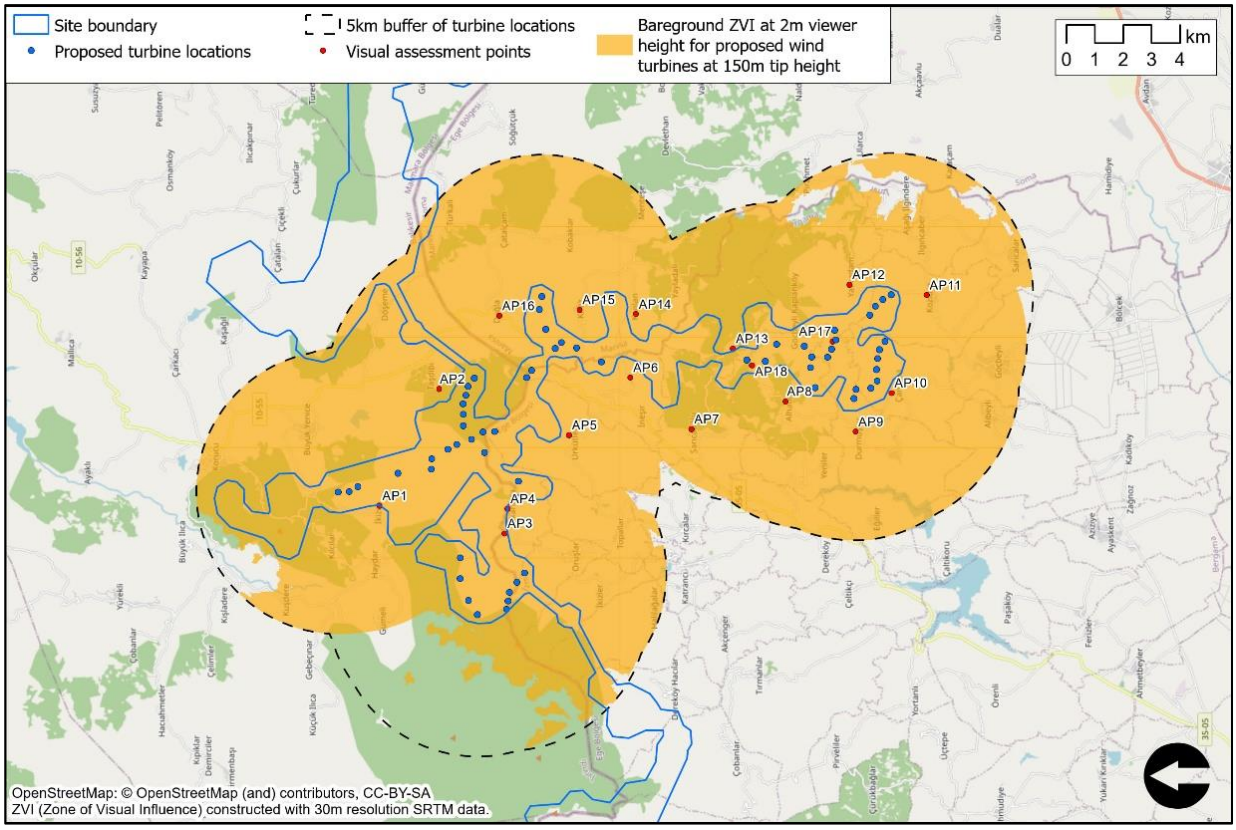


Figure 10.5: Operational ZVI

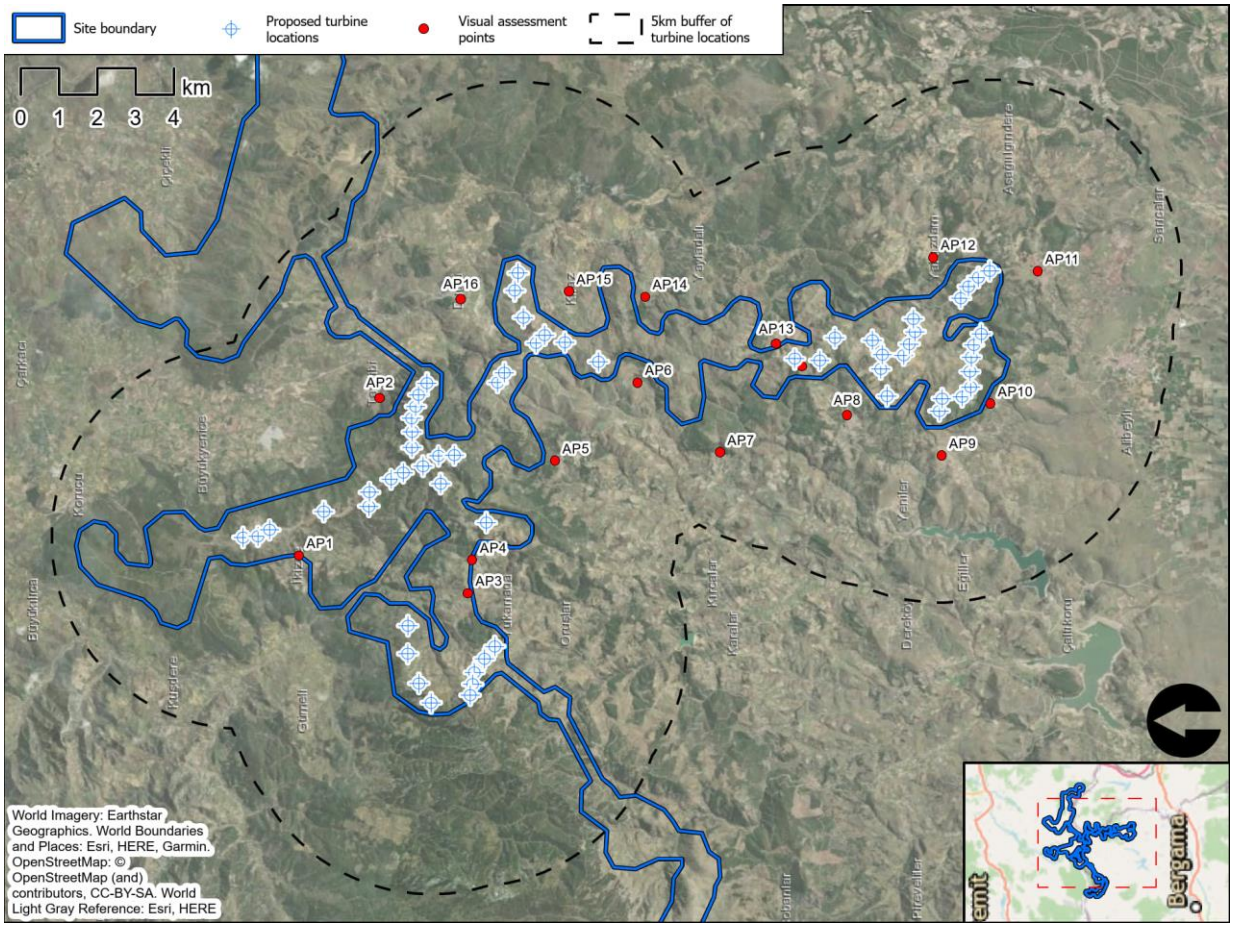


Figure 10.6: Representative Visual Receptor Viewpoint Locations

10.4 Impact Assessment

Limiting values guided by World Bank Group 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 10.7 shows the shadow flicker occurrence periods according to a real case scenario.

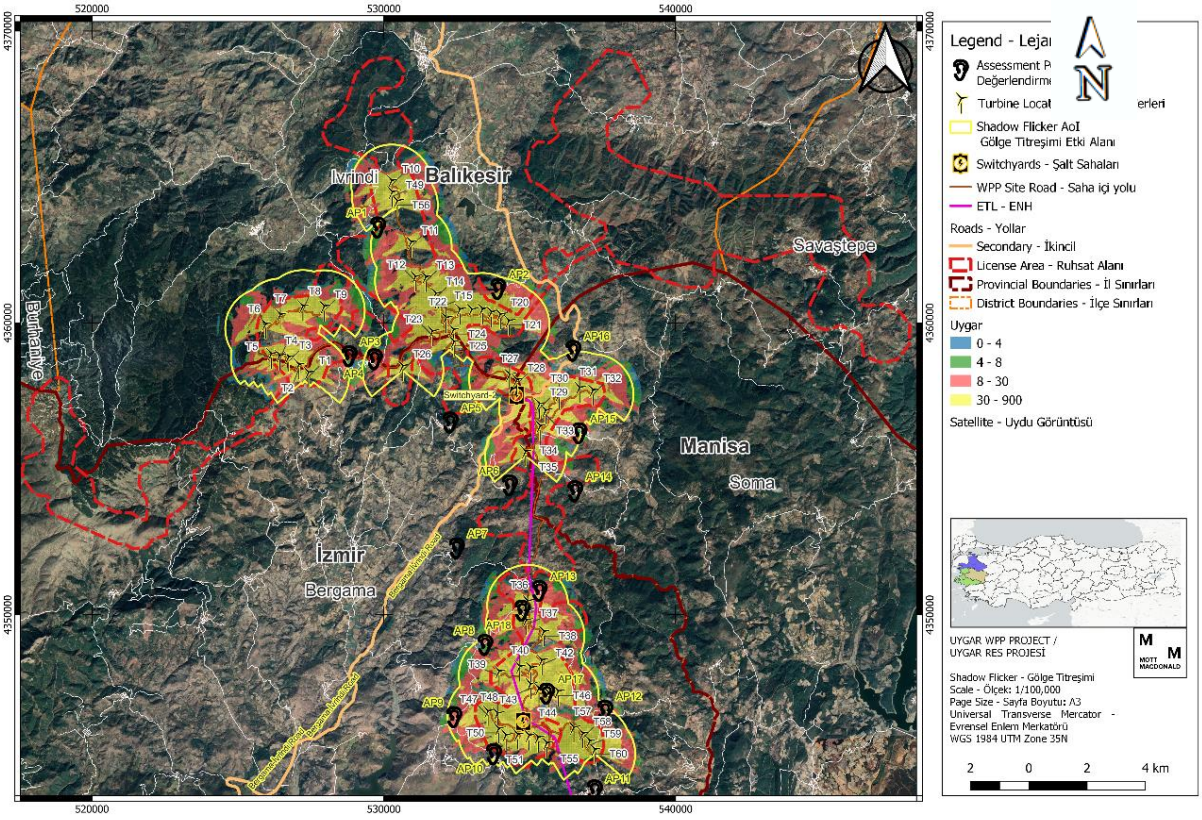


Figure 10.7: Shadow Flicker Occurrence Map, Real Case, Hours per Year

Below Table 10-9 shows point calculation results and assessment for shadow flicker according to worst case scenario. Accordingly, at some 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	12:14	30:00	00:25	00:30	No Impact
2	00:00	30:00	00:00	00:30	No Impact
3	09:02	30:00	00:21	00:30	No Impact
4	16:56	30:00	00:31	00:30	Possible 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
8	12:18	30:00	00:22	00:30	No Impact
9	11:47	30:00	00:20	00:30	No Impact
10	00:00	30:00	00:00	00:30	No Impact
11	00:00	30:00	00:00	00:30	No Impact
12	00:00	30:00	00:00	00:30	No Impact
13	64:12	30:00	00:49	00:30	Possible Impact
14	00:00	30:00	00:00	00:30	No Impact

Assessment Point	Worst-case hours per year	Limit, Hours	Worst affected day hours per day	Limit, Minutes	Impact
15	00:00	30:00	00:00	00:30	No Impact
16	00:00	30:00	00:00	00:30	No Impact
17	690:55	30:00	04:21	00:30	Possible Impact
18	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.

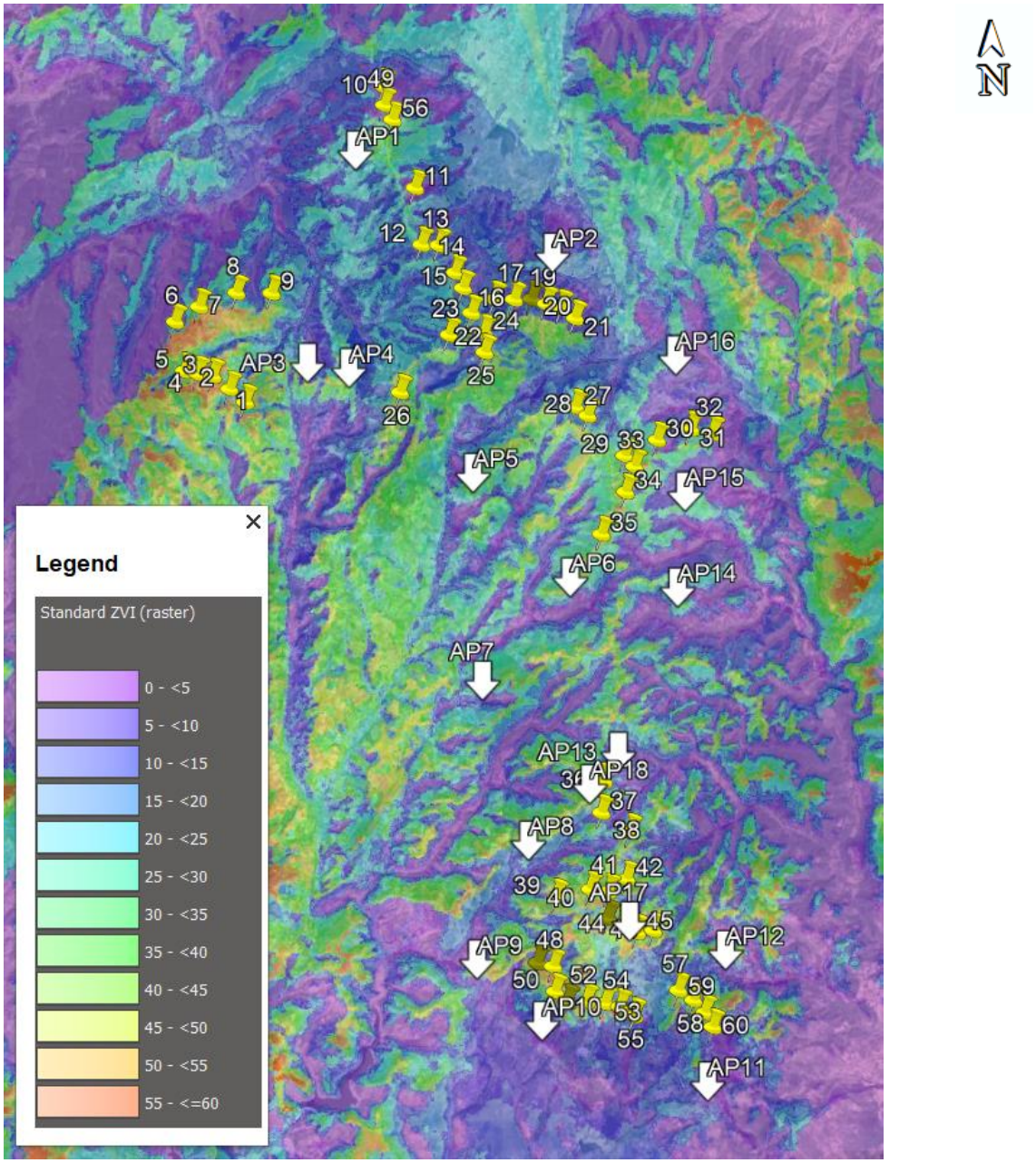


Figure 10.8: Turbine Visibility Map, (0=No visible turbine, 1-10=n turbines visible)

Below Table 10.10 shows the visible turbine quantities for each receptor.

Table 10.10: Turbine Visibility Census per Receptor

Assessment Point	Number of Visible Turbines	Final Impact
1	20-25	Negligible/Minor
2	10-15	Negligible/Minor
3	45-50	Negligible/Minor
4	40-45	Negligible/Minor
5	35-40	Negligible/Minor
6	10-15	Negligible/Minor
7	5-10	Negligible/Minor
8	20-25	Negligible/Minor
9	10-15	Negligible/Minor
10	0-5	Negligible/Minor
11	0-5	Negligible/Minor
12	5-10	Negligible/Minor
13	10-15	Negligible/Minor
14	25-30	Negligible/Minor
15	15-20	Negligible/Minor
16	0-5	Negligible/Minor
17	50-55	Negligible/Minor
18	45-50	Negligible/Minor

Theoretical relative visibility of the turbines from identified receivers are rendered on satellite images and presented in figures Figure 10.27 to Figure 10.38..

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 noticeable change to the landscape such that the magnitude of landscape impact is considered to be moderate adverse, and, taking into account the medium landscape sensitivity that has been identified, the overall significance of landscape effect during operation is considered to be negligible to 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 noticeable change to views such that the magnitude of visual impact is considered to be 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 negligible to minor adverse.

Figure 10.9 to Figure 10.26 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, south and north of the project such that views to the project are facing in west, east, north, and south. Given the other WPPs identified are south of the project 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.

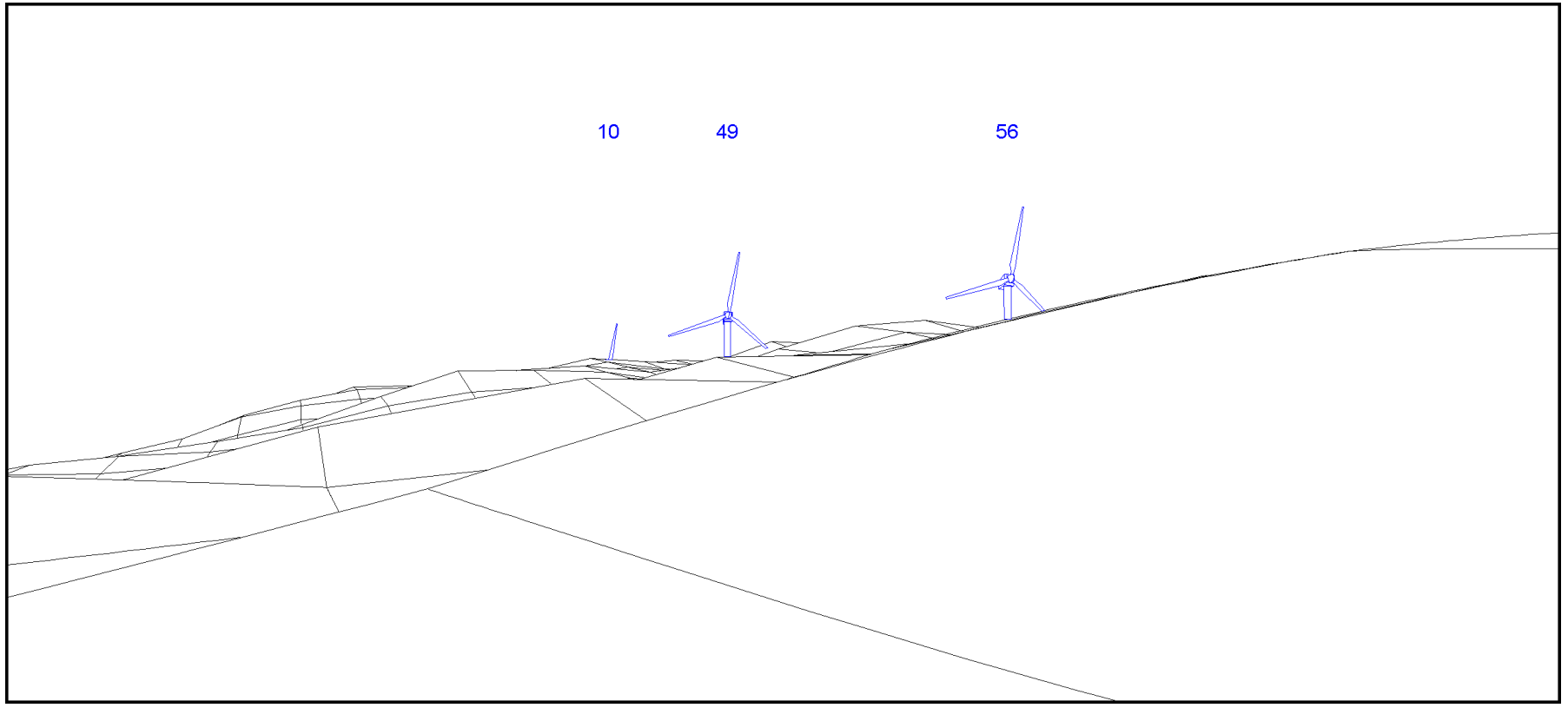


Figure 10.9: AP1 Proposed Wireline during Operation. View direction to Site Centre: 28.2°; Coordinates X: 529,796; Y: 4,363,270; Pitch: 10°.

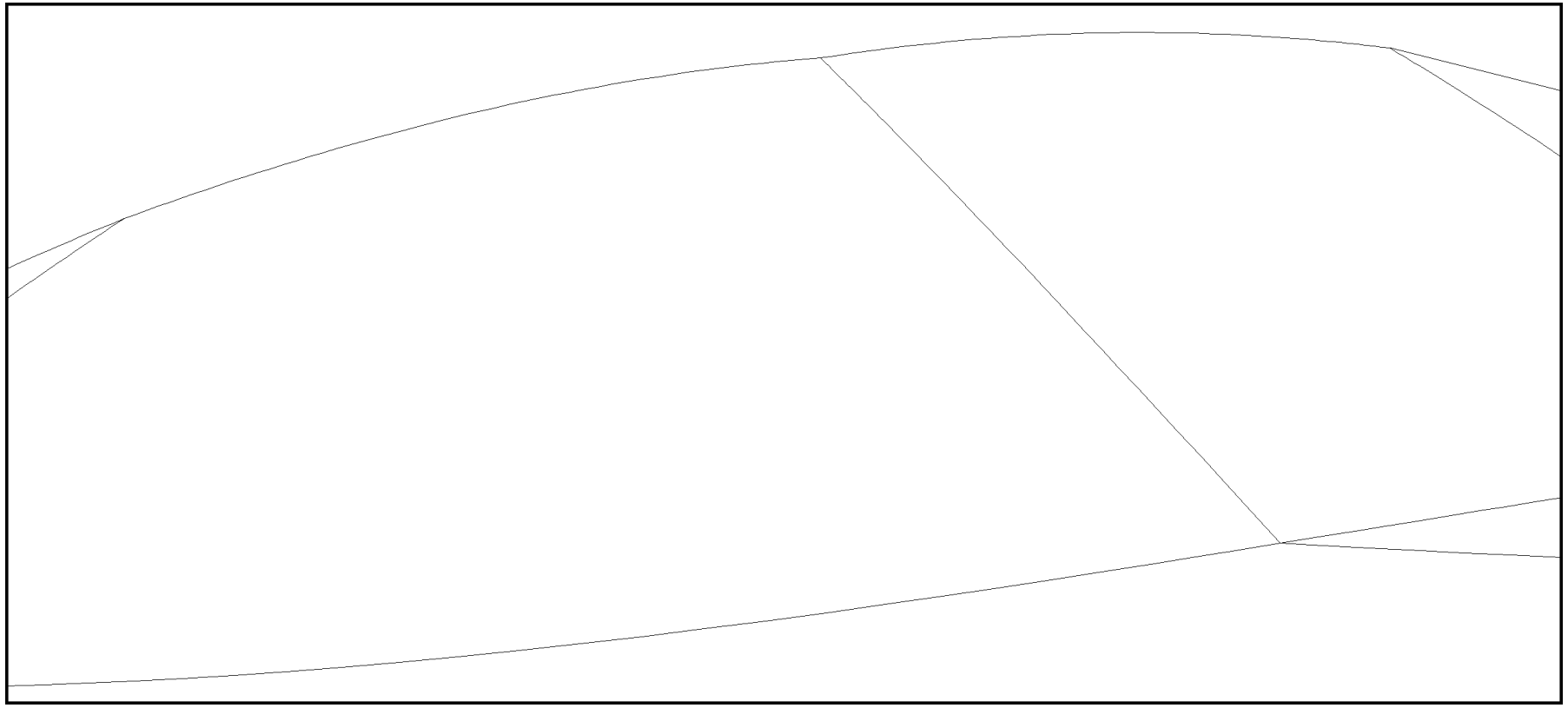


Figure 10.10: AP2 Proposed Wireline during Operation. View direction to Site Centre: 188.2°; Coordinates X: 533,912; Y: 4,361,166; Pitch: 10°.

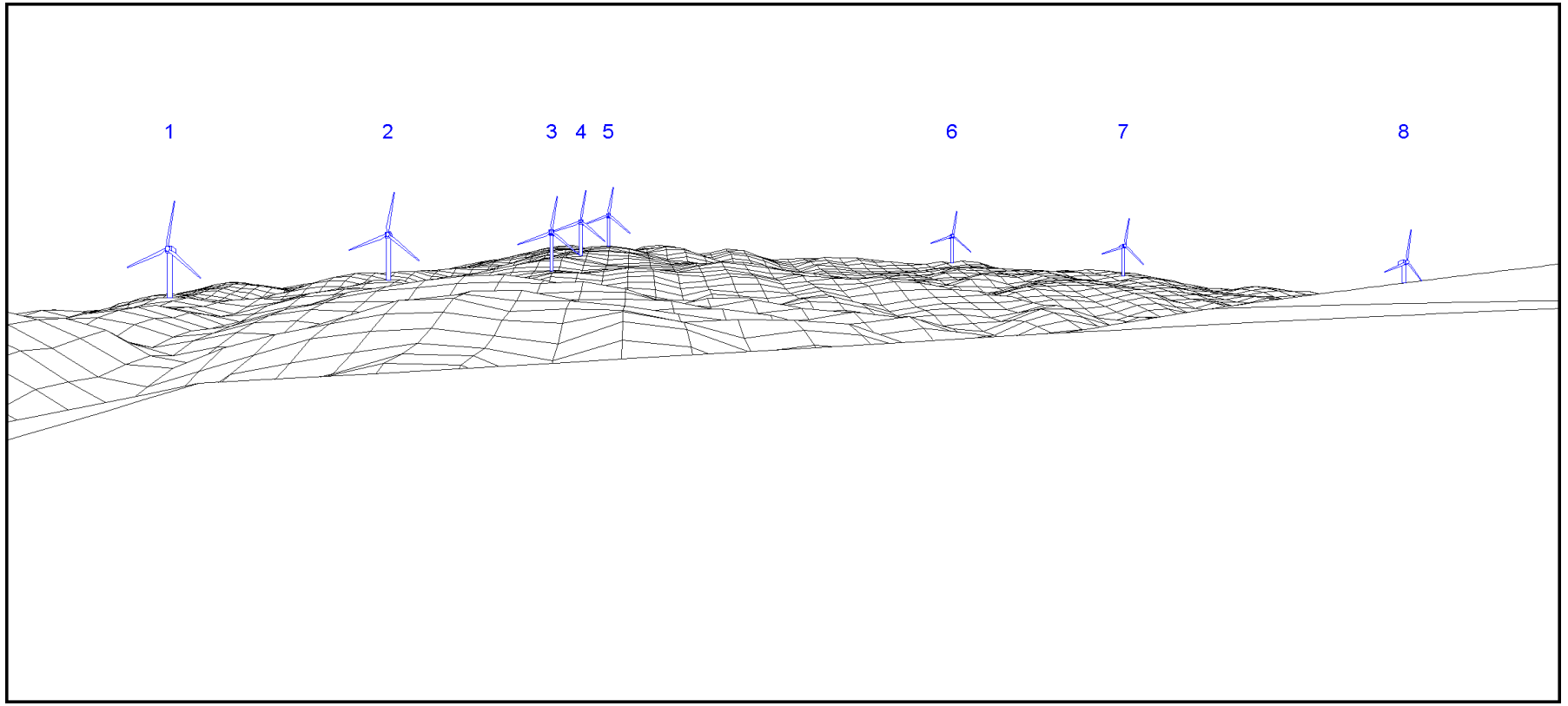


Figure 10.11: AP3 Proposed Wireline during Operation. View direction to Site Centre: 278.8°; Coordinates X: 528,815; Y: 4,358,857; Pitch: 0°.

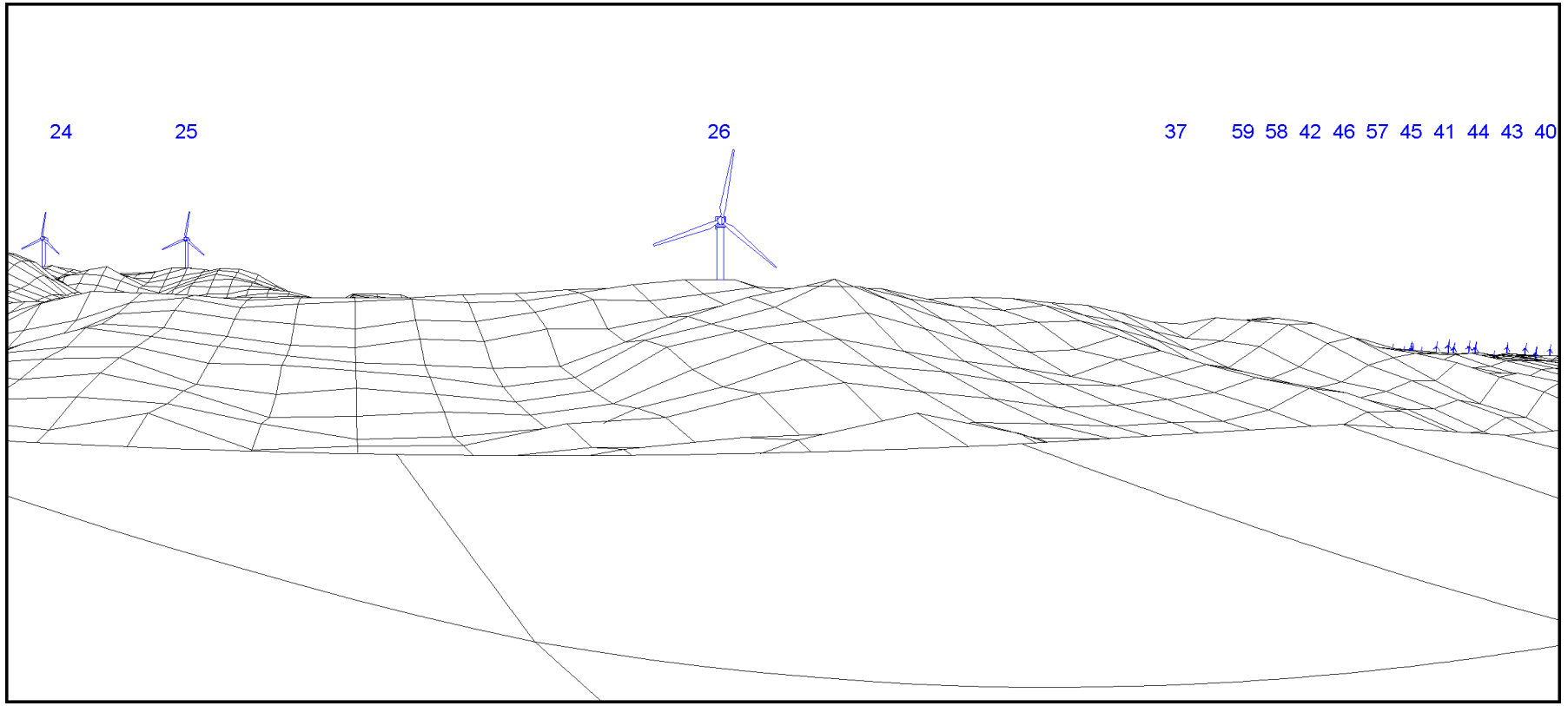


Figure 10.12: AP4 Proposed Wireline during Operation. View direction to Site Centre: 115°; Coordinates X: 529,684; Y: 4,358,753; Pitch: 0°.

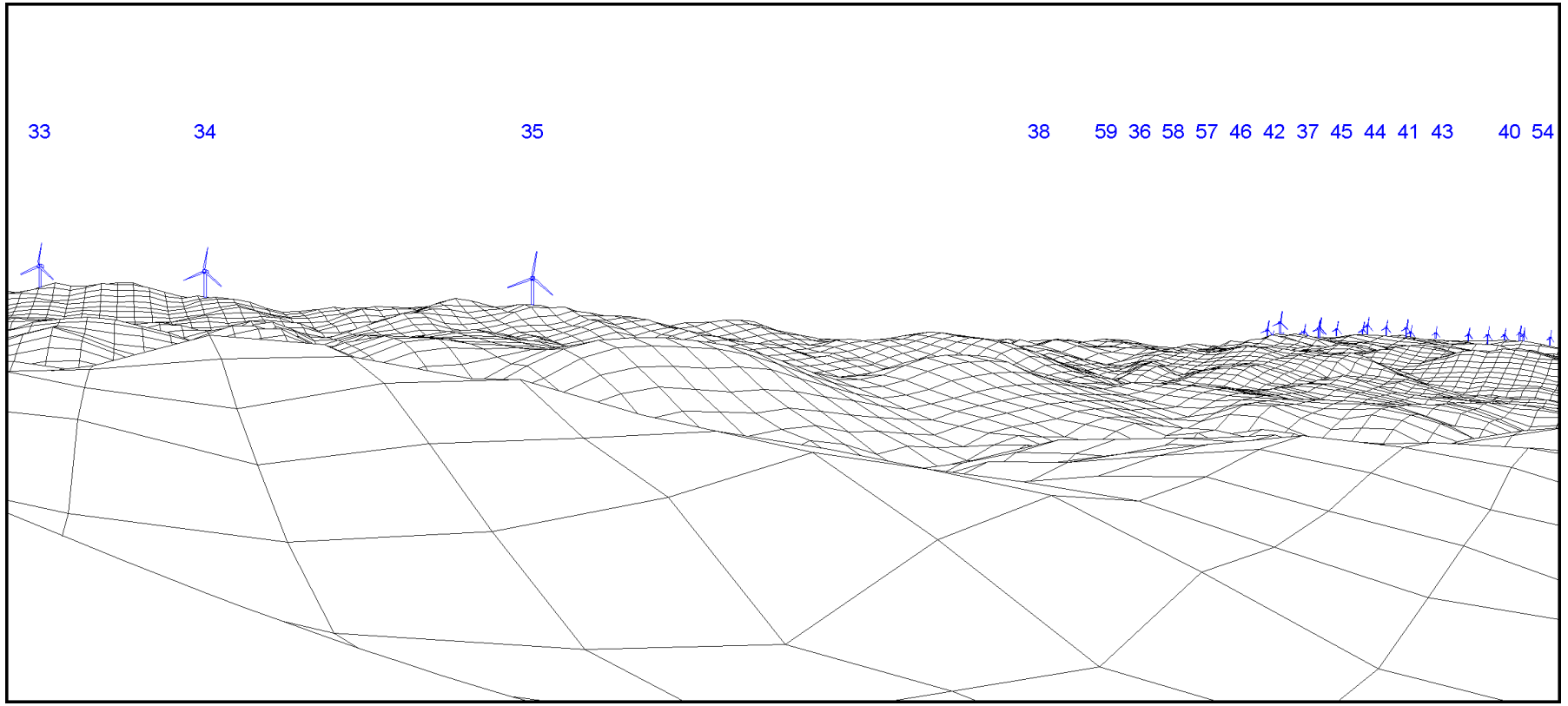


Figure 10.13: AP5 Proposed Wireline during Operation. View direction to Site Centre: 128.3°; Coordinates X: 532,276; Y: 4,356,588; Pitch: 0°.

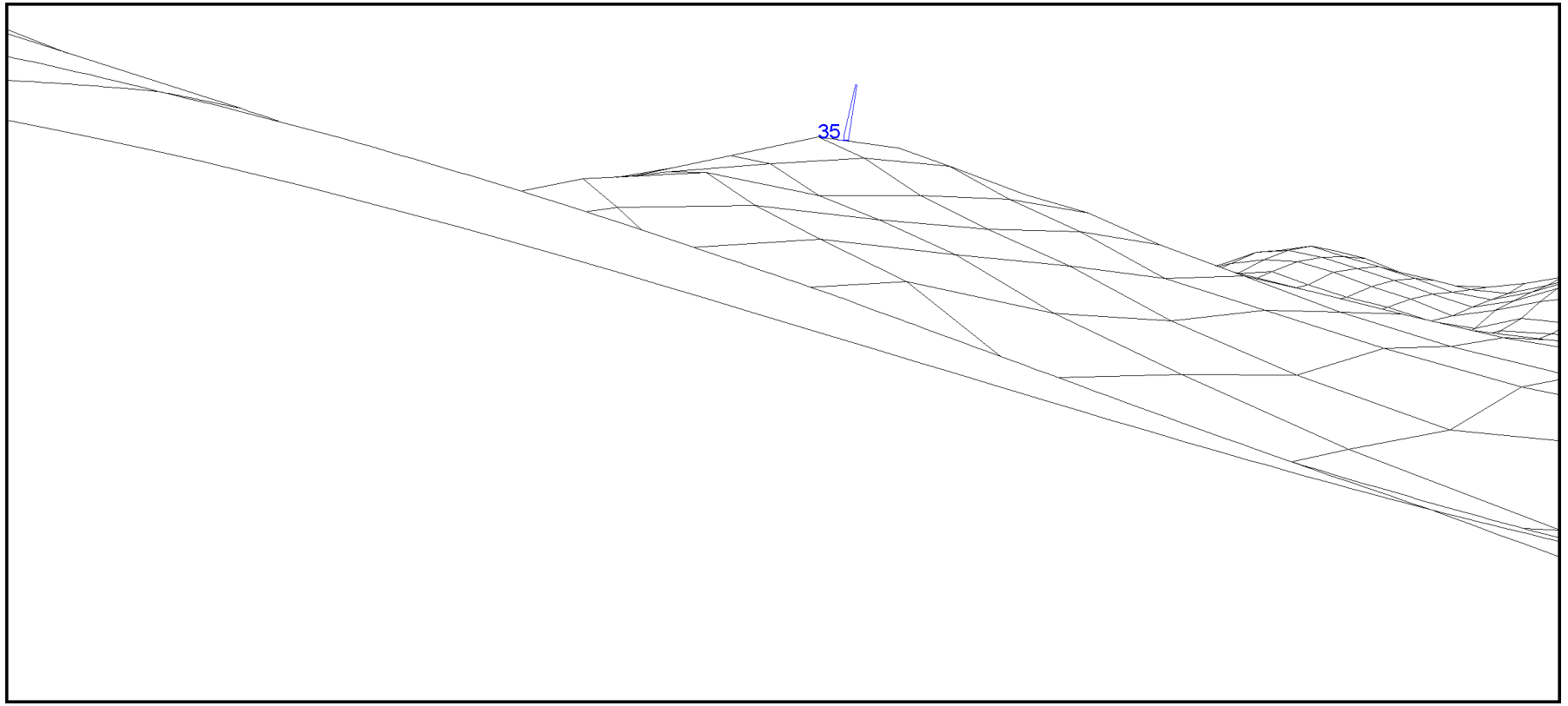


Figure 10.14: AP6 Proposed Wireline during Operation. View direction to Site Centre: 24.7°; Coordinates X: 534,314; Y: 4,354,431; Pitch: 0°.

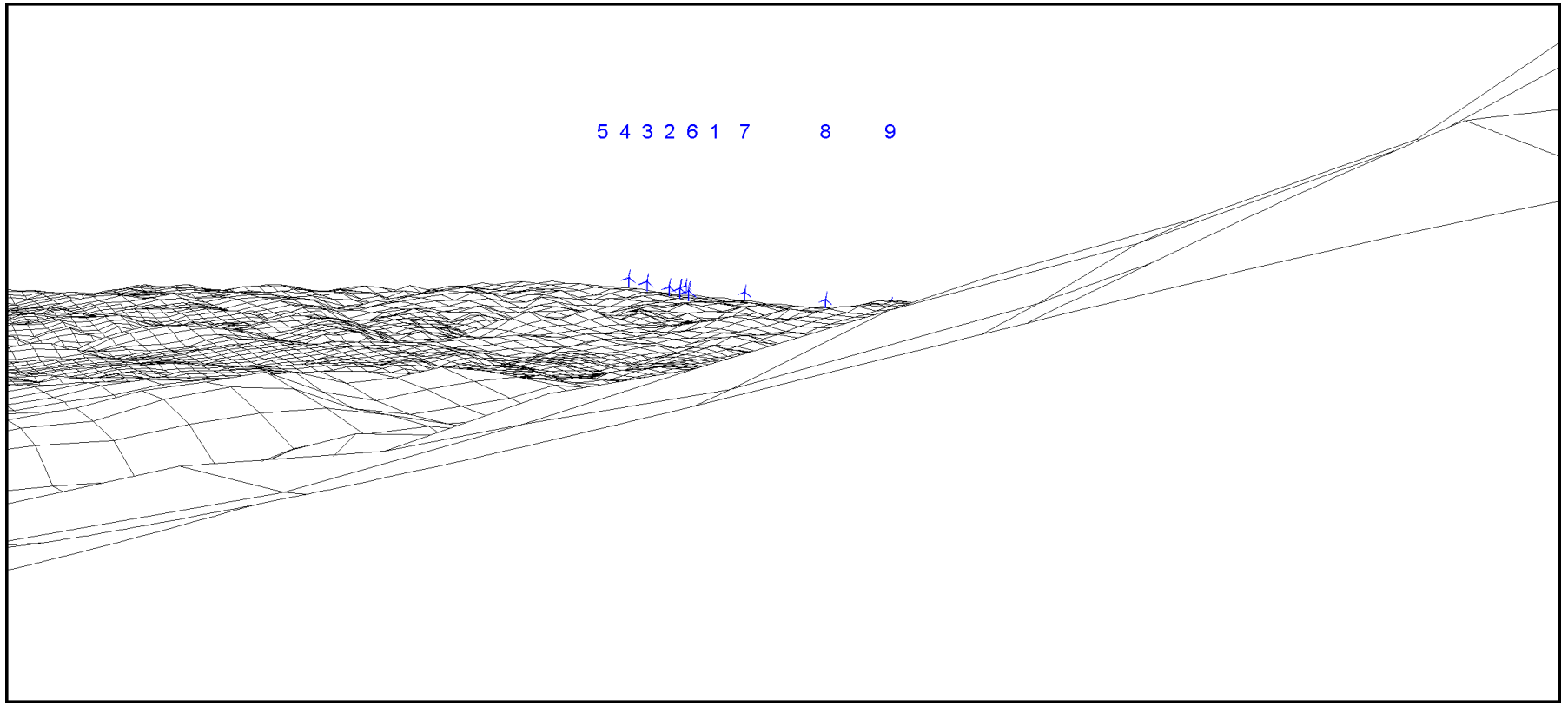


Figure 10.15: AP7 Proposed Wireline during Operation. View direction to Site Centre: 324.7°; Coordinates X: 532,495; Y: 4,352,280; Pitch: 0°.

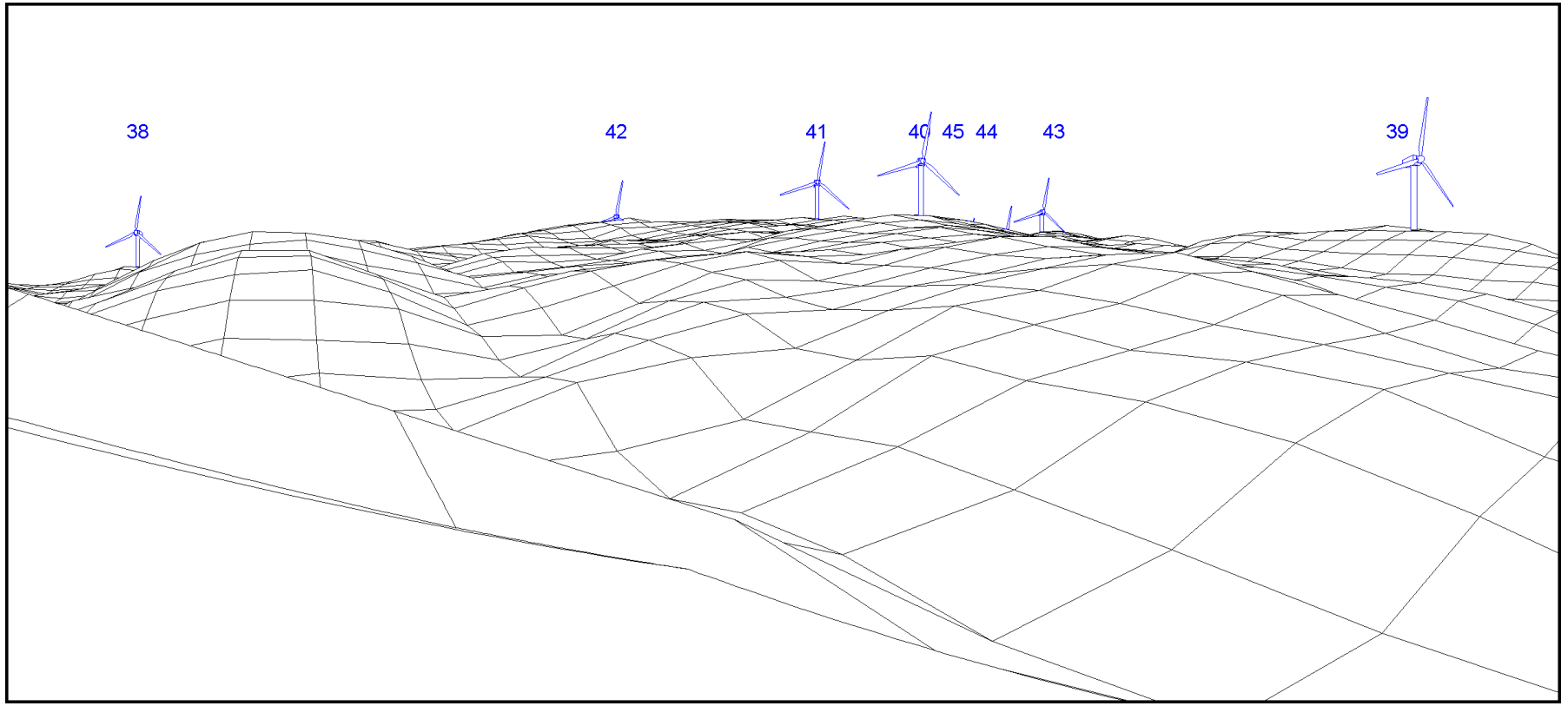


Figure 10.16: AP8 Proposed Wireline during Operation. View direction to Site Centre: 118.5°; Coordinates X: 533,467; Y: 4,348,964; Pitch: 0°

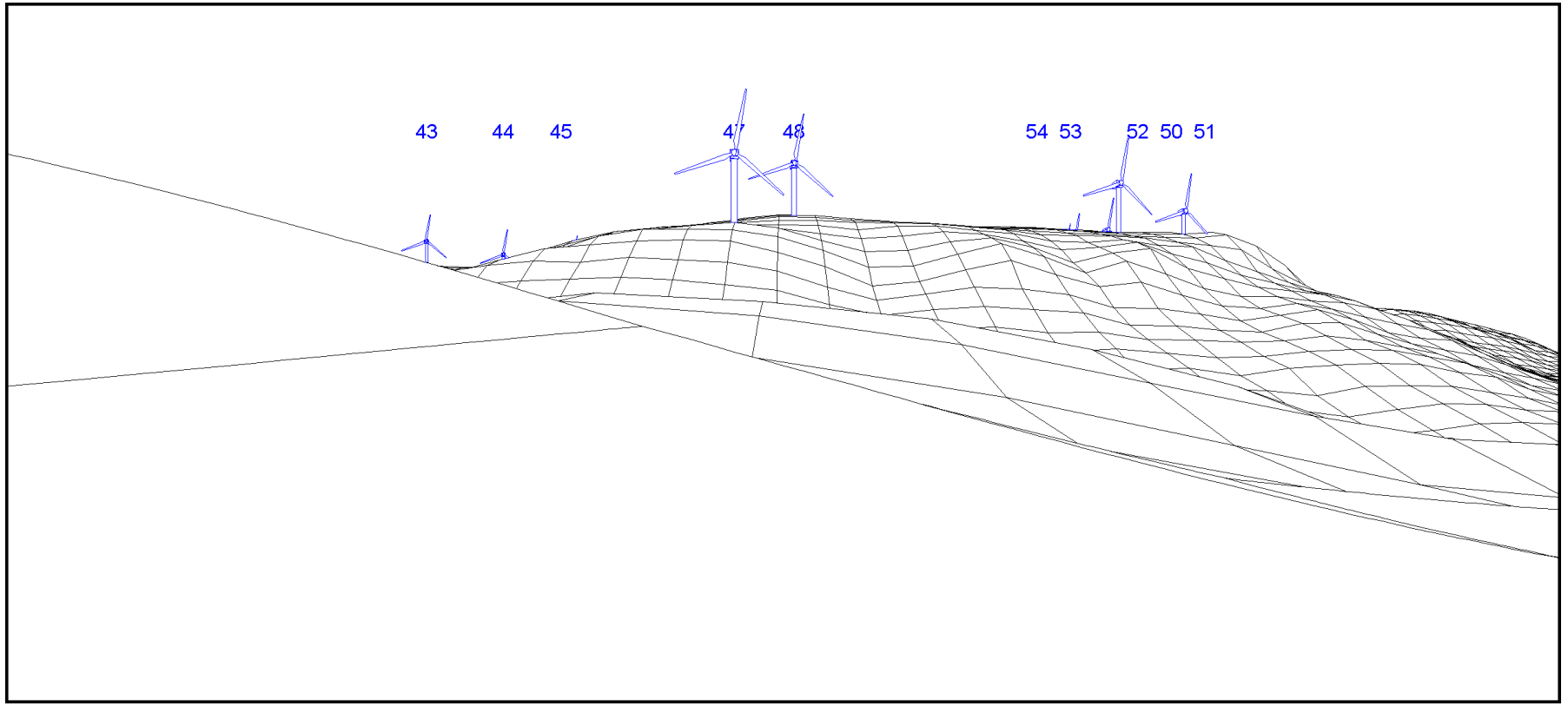


Figure 10.17: AP9 Proposed Wireline during Operation. View direction to Site Centre: 90°; Coordinates X: 532,408; Y: 4,346,494; Pitch: 0°.

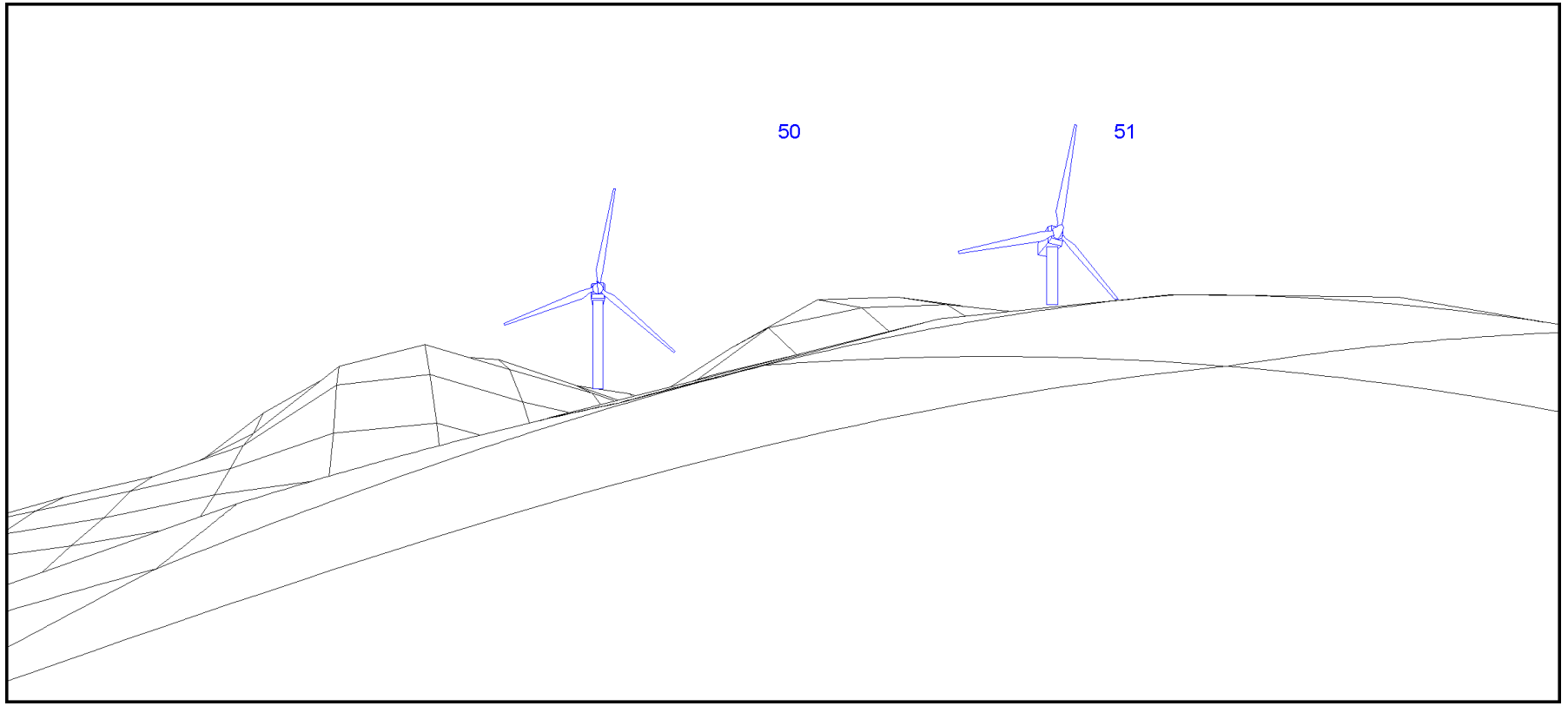


Figure 10.18: AP10 Proposed Wireline during Operation. View direction to Site Centre: 24°; Coordinates X: 533,767; Y: 4,345,222; Pitch: 20°.

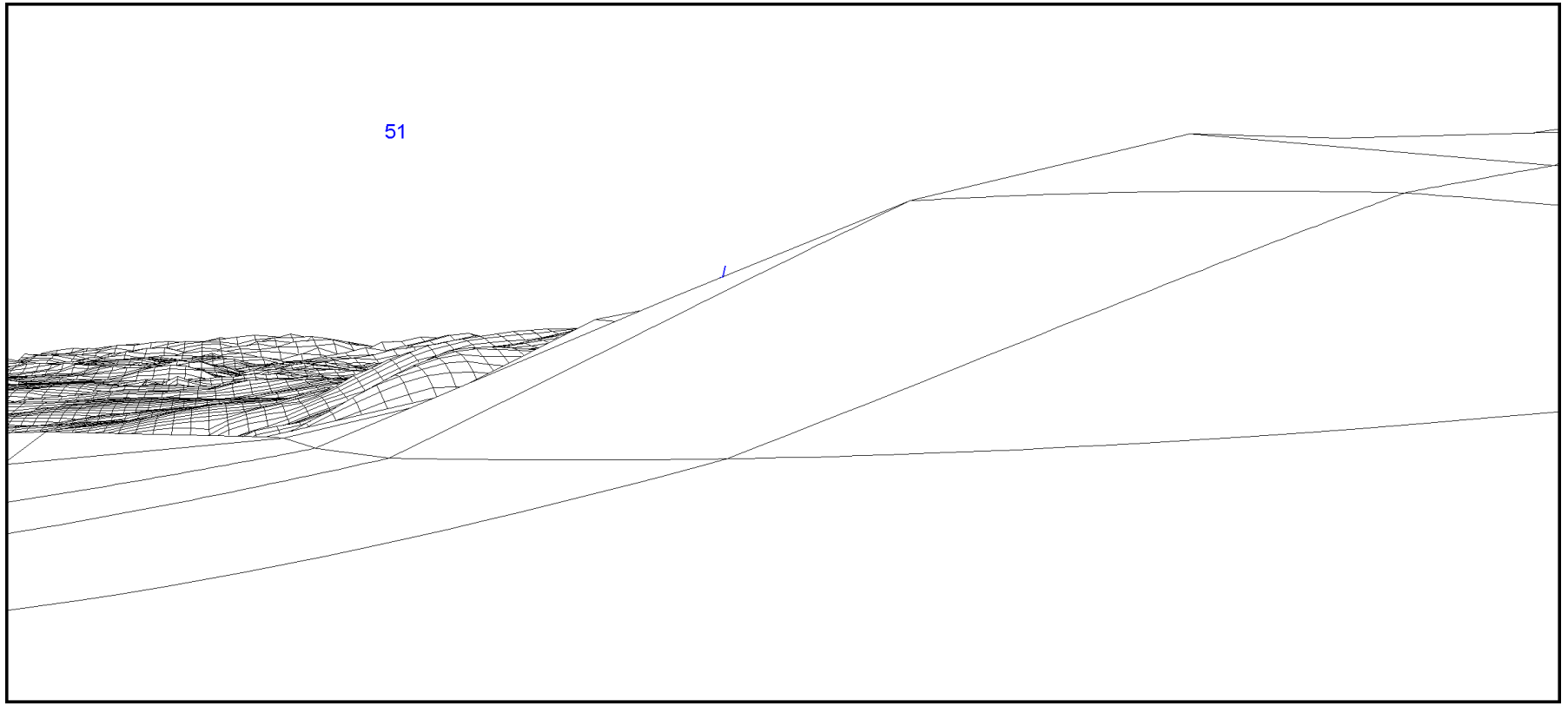


Figure 10.19: AP11 Proposed Wireline during Operation. View direction to Site Centre: 303.5°; Coordinates X: 537,224; Y: 4,343,986; Pitch: 0°.

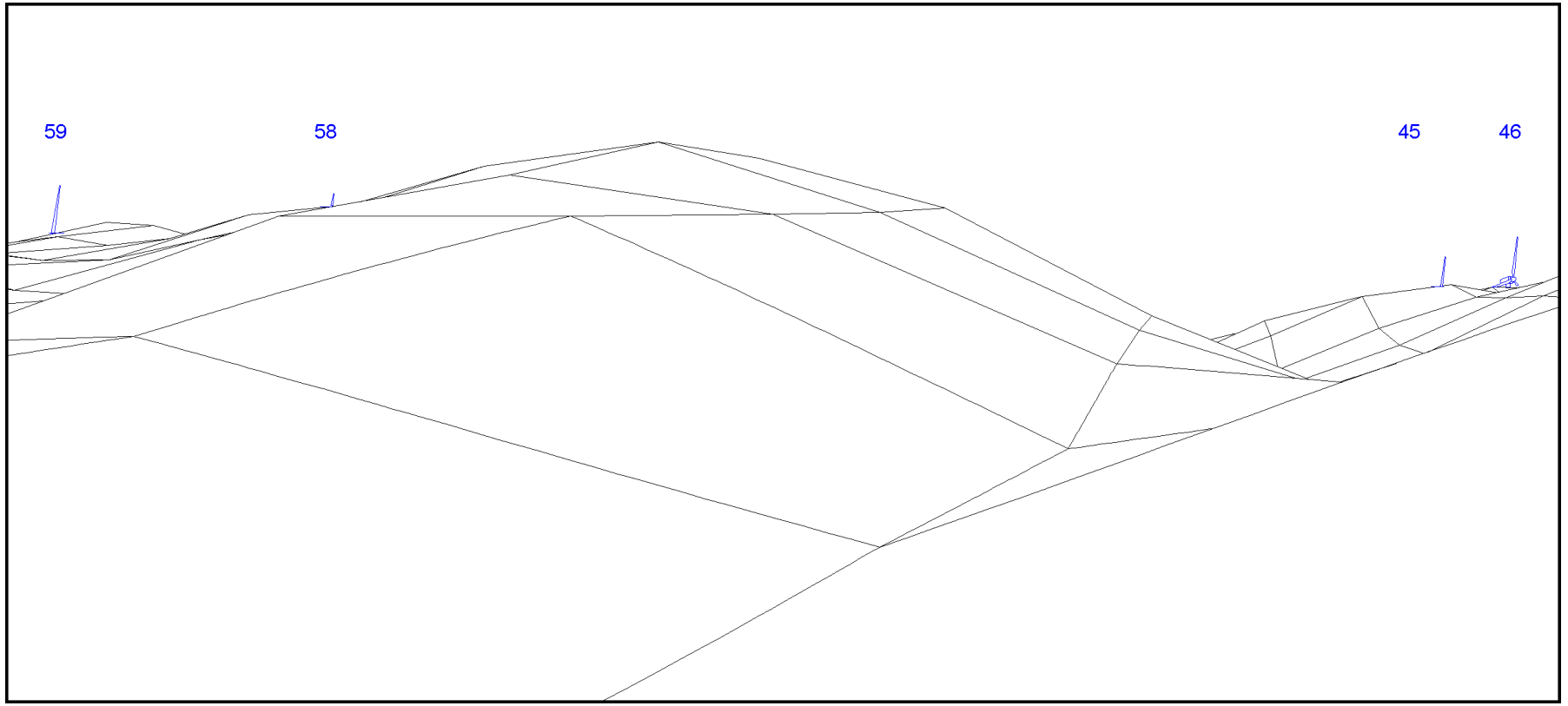


Figure 10.20: AP12 Proposed Wireline during Operation. View direction to Site Centre: 246°; Coordinates X: 537,583; Y: 4,346,711; Pitch: 5°.

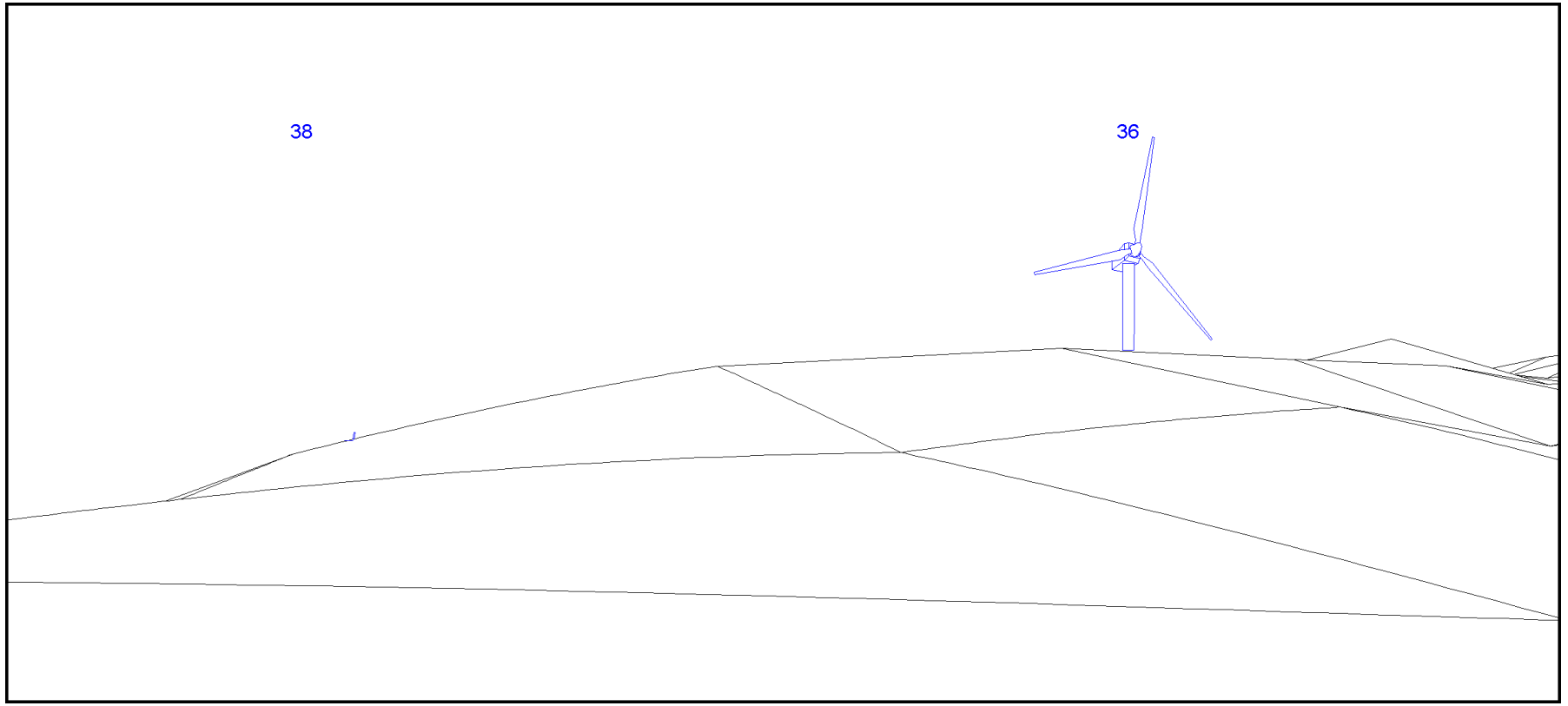


Figure 10.21: AP13 Proposed Wireline during Operation. View direction to Site Centre: 199.4°; Coordinates X: 535,332; Y: 4,350,815; Pitch: 15°

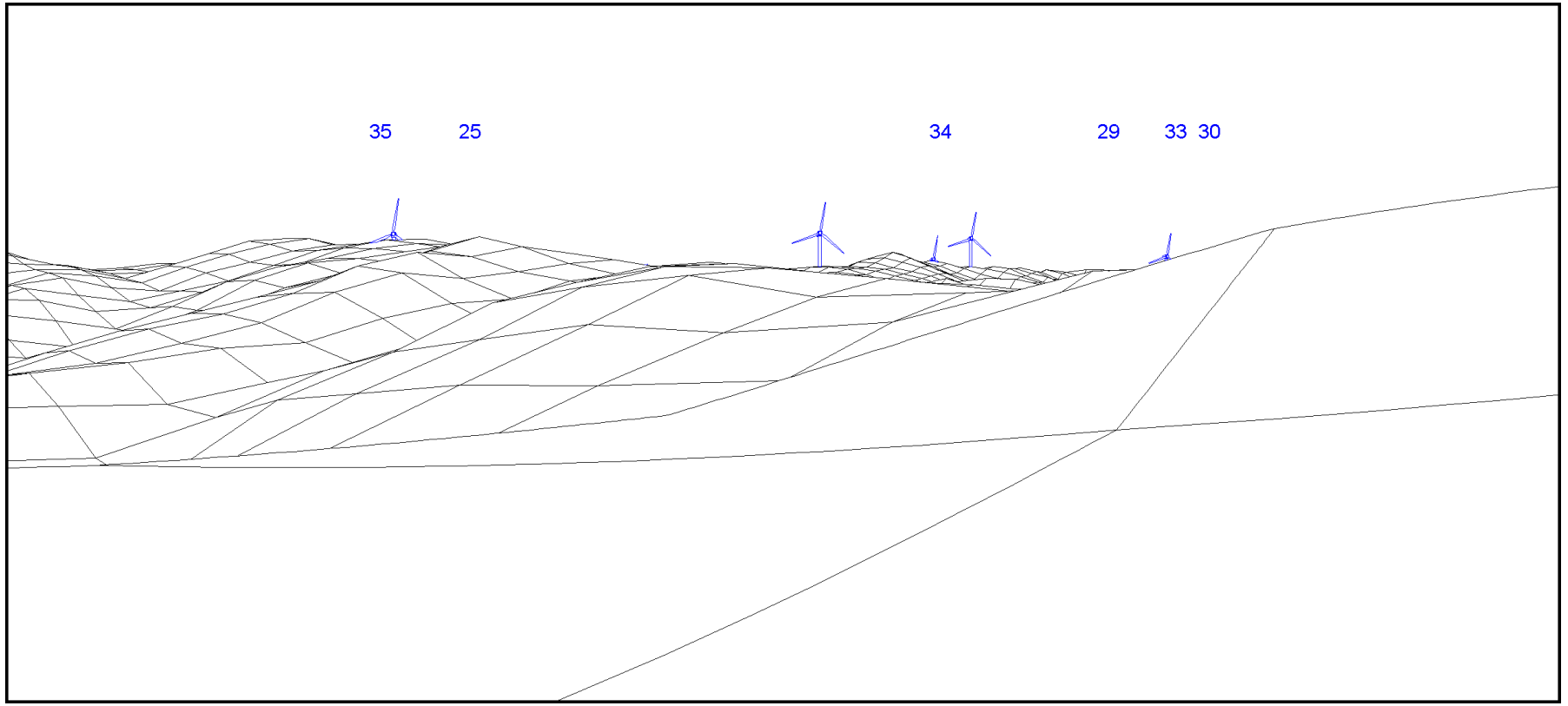


Figure 10.22: AP14 Proposed Wireline during Operation. View direction to Site Centre: 328.2°; Coordinates X: 536,554; Y: 4,354,232; Pitch: 0°.

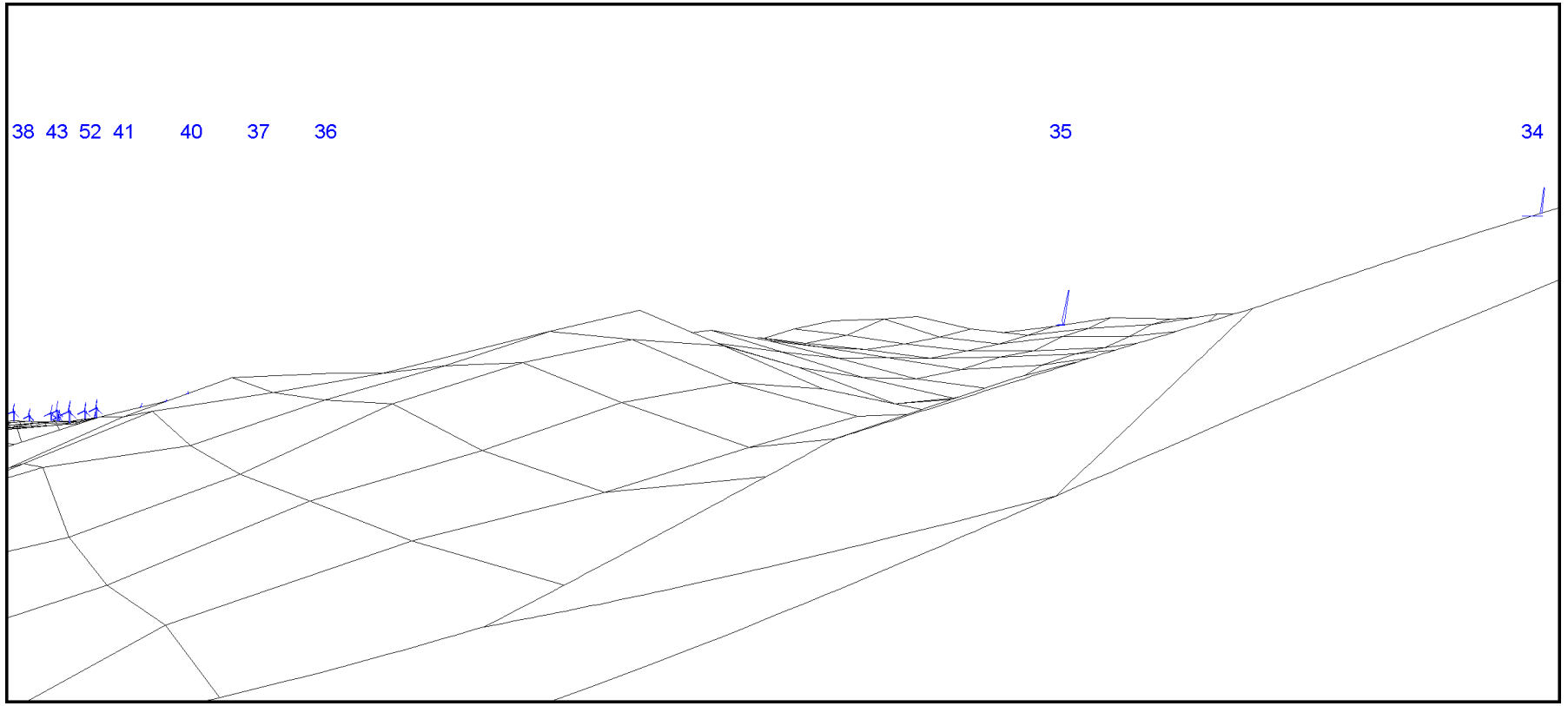


Figure 10.23: AP15 Proposed Wireline during Operation. View direction to Site Centre: 231.2°; Coordinates X: 536,697; Y: 4,356,220; Pitch: 0°.

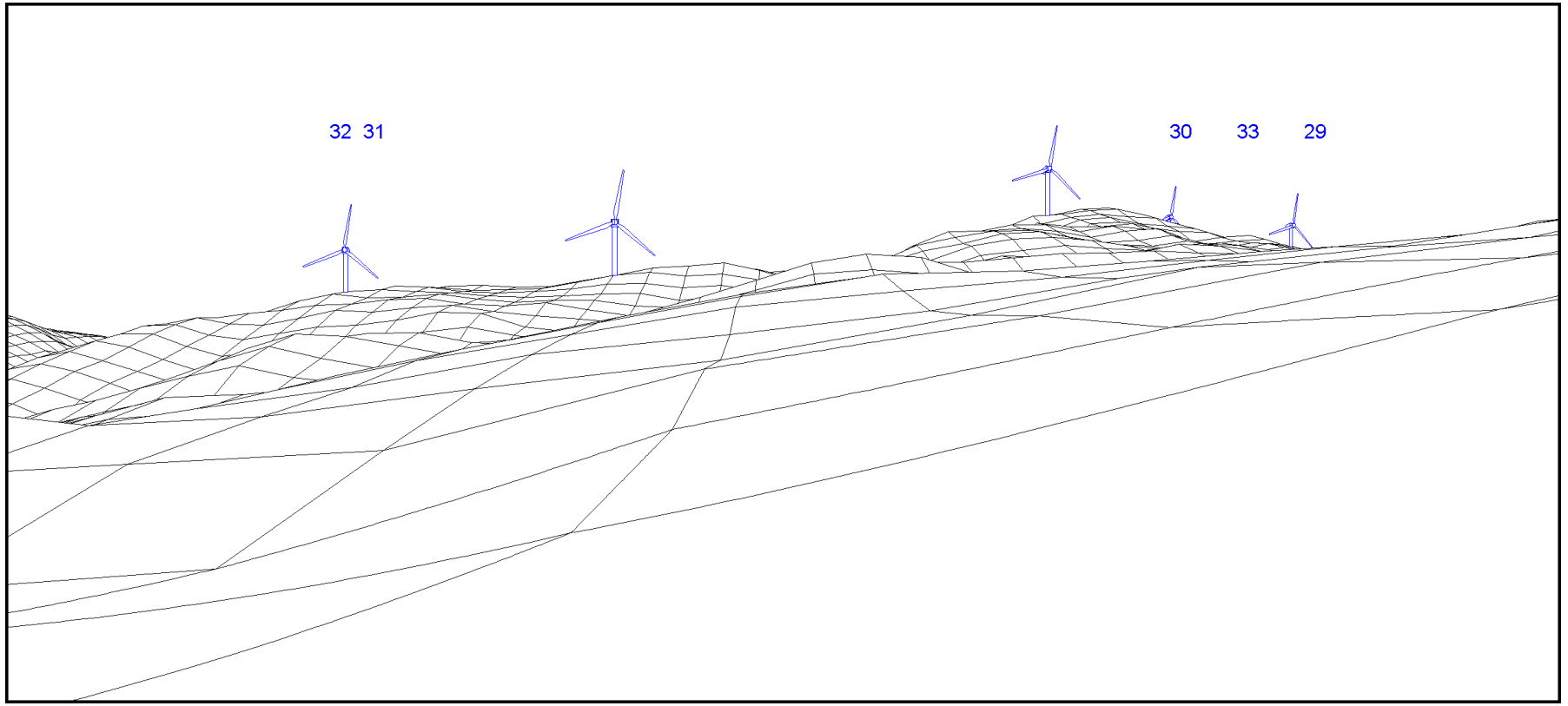


Figure 10.24: AP16 Proposed Wireline during Operation. View direction to Site Centre: 181°; Coordinates X: 536,491; Y: 4,359,045; Pitch: 0°.

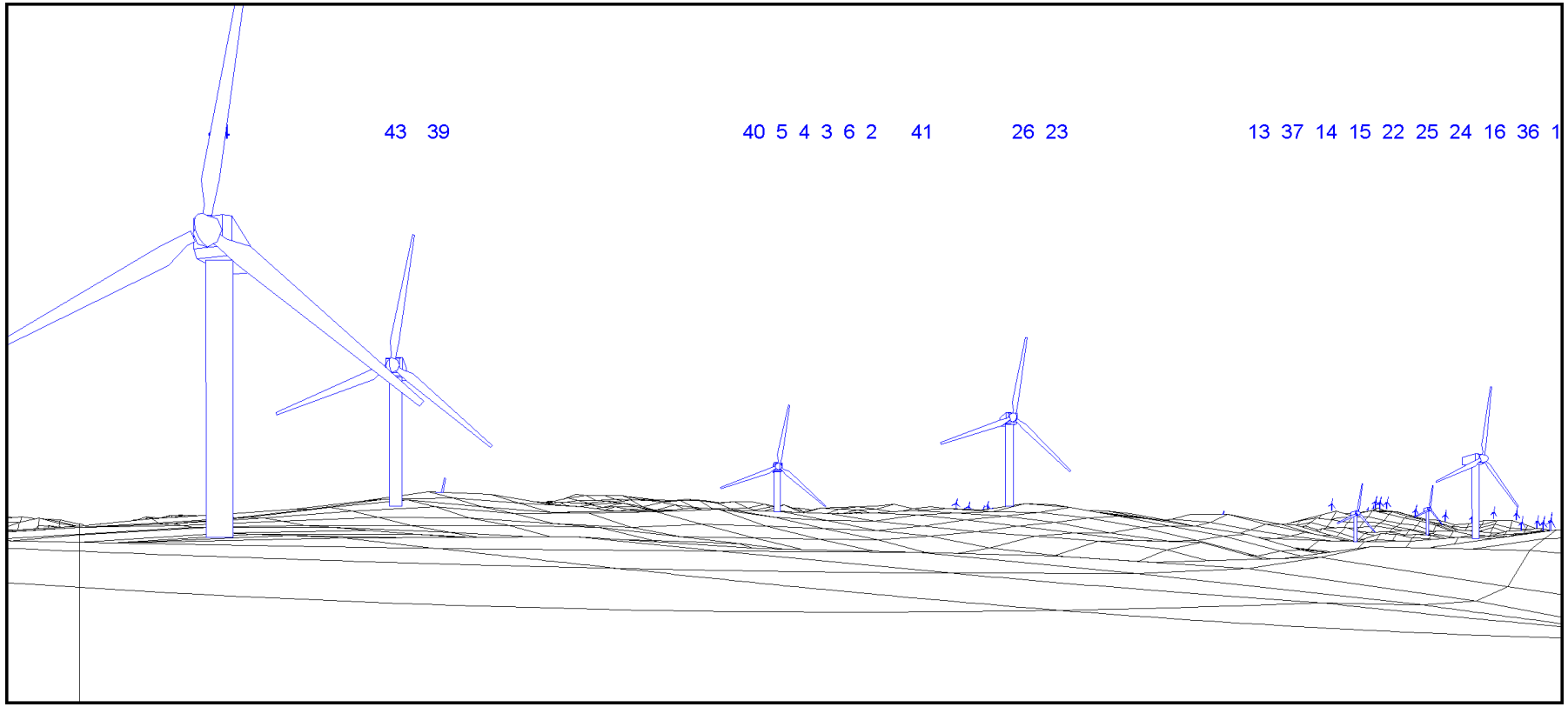


Figure 10.25: AP17 Proposed Wireline during Operation. View direction to Site Centre: 310.7°; Coordinates X: 535,583; Y: 4,347,300; Pitch: 10°

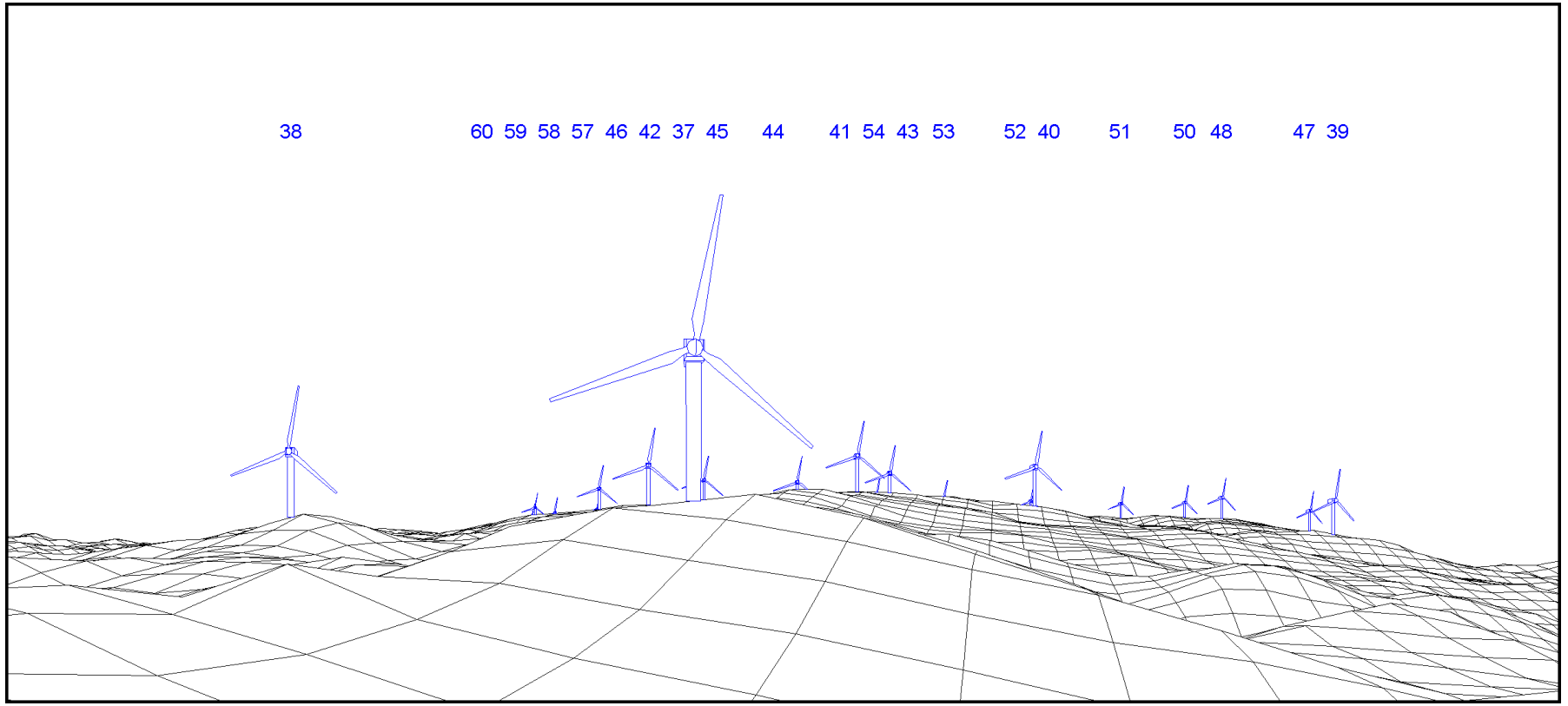


Figure 10.26: AP18 Proposed Wireline during Operation. View direction to Site Centre: 167.6°; Coordinates X: 534,740; Y: 4,350,141; Pitch: 10°

The satellite view of turbines at the assessment points are presented in Figure 10.27 to Figure 10.38.

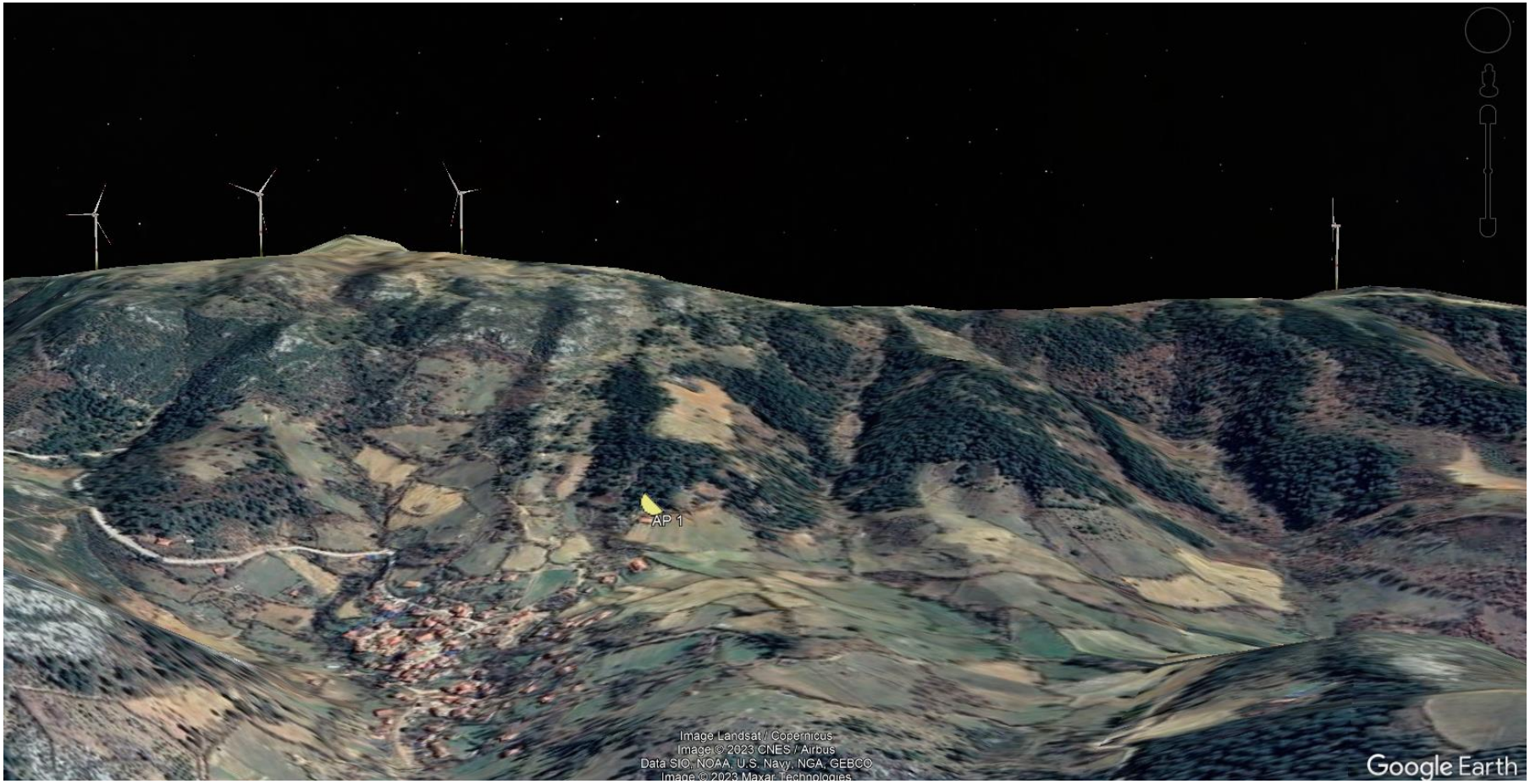


Figure 10.27: Turbine Visibility at Assessment Point 1

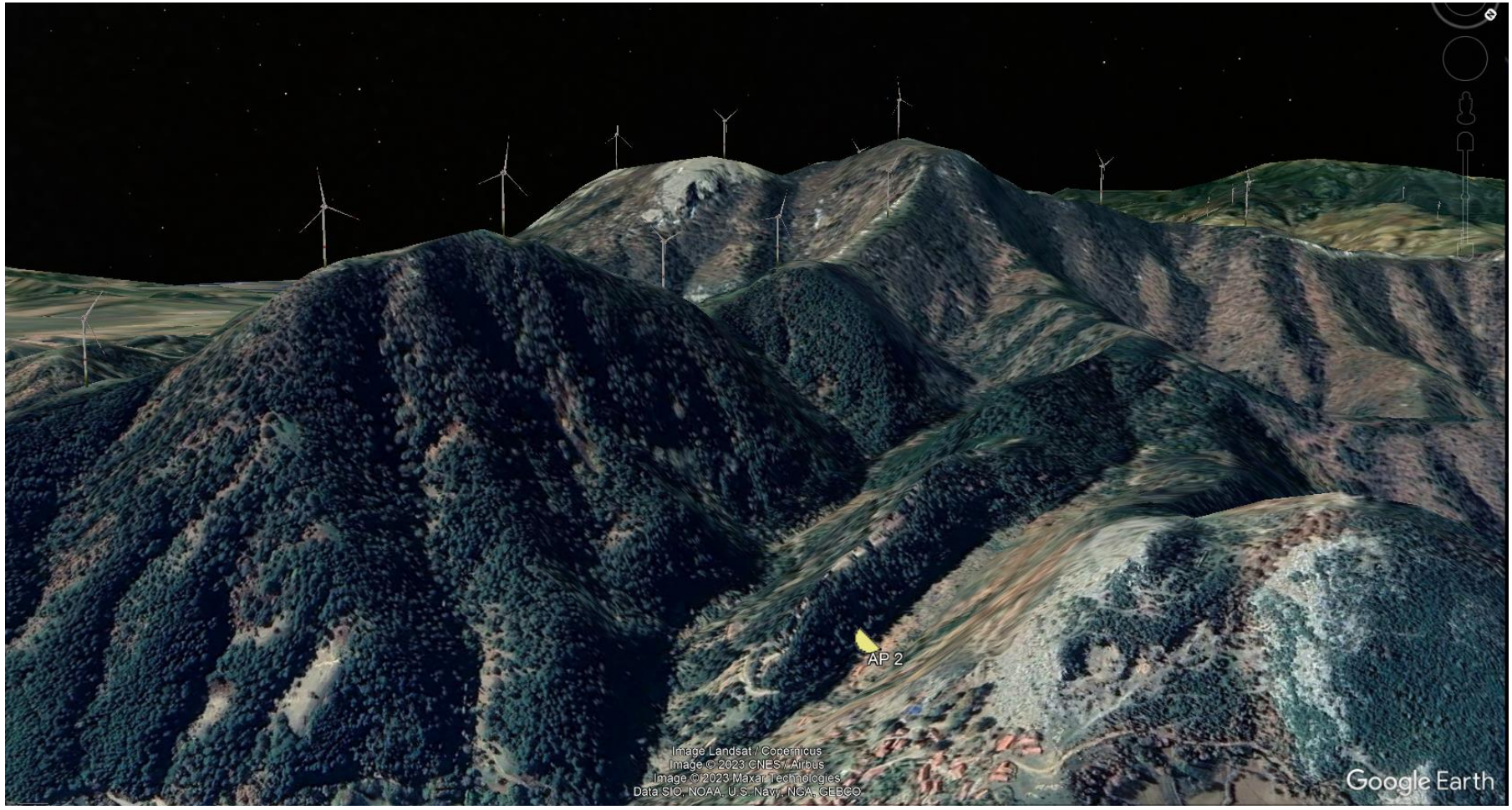


Figure 10.28: Turbine Visibility at Assessment Point 2

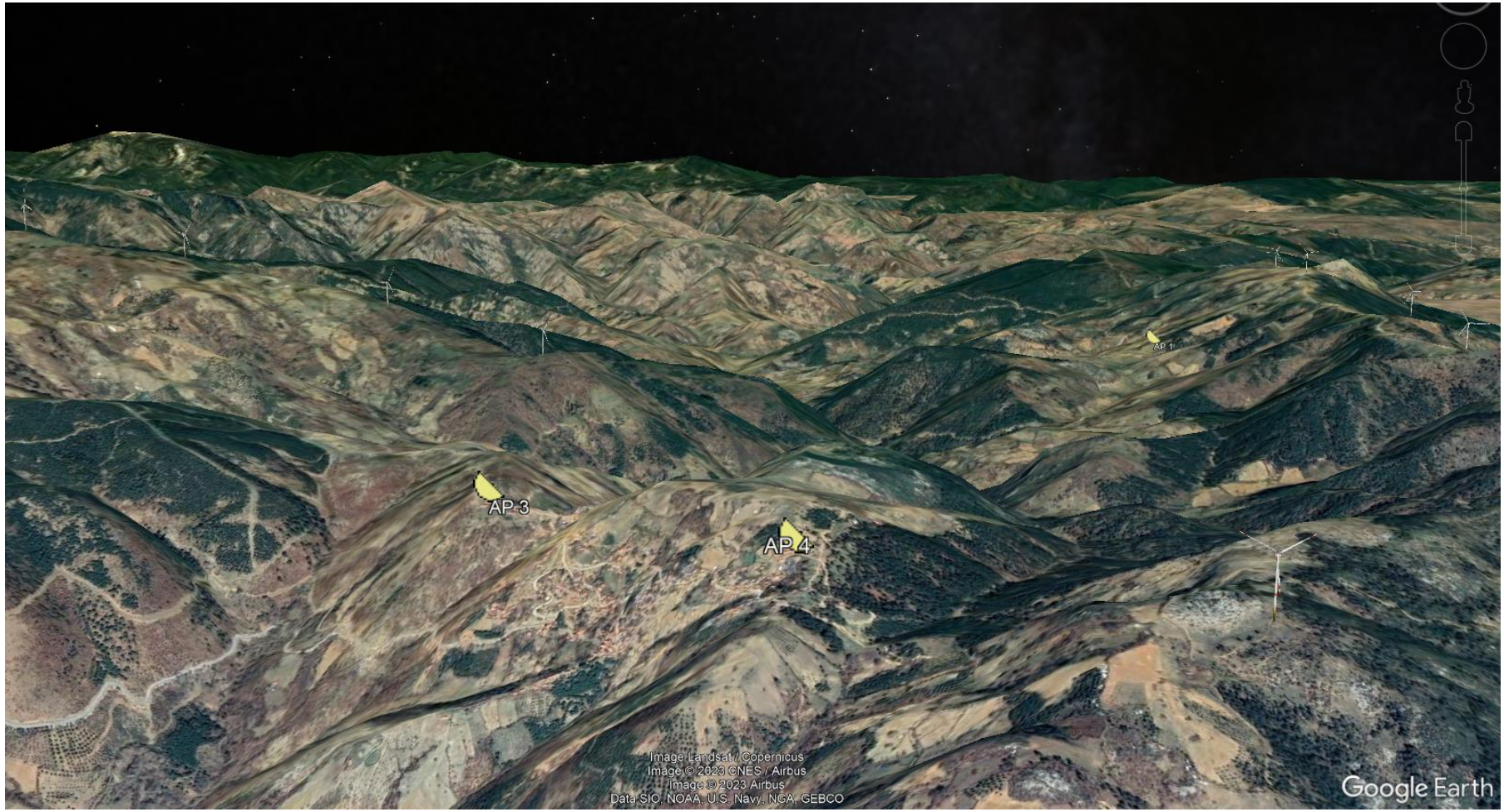


Figure 10.29: Turbine Visibility at Assessment Point 3-4

Figure 10.30: Turbine Visibility at Assessment Point 5

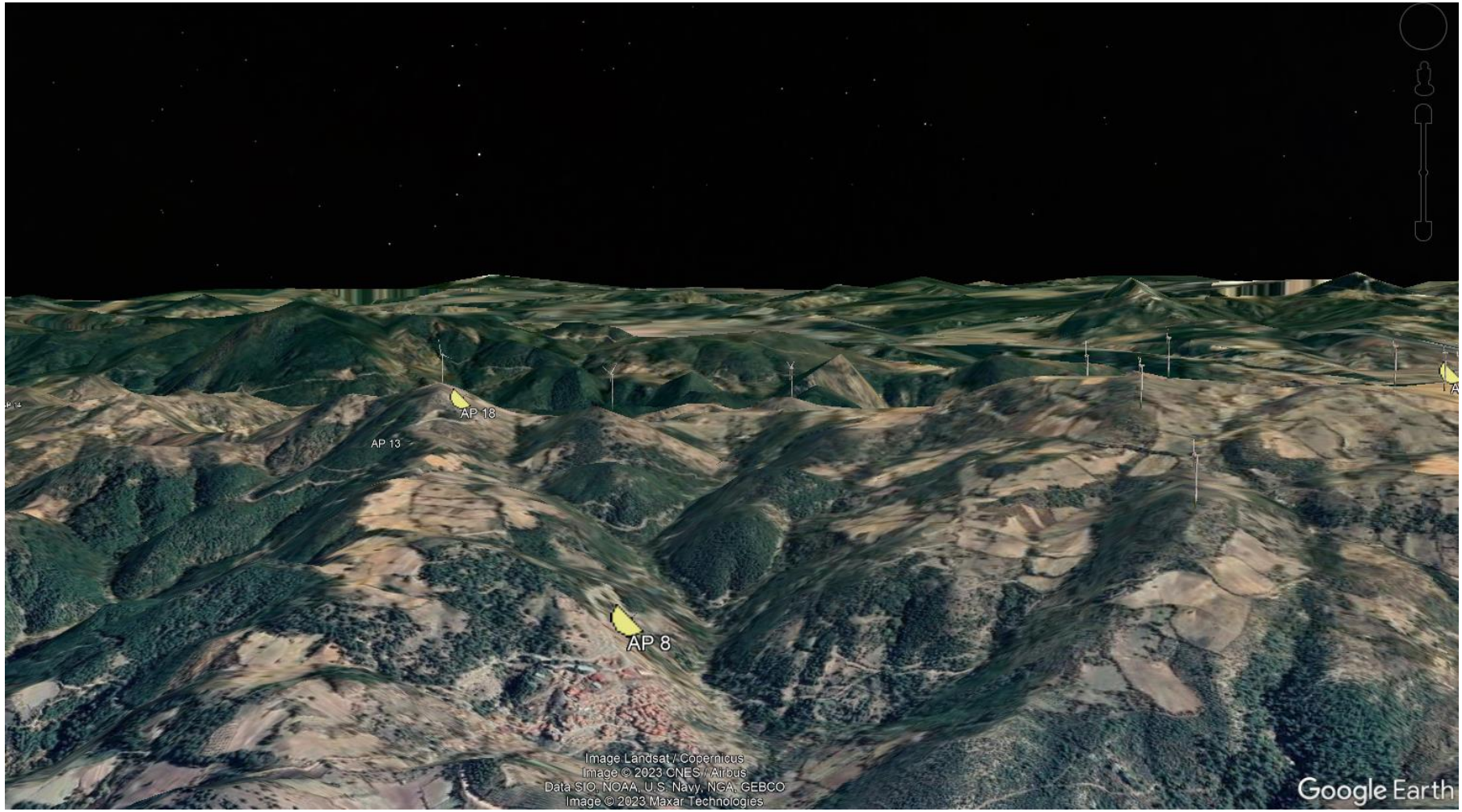


Figure 10.31: Turbine Visibility at Assessment Point 8-18

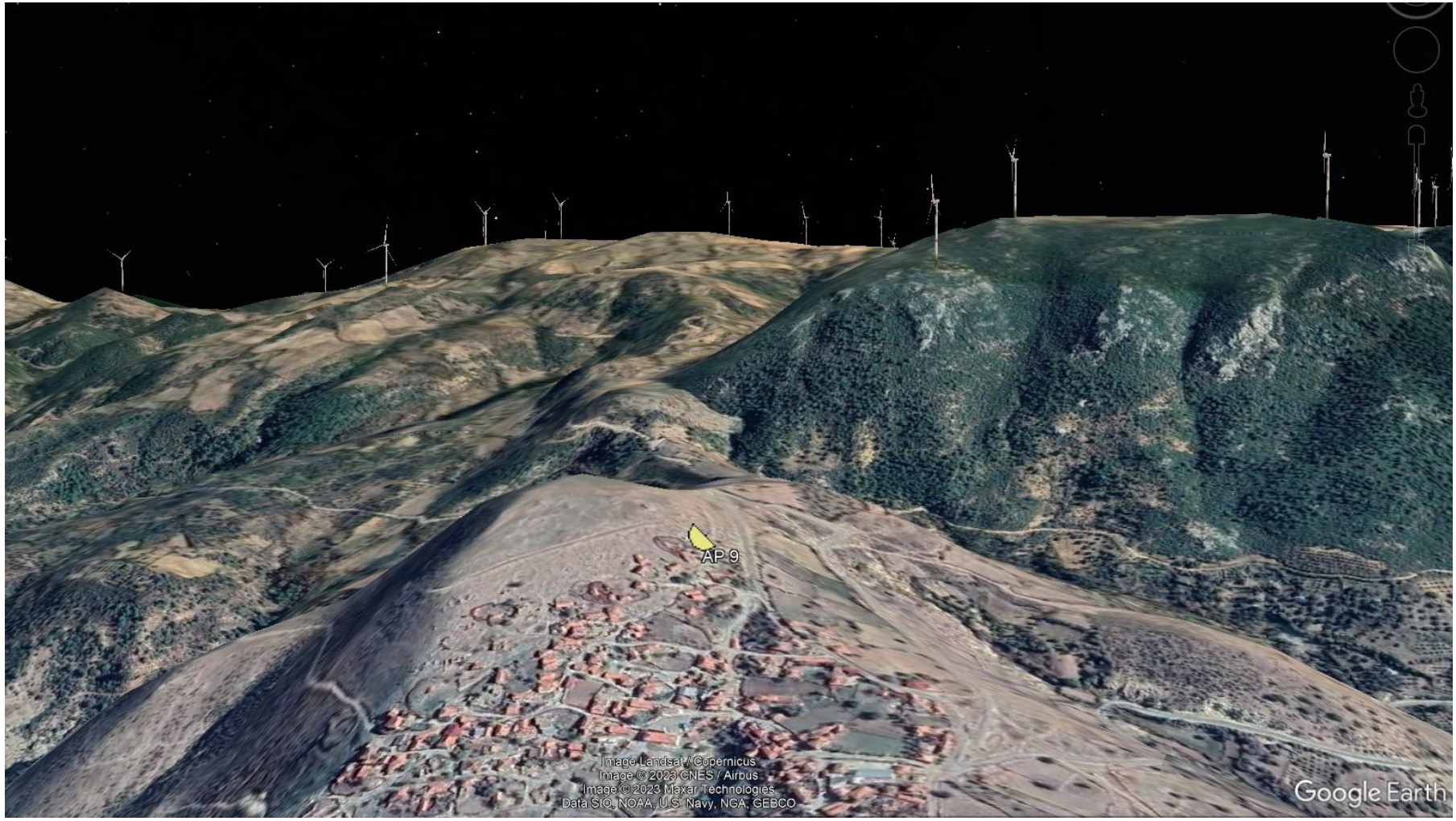


Figure 10.32: Turbine Visibility at Assessment Point 9

Figure 10.33: Turbine Visibility at Assessment Point 10

Figure 10.34: Turbine Visibility at Assessment Point 11

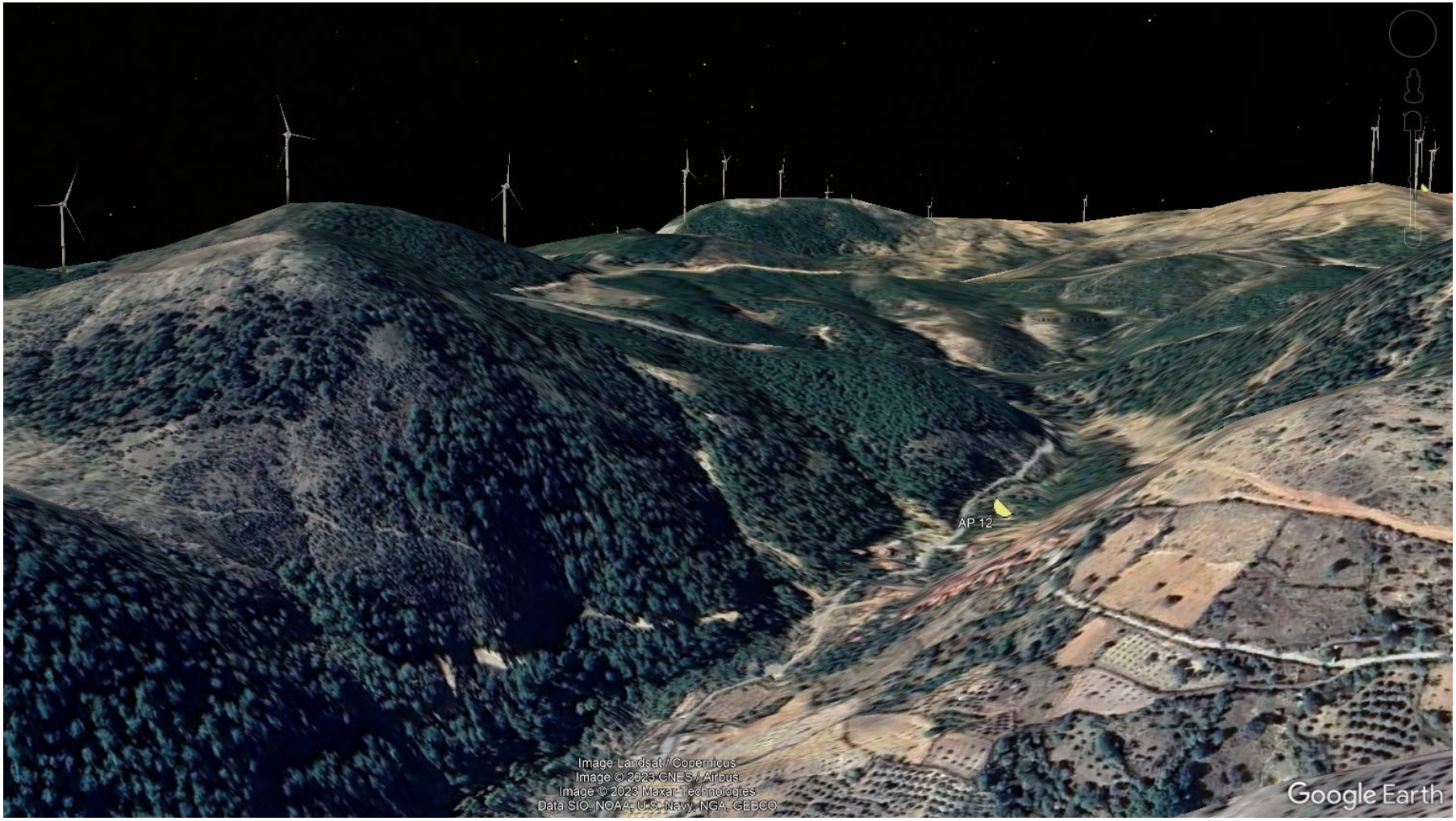


Figure 10.35: Turbine Visibility at Assessment Point 12

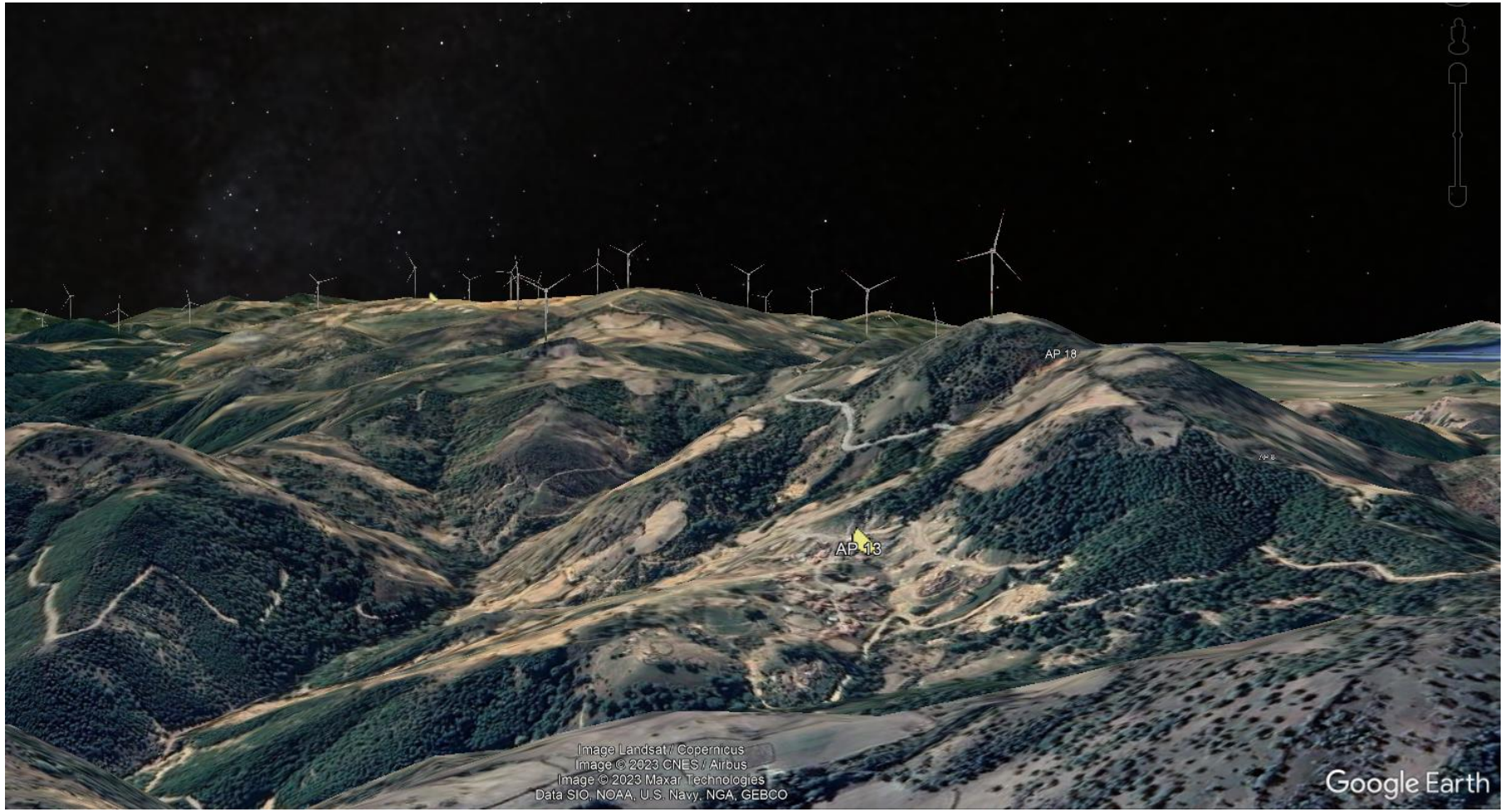


Figure 10.36: Turbine Visibility at Assessment Point 13

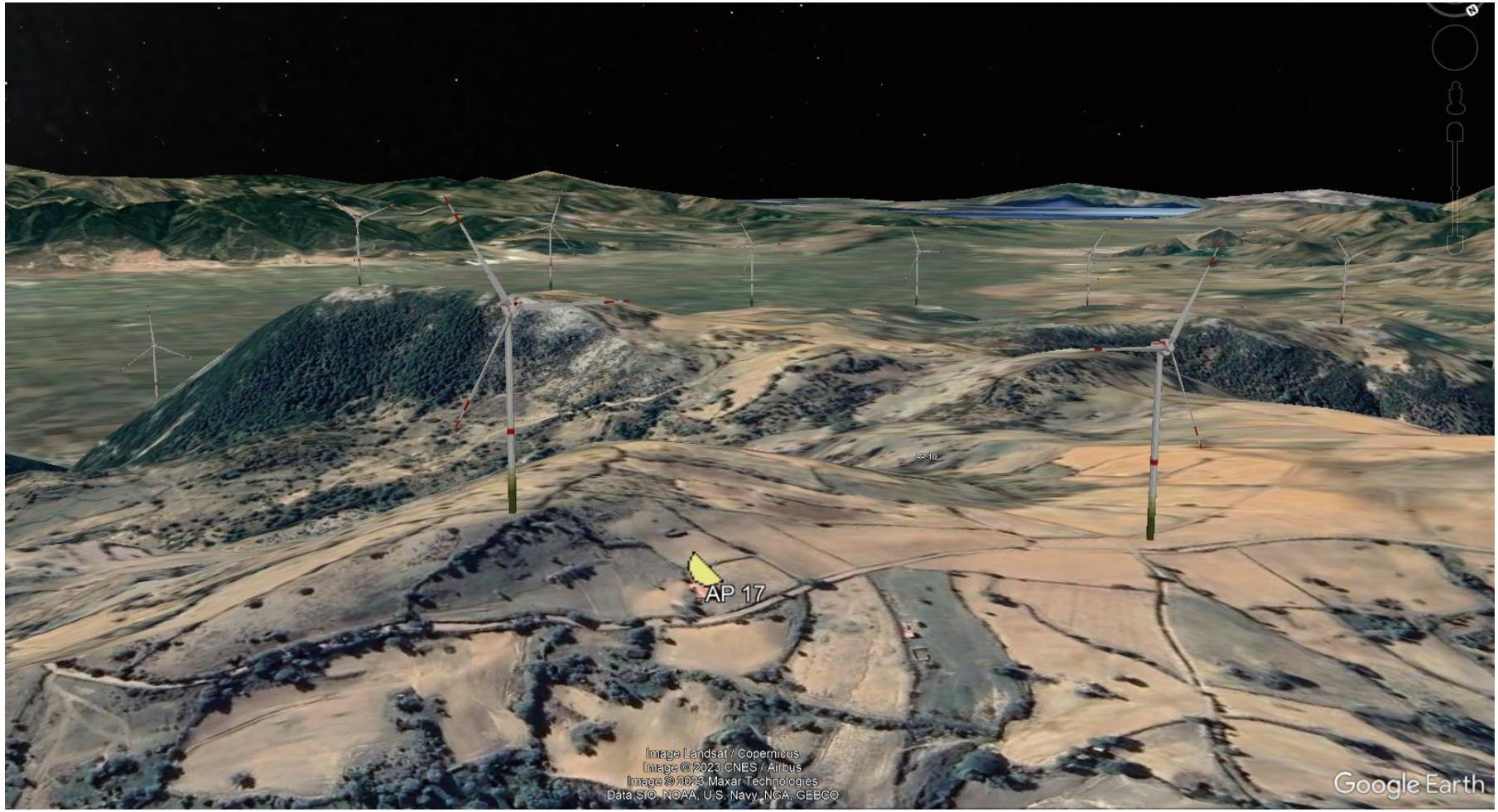


Figure 10.37: Turbine Visibility at Assessment Point 17

Figure 10.38: Turbine Visibility at Assessment Point 18

10.5 Mitigation Measures and Residual Impacts

In terms of shadow flicker negligible/minor impact detected at most at identified receptors. Thus, no mitigation measures 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 Lender's guideline, 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: Policy, Legal and Institutional 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. The Regulation on Wastewater Discharges to Sewerage System published by Water and Sewerage Administration authorities of Izmir, Balıkesir and Manisa Metropolitan Municipalities is followed in case any discharge of wastewater to the sewerage system.

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 below.

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

Requirement	Publish Date/Last Amendment Date
U.S. International Development Finance Corporation (DFC)' s Environmental and Social Policy and Procedures	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
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 December 2023.

11.2.1.3 Project Standards

The Project Company commits 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. In the Draft ESIA Scoping Report prepared by the Consultant, the anticipated resources to be utilized and expected wastes to be generated are outlined. 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 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.

Information regarding the baseline waste and resources was obtained by examining the listed documentation[103]:

- National Waste Management and Action Plan (2016-2023), published in 2017, Ministry of Environment, Urbanization and Climate Change
- İzmir and Manisa Environmental Status Reports, 2022, Provincial Directorates of Environment, Urbanization and Climate Change
- Balıkesir Environmental Status Report, 2021, Provincial Directorates of Environment, Urbanization and Climate Change
- Uygar WPP National EIA Report, 2023, Nartus
- The Project Description File namely “400 kV Uygar RES Secondary Transformer Substation (TS)-Uygar RES TS Electrical Energy Transmission Line”, 2023, Duru Çevre

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, sensitivity/value magnitude of these impacts on resource/receptors are identified in Section 11.4.5 and the necessary mitigation measures are identified accordingly in Section 11.5.

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 and Metropolitan Municipalities of İzmir, Balıkesir and Manisa were extensively utilized to supplement the baseline information in the region of the Project area. The Consultant 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

[103] The latest available documents as of December 2023.

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 İzmir, Manisa and Balıkesir provinces and in particular for the Project area or the Power Plant.

11.3.1 Resource Management

The construction phase activities include the supplying of materials, preparing infrastructure, the assembly of the Project's components, and the ultimate disposal of construction waste. The operation phase activities include enabling electricity production continuously and disposal of operation waste. The 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, and necessary resources will 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 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 filling material, which will be classified as excavated soil, 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. During the maintenance and repair of the turbines within the Power Plant, chemical substances are employed. The utilized chemical materials will be temporarily stored in dedicated storage areas provided with appropriate containment and then sent for disposal through licensed companies.
- The ready-mixed concrete and aggregate will be supplied ready-mixed concrete manufacturer with current certification under from National Ready Mixed Concrete Association (NRMCA) of ready mixed concrete production facilities, the closest manufacturer is at approximately 80km distance to the Project area. There are several NRMCA inspected and certified ready mixed concrete manufacturers in İzmir, Balıkesir and Manisa provinces. It is to be noted that no concrete batching plant will be established within the scope of the

Project. It is also to be noted that ready-mixed concrete and aggregate will be supplied from the ready-mixed concrete production facilities to be readily used during the construction. The ready-mixed concrete will be delivered by a concrete mixer/transit mixer to the Project area.

- 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 storage 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 shared 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.

11.3.2 Solid Waste Management

According to TurkStat data[104], a total of 1,983,465 tonne municipal waste for İzmir province, 634,997 tonne municipal waste for Manisa province and 445,066 tonne municipal waste for Balıkesir province is collected annually.

In İzmir province, out of all collected municipal waste in 2022; 99.4% is disposed of in licenced waste recycling facilities, 0.6 is disposed of in other waste disposal methods e.g., sanitary landfills.

Currently, there are three municipal sanitary landfills in Çiğli, Bergama and Ödemiş districts within İzmir province. All the sanitary landfill includes an energy production plant which uses landfill gas as raw material. The daily average capacities of the Çiğli, Bergama and Ödemiş sanitary landfills are 3,000 tonne, 600 tonne and 560 tonne, respectively. The closest sanitary landfill is located at 38km to the Project area in Bergama district.

The number and types of waste management facilities for the Izmir province are shared below based on information obtained from Environmental Status Report of İzmir and İzmir Metropolitan Municipality's official website (updated in 2019).

- There is one municipal sanitary landfill in Harmandalı within Çiğli district. There are two integrated solid waste management facilities in Ödemiş and Bergama districts.
- There is one wild dump site in Tire district.
- There are seven licensed waste transfer stations in Türkelli, Halkapınar, Gediz, Kısıkköy, Gümüldür, Urla, Selçuk districts.

[104] TurkStat 2022 Municipal Waste Statistics (the latest available data as of December 2023). Retrieved from *https://biruni.tuik.gov.tr/medas/?kn=119&locale=tr*

- There are 36 licensed hazardous waste recycling facilities and two temporarily operational facilities, along with one licensed hazardous waste landfill facility. Additionally, there are two licensed and two temporarily operational hazardous waste interim storage facilities.
- There are two licensed waste oil recycling facilities and four vegetable waste oil interim storage facilities.
- There are 30 licensed packaging waste collection and separation facilities, and there are 70 licensed packaging waste recycling facilities.
- There is one licensed medical waste sterilization facility in the Menemen district.
- There are licensed recycling facilities that collect and process waste batteries and accumulators, end-of-life vehicles (ELV), end-of-life tires (ELT), and waste electrical and electronic equipment (WEEE).

In Balıkesir province, out of all collected municipal waste in 2022; 97% is disposed of in licenced waste recycling facilities, 2.8% is disposed of in wild dump sites and 0.2% is disposed of in other waste disposal methods.

Currently, there is one integrated solid waste management facility in Balıkesir province, where there is a municipal sanitary landfill with an average capacity of 1,300 tonne per day and technically there is capacity to generate energy from the landfill gas. Technically there is a composting and mechanical segregation of solid waste to recycle/reuse is planned in the integrated solid waste management facility.[105] It is located at 98km to the Project area in Altıeylül district.

The municipal solid waste collected by Burhaniye district municipality is disposed at waste transfer stations, and then it is taken over by metropolitan municipalities for proper disposal in the sanitary landfill. The municipal waste is collected in the waste containers for 12 neighbourhoods and is transferred to the waste transfer station in Havran district. There are 107 waste containers, each with an average capacity of 9 m^3, which are collected in a frequency between two and five times per week by Burhaniye District Municipality.[106]

The municipal solid waste collected by İvrindi and Savaştepe district municipalities are disposed of directly in the sanitary landfill. In İvrindi, there are many containers which are located in the 71 neighbourhoods, each with an average capacity of 0.6 m^3, which are collected in a frequency between one and five times per week by İvrindi District Municipality. In Savaştepe, there are many containers which are located in the three neighbourhoods, each with a capacity of 0.4 m^3, which are collected in five times per week by Savaştepe District Municipality.

The number and types of waste management facilities for the Balıkesir province are shared below based on information obtained Environmental Status Report of Balıkesir.

- There are 13 licensed waste transfer stations.[107] There will be two licensed waste transfer stations in Erdek and Savaştepe districts.
- There are nine licensed packaging waste collection, separation, and recycling facilities which is operated for plastic, paper, wood packaging waste.
- There are 26 licensed recycling facilities that collect and process non-hazardous waste.
- There are six licensed hazardous waste recycling facilities.
- There is one licensed medical waste sterilization facility.

[105] Balıkesir Metropolitan Municipality Activity Report 2022 (the latest available document). Retrieved from *https://cmsapi.balikesir.bel.tr//Media/Dokumanlar/Faaliyet-Rapor/BBB%20FR_2022%20web.pdf*

[106] Balıkesir Zero Waste Management System Plan 2022. Retrieved from *https://webdosya.csb.gov.tr/db/balikesir/menu/ekim-2022-guncel-balikesir-il-sifir-atik-yonetim-sistemi-plani_son_20221018031406.pdf*

[107] Balıkesir Metropolitan Municipality's Official Website, 2023. Retrieved from *https://www.balikesir.bel.tr/haber-detay?id=3618*

- There are two licensed recycling facilities that collect and process waste electrical and electronic equipment (WEEE).
- There are four licensed excavated soil disposal areas which are located in Karesi, Altıeylül, Bandırma and Edremit districts.

In Manisa province, out of all collected municipal waste in 2022; 99.7% is disposed of in licenced waste recycling facilities, 0.2% is disposed of in wild dump sites and 0.1% is disposed of in other waste disposal methods e.g., sanitary landfill.

There is one municipal sanitary landfill in Uzunburun district within Manisa province with a capacity of 2,000 tonne per day. It includes a mechanical biological treatment facility, a compost facility and a waste-derived fuel production facility, as well as a biogas production facility. The sanitary landfill is located at 110km to the Project area.

The number and types of waste management facilities for the Manisa province are shared below based on information obtained Environmental Status Report of Manisa.

- There is one municipal sanitary landfill in Uzunburun district.
- There are 84 wild dump sites and rehabilitation will be carried out for seven of them.
- There are 12 licensed waste transfer stations, and one more station is under construction.
- There are 43 licensed packaging waste collection and separation facilities, and there are 71 licensed packaging waste recycling facilities.
- There are 18 licensed hazardous waste recycling facilities.
- There is one licensed medical waste sterilization facility.
- There are licensed recycling facilities that collect and process non-hazardous wastes, end-of-life vehicles (ELV), and waste electrical and electronic equipment (WEEE).

The Project Company shared on 7 May 2024 that waste collecting and transferring contract between Bergama Municipality and the subcontractors which are actively working onsite were shared with the Consultant. According to the contracts, municipal waste to be generated onsite will be collected onsite twice a week and transferred to the licenced municipal sanitary landfills.

According to the Regulation on the Control of Excavation Soil, Construction, and Demolition Wastes, it is essential to prevent the mixing of excavation soil with construction and demolition wastes. During excavation in the construction phase of the Project, topsoil is collected separately, which will be used for recreational purposes in the construction of green areas and must not be sent to storage areas. Excavated soil other than topsoil can be used for filling in the Project area. If reuse is not feasible, it will be stored in designated areas in the Project area to be disposed of in the disposal areas e designated by the municipalities. It is also specified in the Regulation on the Control of Excavation Soil, Construction, and Demolition Wastes that recycling of construction and demolition wastes is crucial to conserve natural resources, promote sustainable production, reduce the amount of waste to be stored, and create economic value. As per this specification, the recyclable construction and demolition wastes during the construction phase of the Project are anticipated to be managed in the recycling facilities of the municipalities. Non-recyclable construction/demolition wastes, after necessary sorting and size reduction, can be used as daily cover material in sanitary landfills, following the principles outlined in the Solid Waste Control Regulation.

According to the information shared in Environmental Status Reports for İzmir, Balıkesir and Manisa provinces, excavated soils are disposed in the disposal areas and the construction and demolition wastes generated are disposed in the recycling facilities which are destinated by Metropolitan Municipalities of the provinces. The number of licensed disposal areas for the excavated soil and the number of the licensed recycling facilities for construction and demolition wastes generated are shared in below table.

Table 11.2: The number of licensed excavated soil disposal areas and construction and demolition waste recycling facilities

Province	Number of Disposal Areas for the Excavated Soil	Number of Recycling Facility for Construction and Demolition Wastes Generated
İzmir	13	8
Balıkesir	4	-
Manisa	10	1

The locations of the excavated soil disposal areas are accessed via the websites of the İzmir and Manisa Metropolitan Municipalities. The closest excavated soil disposal areas are located at 42.8km and 49.5km to the Project area in Soma and in Kırkağaç districts of the Manisa province, respectively. The closest excavated soil disposal areas are located at 24.7km, 66km, 80.6km to the Project area in Kınık, Çaltılıdere and Aliağa districts of the İzmir province, respectively.

According to the National Waste Management and Action Plan prepared for the period between 2016 and 2023, a municipal waste management strategy is specified as establishment of a thermal disposal facility for the provinces with a given prioritization. Among the provinces which priorities given for the implementation of the waste management strategy, the first priority is given for İzmir province and third priority is given for Balıkesir and Manisa provinces by the end of 2023.

Moreover, for the year 2023, capacity expansions have been planned for municipal waste management facilities in the Aegean Region, where the Project area is located. These capacity increases are given below:

- A total capacity increase to 1,035 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 1,250 tonne for mixed municipal waste.
- The establishment of an incineration facility with a daily capacity of 1,350 tonne for mixed municipal waste.

It has been also projected that 8% of the waste generated in the Aegean Region will undergo biological processing, 10% will undergo Mechanical Biological Treatment (MBT), and 11% will be subjected to thermal processes, and 71% of it is planned to be recycled and disposed of in the municipal sanitary landfills.

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 within 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.

All solid waste streams including hazardous wastes, are effectively managed within the district where the Project is located, utilizing existing licensed waste facilities. There is no anticipated need for trans-boundary disposal of the Project waste.

11.3.3 Wastewater Management

According to İzmir and Manisa Environmental Status Reports for 2022, there are 69 licensed wastewater treatment plants (WWTPs) in İzmir and 18 licensed WWTPs in Manisa provinces. According to Balıkesir Environmental Status Report for 2021, there are 39 licensed WWTPs in Balıkesir.

Out of all WWTPs in İzmir province, the closest WWTP is an advanced wastewater treatment plant namely Bergama WWTP, which is located at 35km to the Project area approximately, is in Bergama district with a capacity of 14,304 m^3/day and discharged treated water to Bakırçay Creek in accordance with the limit discharge values specified in the national regulation.

Out of all WWTPs in Balıkesir province, BASKİ Savaştepe Advanced WWTP, which is located at 32km to the Project area at Savaştepe district, has a capacity of 3,678 m^3/day and is discharging treated water to Göçmen Creek.

Out of all WWTPs in Manisa province, the closest WWTP is a biological wastewater treatment plant namely Soma WWTP, which is located at 24km to the Project area approximately, is in Soma district with a capacity of 13,752 m^3/day, respectively and discharged treated water to Kuzey Ege River Basin in accordance with the limit discharge values specified in the national regulation.

Comparison assessment is carried out between daily capacities of WWTPs and total daily wastewater discharged amount by the Municipalities. The local existing licensed WWTPs have enough capacity to manage wastewater generated by the Municipalities of İzmir, Balıkesir and Manisa provinces.

Table 11.3: The Capacity of the Local Existing Licensed WWTPs in İzmir, Balıkesir and Manisa

Benchmark[108]	İzmir	Balıkesir	Manisa
Total municipal population which is served by the local existing WWTPs (person)	4,462,056	946,918	1,075,317
Domestic wastewater production per person by the Municipalities (m^3/person-day)	0.181	0.191	0.136
Total daily domestic wastewater amount received by the WWTPs (m^3/day)	807,632	180,861	146,243
Total daily capacity of WWTPs (m^3/day)	947,771	91,146	202,290

The Consultant estimated the capacities and dimensions of the septic tanks which are required to be designed to meet the demand for the wastewater to be generated onsite. The frequency of the wastewater transfer to the local WWTPs and load per transfer to the existing licensed WWTPs are estimated accordingly in Section 11.4. 4. According to the estimated capacities compared with to the existing local facilities' capacities, there is enough capacity to meet load of the wastewater to be generated onsite. This conclusion is aligned with the current on-site practices according to the information shared by the Project Company on 7 May 2024. There are four subcontractors which are actively working onsite. The capacities of each subcontractors' septic tanks are 20, 15, 10, and 10 m^3. The quality certificates stating that the tanks are made of leak-proof material to be obtained and septic tank level occupancy tracking form to be monitored for each subcontractor onsite are registered by the Project Company.

[108] TurkStat 2022 Municipal Wastewater Statistics, İzmir and Manisa Environmental Status Reports 2022 and Balıkesir Environmental Status Report 2021 (the latest available data as of December 2023).

It is to be noted that the septic tank will be emptied by vacuum trucks when the septic tank reaches 80% capacity to be disposed to the local existing wastewater treatment plants in accordance with the relevant legislation.

11.4 Impact Assessment

11.4.1 Resource Management

- 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 and around 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 be formed.
  - 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 that construction and operation waste to be generated for 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 for the Project could increase in load on the capacity of existing local licensed waste recycling/landfilling facilities, excavated soil disposal areas, and wastewater treatment plants (WWTPs).
- During the excavation process in the construction phase, excavation waste will be generated which will be managed either in the local existing licensed disposal areas or in the Project area.
  - 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 excavation waste storage in the Project area which can result in soil, groundwater and sediment contamination.

11.4.2 Land Preparation, Excavation and Construction Activities

The Consultant conducted a site visit on 2 October 2023. The construction works had not been initiated yet. No material storage and waste generation were observed herewith.

During the earthworks in the construction phase of the Project, topsoil is collected separately and is 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. If there is any requirement in the future, stakeholder engagement activities that are required to be undertaken will be shared in the Stakeholder Engagement 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 vegetative 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 İzmir, Balıkesir and Manisa. The necessary communications and official correspondences will be conducted with the authorities of the Environment, Urbanization and Climate Change Provincial Directorates. 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 60 wind turbines together with a switchyard, and access and site roads are planned to be completed in 21 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 of the Project. According to the figures which are estimated and provided by the Project Company, the total cut and fill volumes are 3,026,516 m^3 and 1,611,344 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 11.4: Excess Excavation Soil Generation

Phase	The expected workdays	Total volume of excess excavation soil	Excess Excavation Soil Generation Rate	
			Period	Quantity
Construction	21 months	1,415,172 m^3	Monthly	67,389 m^3/month
	26 days/month		Daily	2,592 m^3/day
	10 hours/day		Hourly	259 m^3/hour

In the worst-case scenario with an assumption that all excessive excavation soil could not be reused in the Project area and to be managed as excavation waste, total volume of excavation waste to be generated will be 259 m^3 per 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, capacity of the temporary excavation waste storage areas and time frame for the transferring the excavation waste to the final licensed disposal facilities storage areas. Since these parameters could be variable during the implementation of the Project, the detailed estimation could not be provided herewith. However, the Consultant made a rough estimation on the truck movements to transfer the excavation waste amount in the worst-case scenario. Approximately 26 truck movements with a truck capacity of 10 m^3 could be required hourly.

The excavation 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 (Official Gazette Date/No: 18.03.2004/ 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. In addition to the excavation waste, the construction waste generation is also anticipated. It is specified that preventing from 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 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 600 and 22 personnel will work during construction and operation phases of the Project, respectively.

It is to be noted that the total anticipated personnel numbers including the personnels of the subcontractors will work temporarily for the Project. Therefore, waste generation amounts are projected in a worst-case scenario with an assumption that all personnel, total number is anticipated, would work and generate hazardous and non-hazardous waste during the construction and operation phases of the Project.

It is planned to be working 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 working 24 hours daily and 365 days annually for the operation phase of the Project.

- Municipal waste

According to TurkStat data[109], the average amount of municipal waste generated in İzmir, Balıkesir and Manisa provinces per person is recorded as 1.22, 0.97, and 1.18 kg/ person-day respectively. In order to assess the maximum impact, the daily municipal waste generated per person of İzmir province is taken as a basis. 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.

[109] TurkStat 2022 Municipal Waste Statistics (the latest available data as of December 2023). Retrieved from *https://biruni.tuik.gov.tr/medas/?kn=119&locale=tr*

Table 11.5: Municipal Waste Generation

Phase	Number of Personnel Expected to Work	Average Amount of Municipal Waste Generated	Amount of Municipal Waste to be Generated[110]
Construction	600	1.22 kg/person-day	732 kg/day
Operation	22		26.8 kg/day

The municipal waste to be generated for the Project will be collected in waste containers to be transferred to the agreed district municipality waste transfer station which has sufficient technical capability and capacity to have projected waste volumes and convenient accessibility for waste transport. Necessary waste transfer protocols with the district municipality will be signed.

- 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[111], 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[112]. 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 11.6: Packaging Waste Generation

Phase	Amount of Municipal Waste to be Generated	Scale factor	Amount of Packaging Waste to be Generated[113]
Construction	732 kg/day	29.2%	213.7 kg/day
Operation	26.8 kg/day		7.8 kg/day

The packaging waste will be separately managed from other waste streams at the source. It will be collected, stored at a 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 Project Company shared the chemical inventory list, which includes chemicals with Chemical Abstracts Service (CAS) registry numbers[114], planned to be used during the construction and operation phases of the Project. According to the list, there are several chemicals to be used as described below:

  - pad cleaner,
  - paints and paint removers (consist of methanol),
  - ethyl alcohol,

[110] Amount of municipal waste to be generated per day is calculated by multiplying average amount of municipal waste generated in İzmir with the number of personnel expected to work for the Project

[111] TurkStat 2020 Municipal Waste Statistics. Retrieved from *https://biruni.tuik.gov.tr/medas/?kn=119&locale=tr*

[112] 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*

[113] Amount of packaging waste to be generated per day is calculated by multiplying amount of municipal waste to be generated with the scale factor.

[114] CAS registry number is an internationally recognised hazardous substance identification system (Environmental Protection Agency (EPA), 2023). Retrieved from *https://www.epa.gov/epcra/cercla-release-reporting-cas-registry-number-vs-hazardous-substance-name*

- aluminium cleaners,
- fuel oils, engine and hydraulic oils and spray grease,
- wood varnish,
- solid lubricant pastes,
- foams (consist of isocyanic acid),
- silicone sealants.

These chemicals will be used during the maintenance and repair processes of machinery and equipment to be used during the construction and operation phases of the Project. Use of these chemicals may potentially generate hazardous waste such as oily rags, used filters from machinery, and/or empty containers of oils and paints, sealant tubes of the chemicals. 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.

Hazardous waste generated per person (excluding major mineral wastes) is 36.7 for 2018 year.[115] Thus, with the assumption that the general trend is similar, hazardous waste to be generated is estimated below.

Table 11.7: Hazardous Waste Generation

Phase	Number of Personnel Expected to Work	The expected working days in a year	Hazardous waste generated per person annually in Türkiye	Amount of Hazardous Waste to be Generated[116]
Construction	600	312 days	36.7 kg/person-year	70.6 kg/day
Operation	22	365 days		2.2 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[117]. Thus, with the assumption that the general trend is similar, medical waste to be generated is projected below.

[115] 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

[116] 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 working days in a year.

[117] 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

Table 11.8: Medical Waste Generation

Phase	Amount of Hazardous Waste to be Generated	Scale factor	Amount of Medical Waste to be Generated[118]
Construction	70.6 kg/day	6.8%	4.8 kg/day
Operation	2.2 kg/day		0.15 kg/day

During the construction phase of the Project, 600 personnel are 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 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 the kitchen at the campsite, thus generation of vegetable oil waste is anticipated.

According to the Hazardous Waste Declaration System (TABS) data that vegetable oil waste constitutes 0.7% of the total hazardous waste amount[119]. Thus, with the assumption that the general trend is similar, vegetable oil waste to be generated is estimated below.

Table 11.9: Vegetable Oil Waste Generation

Phase	Amount of Hazardous Waste to be Generated	Scale factor	Amount of Vegetable Waste to be Generated[120]
Construction	70.6 kg/day	0.7%	0.49 kg/day
Operation	2.2 kg/day		0.02 g/day

The vegetable oil waste 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

[118] Amount of medical waste to be generated per day is calculated by multiplying amount of hazardous waste to be generated with the scale factor.

[119] 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

[120] 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.

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 Hazardous Waste Declaration System (TABS), the quantity of waste oil constitutes 3.6% of the total hazardous waste amount[121]. Thus, with the assumption that the general trend is similar, waste oil to be generated is projected below.

Table 11.10: Waste Oil Generation

Phase	Amount of Hazardous Waste to be Generated	Scale factor	Amount of Waste Oil to be Generated[122]
Construction	70.6 kg/day	3.6%	2.5 kg/day
Operation	2.2 kg/day		0.08 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 loader, crane, road grader, excavator, truck, etc. with an average oil capacity of 5 litre. It is anticipated that oil changes will be conducted fourth times during the construction phase. Thus, amount of waste oil generated during the oil changes of machinery is projected below.

Table 11.11: 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[123]
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 averagely. For 15 turbines, average waste oil generation due to operation and maintenance works is calculated below.

Table 11.12: Waste Generation for Lubrication of Wind Turbines

Phase	Amount of lubricant to be used	Number of turbines	Amount of Waste Oil to be Generated[124]
Operation	150 litre/year	60	9,000 litre/year

[121] 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-madeni-yaglar-bitkisel-atik-yaglar-atik-piller-atik-akumulator-atik-elektrikli-ve-elektronik-esyalar-omrunu-tamamlamis-lastik-ve-araclar-i-85755

[122] Amount of waste oil to be generated per day is calculated by multiplying amount of hazardous waste to be generated with the scale factor.

[123] 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.

[124] 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.

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, approximately 4-5 batteries per person is generated annually[125]. Thus, with the assumption that the general trend is similar, waste batteries to be generated is estimated below.

Table 11.13: Waste Batteries 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[126]
Construction	600	5 batteries/year-person	3,000 batteries/year
Operation	22		110 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 and some components of wind turbines will be reused as spare parts. The details regarding the management of waste wind turbine components will be discussed in the decommissioning strategy and further evaluated in the detailed Decommissioning Plan.

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. 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

[125] 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

[126] 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.

e.g., wind shear, air density and operational conditions e.g., number of shutdowns (Ziegler et al., 2018) [127].

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.

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. There will be only domestic wastewater generation as a result of the Project activities.

Table 11.14: Wastewater Generation

Phase	Number of Personnel Expected to Work	The amount of drinking and potable water	Amount of Wastewater to be Generated[128]
Construction	600	216 L/person-day	130 m^3/day
Operation	22		5 m^3/day

The domestic wastewater generated at site during the construction and operation phases will be collected in a septic tank. When the capacity of the septic tank reached to 80%, then it will be collected and transported via vacuum trucks to the existing local licensed wastewater treatment plant which is to be discharged as per the agreement with the relevant municipalities.

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 maximum daily wastewater generation of 130 m^3/day and factoring in an 80% filling capacity of a septic tank. The septic tank is desired to empty it when it reaches 80% capacity.

The dept of the tank is typically around 4 meters, approximate dimensions for the length and width of the tank could be chosen as 6 and 5.4 meters. It is assumed that each vacuum truck can remove 20 m^3 of wastewater, approximately five vacuum trucks' 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.

[127] Lisa Ziegler, Elena Gonzalez, Tim Rubert, Ursula Smolka, Julio J. Melero, Lifetime extension of onshore wind turbines: A review covering Germany, Spain, Denmark, and the UK, Renewable and Sustainable Energy Reviews, Volume 82, Part 1,2018, Retrieved from *https://www.sciencedirect.com/science/article/pii/S1364032117313503*

[128] 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.

The domestic wastewater to be generated for the Project, will be transferred by the municipality to be discharged to agreed WWTP which have sufficient technical capability and capacity to have projected wastewater volume and closest to the Project area.

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 of defined in Section 11.3. Specific sensitivity/value criteria considered in assessing the impacts on waste and resources is provided below.

Table 11.15: Waste and Resource Sensitivity/Value Criteria for Resource/Receptors

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 be easily affected from Community Health and Safety related concerns, inside WPP License Area	Local community members are located near the Project Area where can be easily affected from Community Health and Safety related concerns, 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, excavated soil disposal areas	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 11.16: 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 accidental spills during hazardous material and waste storage	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. All activities undertaken will adhere to relevant legislation and comply with the applicable national legislation specified in Section 11.2.1 of this Report. 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

Techniques for prevention, minimization, and control of resource and waste associated impacts during the construction phase include:

- 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 area to minimize impacts related to transport.
- Monitor and manage energy consumption of the equipment/machines to minimize the Project's overall environmental footprint.
- 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 excavation soil will be reused in levelling and landscaping to the extent possible. 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 (Official Gazette Date/No: 18.03.2004/25406). 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 (Official Gazette Date/No: 18.03.2004/25406):

- 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.

- The excavation and construction waste in the Project area will be transported and disposed of at the agreed excavated soil and construction waste disposal areas of the municipalities. The distance between the excavation disposal facilities and the Project area will be considered to minimize the environmental impacts related to transportation. Excavation waste will not be mixed with demolition waste and topsoil.

Mitigation during Operation

- Energy management program will be implemented including identification, and regular measurement and reporting of principal energy flows within the Power Plant, 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 breakdowns/repairs/replacements and extent life of wind turbines.

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 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 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.
- Good housekeeping practices will be applied such as regular inventory control to reduce the amount of waste resulting from materials that are out-of-date, off-specification, contaminated, damaged or excess to need for the Project.

Techniques for prevention, minimization, and control of waste generated by the employee related impacts during the construction and operation phase include:

- Waste and Wastewater Management Plan will be developed identifying the actions to be implemented in accordance with waste hierarchy and applicable legislation. 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 and Wastewater Management Plan will include following practices to be applied for proper waste handling on-site:

  <u>Storage:</u>

  – 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 materials to be generated phase will be properly stored in waste storage area with appropriate secondary containment.
- Hazardous wastes will be properly stored in waste storage area not more than six months.
- 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.
- Adequate ventilation will be provided where volatile wastes are stored.

Training:

- Personnels will be trained on the correct transfer and handling of fuels and chemicals and the response to spills.
- 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.

Collection, segregation, transportation, and disposal:

- Proper segregation of waste at source will be implemented for efficient managing waste and to reduce the quantity of waste requiring treatment prior to final disposal by the Project Company and sub-contractors.
- The Project Company, and sub-contractors will be responsible in the construction and operation phases of the Project will work together to facilitate proper waste handling and disposal from the site in accordance with Waste and Wastewater Management Plan.
- Different classes of wastes will be put 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[129].
- 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.
- If applicable, kitchen waste will be separately collected for further composting.
- The disposal of end-of-life waste oils will be conducted in licensed disposal facilities.
- Waste oils and solid wastes contaminated with hazardous substances will be sent to licensed hazardous waste disposal facilities for proper disposal.
- The disposal of packaging waste will be conducted in the licenced recycling facilities.
- Waste batteries will be collected in battery box to be transferred to TAP (Portable Battery Manufacturers and Importers Association of Türkiye) for handling and final disposal.

[129] 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.

- WEEE will be collected in dedicated containers to be transferred to licenced recycling and disposal facilities by the licenced transporters.
- Waste tires will be transferred the authorized waste dealer for recycling.
- Medical waste will be collected in medical waste bag with a colour code in the infirmary to be transferred to nearby local health clinic.

Internal Audits:

- Regular visual inspection/audits for all waste storage collection and storage areas will be performed 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.
- Audit mechanism will be integrated in the Waste and Wastewater Management Plan.
- Waste generation trends by type and amount of waste generated will be tracked. The records of document including amount of waste generated, segregated and its destination will be kept.
- 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 wastewater associated impacts during the construction and operation phase include:

- If groundwater usage is deemed necessary for utility water needs, relevant permits from Regional Directorates of State Hydraulic Works will be obtained and allowed amount will be utilized to prevent excessive withdrawal.
- 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.
- In accordance with the current legislation, the watertight reinforced concrete septic tank project must be reviewed and approved by the relevant administration.
- 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.

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 11.17. 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 11.17: Summary of Residual Effects, After the Application of Mitigation

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Soil Contamination due to accidental spills during hazardous material and waste storage	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 Performance Standards (PS6) and related Guidance Notes (6), EBRD Performance Requirements (PR6) and Guidance Notes (6) as well as Equator Principles IV (EP IV).

The impact assessment and critical habitat assessment are carried out in accordance with the following international requirements:

- IFC Performance Standards 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 all turbines and their pads, the site roads, the switchyard area and the entire length of the ETL and pylons. Although the ETL and pylons are owned and operated by

TEIAS, the standards of Project Lenders include these structures, along with the site 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, legally protected areas and/or internationally recognized areas of high biodiversity value information ans 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 CHA, the EAAA for flora and terrestrial fauna (amphibians, reptiles and non-bat mammals) was designated according to the surrounding terrain and water features and encompasses an area of 1236 km^2 and is expanding towards the southern region in order to sample and investigate different habitat types in the region for fauna. The EAAA for flora and terrestrial fauna is shown on Figure 12-1.

For EAAA for birds and bats, the EAAA was designated to encompass the surrounding mountain slopes and the valleys. The EAAA for birds and bats encompasses an area of 4507 km^2 and is shown on Figure 12-2.

Within the EAAA, an Area of Influence of the Project on biodiversity values was designated. For flora species, since the main expected impact source 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.

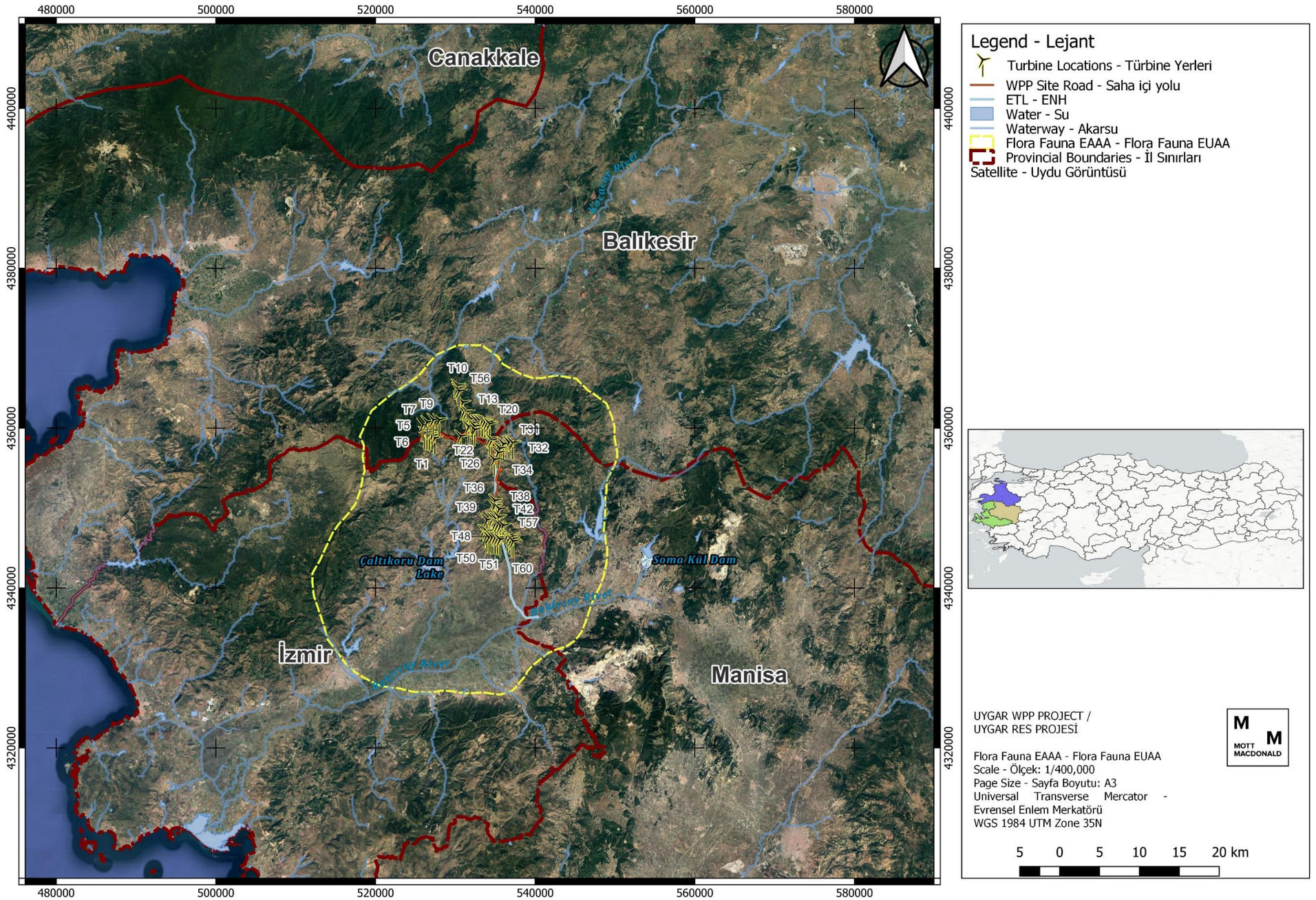


Figure 12-1: EAAA for Flora and Terrestrial Fauna for the Project.

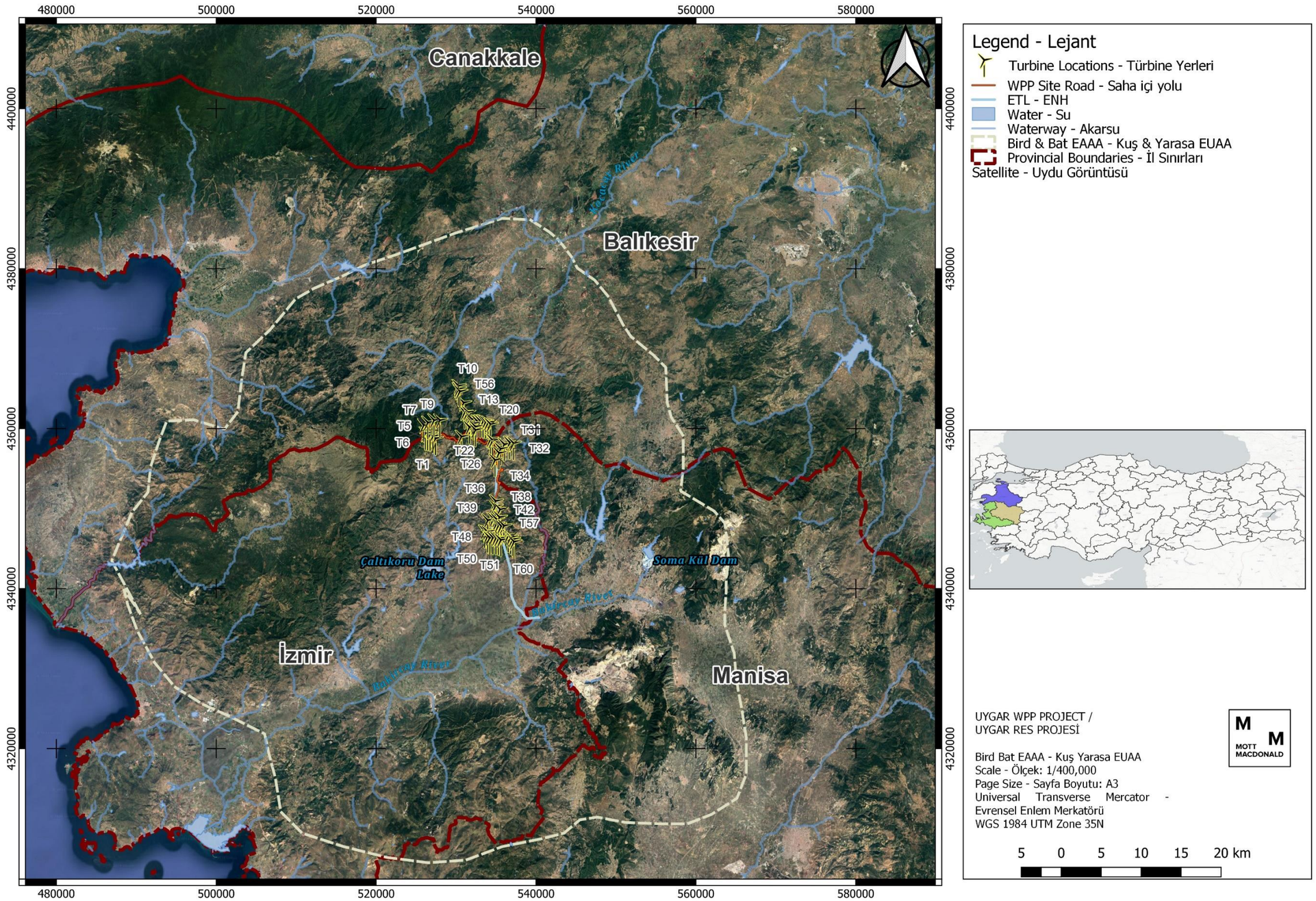


Figure 12-2: EAAA for Birds and Bats for the Project.

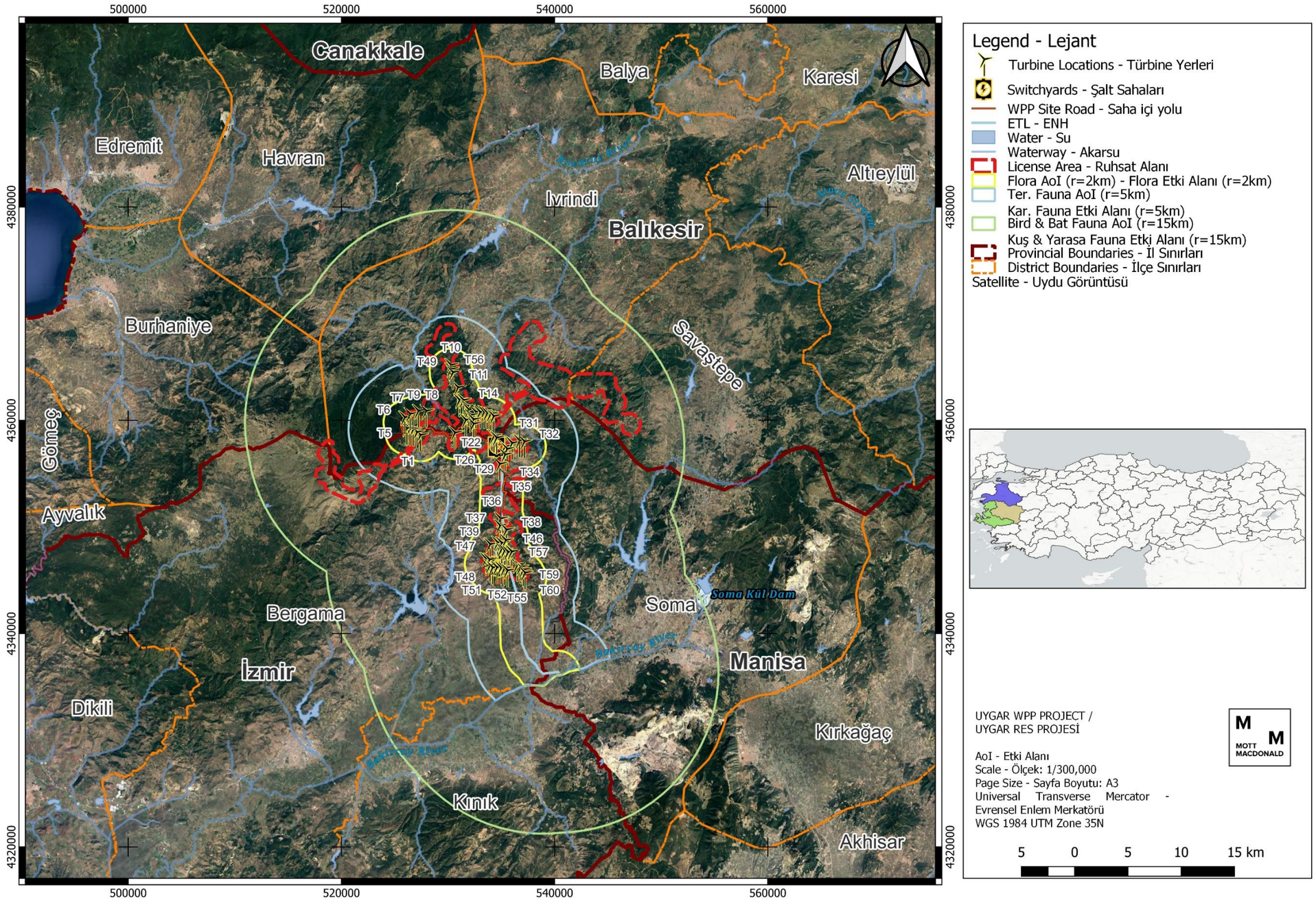


Figure 12-3: AoI for different biological taxa for the Project

.

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 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,
    - 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 area 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:** 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 will be described in successive sections.

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 (all appendices relevant to flora, fauna, ecosystem, bat and ornithology)
- Relevant publicly available peer-reviewed literature
- White and grey literature
- Public biodiversity databases
  - eBird[130],
  - European Breeding Bird Atlas[131]
  - iNaturalist[132],

[130] URL: Ebird.org. Last accessed: 2 January 2024.
[131] URL: ebba2.info. Last accessed: 2 January 2024
[132] URL: Inaturalist.org. Last accessed: 2 January 2024.

  - Tramem[133],
  - Trakel[134],
  - Trakus[135],
  - Movebank[136]
  - Global Invasive species database[137]
  - Bizimbitkiler[138]
- 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

Baseline information on biodiversity 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;

- Nartus conducted fieldwork for the examination of the Project activity area on 9 December 2022 in Balıkesir and 12 December 2022 in Manisa. Nartus also conducted fieldworks in and around the Project area to assess the ecological structure in June 2022 over 3 days, and in February and March 2023, three days each for a total of 6 days.
- For flora, surveys were carried out in the Project area between 11 and 12 June 2022. Also two field visits, lasting three days each, were carried out in February and March 2023.
- For ornithological studies, three separate surveys were presented,
  - Study 1 was 3 days of point counts conducted on 11,12, and 13 May 2022;
  - Study 2 was point and transect counts carried out over 30 days each in Autumn 2022 (7 August – 3 October 2022) and Spring 2023 (10 March – 25 May);
  - Study 3 was a Vantage Point survey conducted over 3 days, 5-6-7 March 2023.
- For bat surveys, two separate surveys were presented,
  - Study 1 was mainly a desktop study with three days site visit were conducted in June 2022;
  - Study 2 was conducted over 5 days in May 2023.
- The observations and examinations were conducted in and around the Project area to assess the presence of honeybees in March and June 2023.

[133] URL: Tramem.org. Last accessed: 2 January 2024.
[134] URL: Trakel.org. Last accessed: 2 January 2024.
[135] URL: Trakus.org. Last accessed: 2 January 2024.
[136] URL: movebank.org. Last accessed: 2 January 2024.
[137] URL: iucngisd.org. Last accessed: 2 January 2024.
[138] URL: Bizimbitkiler.org.tr. Last accessed: 2 January 2024.

- For terrestrial fauna (non-bat mammals, amphibians, reptiles) a 5-day study in May 2023 was conducted.

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 ESIA study. It was possible to conduct a brief site visit (one day) which can be described as a site reconnaissance visit.

On 2 October 2023, the Project area 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.

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 Good International Industry Practice (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.

Table 12-4: Criteria for determining impact

		Magnitude						
		Adverse			Neutral	Beneficial		
Sensitivity		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.[139] Conversely, Türkiye has been and is one of the countries that has been on the fastest track for ecosystem collapse and biodiversity loss.[140]

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 [141], along with populations of threatened bat species and bat migratory flyways.

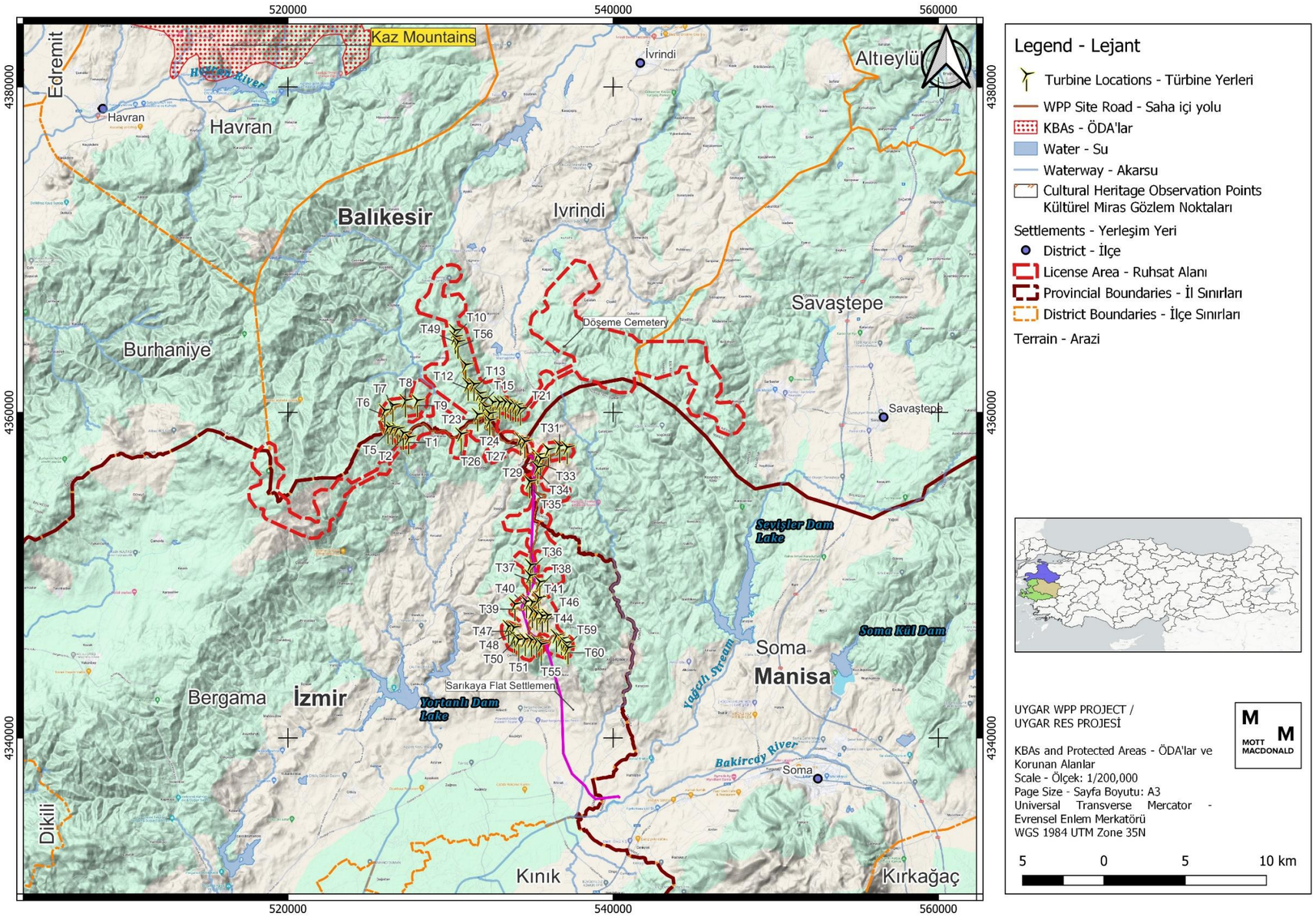
12.3.2 Legally protected and internationally recognised areas

All components of Uygar WPP including turbines, roads and ETL are not located within any protected or international recognized area and the AoI does not overlap any such areas either.

TEIAS, for grid balancing purposes, is planning an external ETL for the Project. The Project is required to be able to connect to the ETL if and when TEIAS builds the ETL, however this ETL is not within Project scope since it will be funded, built and operated completely by TEIAS. This external ETL is planned to over 100 km in length and sections of the ETL crosses Kaz Mountains Key Biodiversity Area (KBA). Since the planning for this ETL is in very early stages,

[139] Turkey's Nature | Key Biodiversity Areas of Turkey (keybiodiversityareasturkey.org)
[140] https://epi.yale.edu/epi-results/2020/component/bdh. Accessed on 10/11/23.
[141] IKGT, 2010. Unpublished.

no final design is available, and neither is a definite date that it will be built, the external ETL has been completely scoped out from any further assessment.



Legend - Lejant

- Turbine Locations - Türbine Yerleri
- WPP Site Road - Saha içi yolu
- KBAs - ÖDA'lar
- Water - Su
- Waterway - Akarsu
- Cultural Heritage Observation Points
  Kültürel Miras Gözlem Noktaları

Settlements - Yerleşim Yeri

- District - İlçe
- License Area - Ruhsat Alanı
- Provincial Boundaries - İl Sınırları
- District Boundaries - İlçe Sınırları

Terrain - Arazi

UYGAR WPP PROJECT /
UYGAR RES PROJESİ

KBAs and Protected Areas - ÖDA'lar ve Korunan Alanlar
Scale - Ölçek: 1/200,000
Page Size - Sayfa Boyutu: A3
Universal Transverse Mercator - Evrensel Enlem Merkatörü
WGS 1984 UTM Zone 35N

MOTT MACDONALD

5 0 5 10 km

Figure 12.4: Location of the Project and Kaz Mountains KBA (upper left corner)

12.3.3 Habitats and Flora

The total of 60 turbines, switchyard, roads and ETL are spread over a vast area in Western Türkiye, in Balıkesir Province, Burhaniye and Savaştepe Districts, Haydar, İkizce, Büyükyenice and Taşdibi Neighbourhoods; İzmir Province, Bergama District, Oruçlar, Ürkütler, Yukarıada, İneşir, Alhatlı, Durmuşlar, Çamoba and Kozluca Neighbourhoods; Manisa Province, Soma District, Kiraz Neighbourhood. As the WPP is sizable, there are three ETLs, one connecting to a substation due north and north-west (114 km toward Bayramic, Canakkale), one connecting to a substation due south (11,6 km toward Izmir), and an internal ETL for connection within the WPP (11,6 km). Turbine sittings are located between 500-900 m elevation, with east-west extension of roughly 12 km and north-south extension of 20 km.

The dominant habitat type of the project impact area consists mostly of damaged red pine-oak and damaged black pine-oak communities. Apart from these forest habitats, there are forest glades where under grazing pressure, tree plantation areas and subalpine meadows. No endangered plant species were found in Project footprint during National EIA study, however, three vulnerable plant species were identified within the impact area. Other identified endemic species are in the LC category.

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.

According to National EIA data, a total of 9985 trees are expected to be cut down within the scope of the Project.

Table 12-5: Habitat Types of the Project AoI

Broad habitat type	EUNIS Habitat Type	Extend within Project Footprint (ha)	Percentage (%)
Woodland	G1.7 Termophilus deciduous woodland	321.4	1.6%
	G4.B Mixed mediterranean pine - thermophilous oak woodland	4472.4	22.8%
	G4.D Mixed Black pine ([Pinus nigra]) - evergreen oak woodland	2274.7	11.6%
Step	E4.4 Calcareous alpine and subalpine grassland	4509.6	23.0%
Inland unvegetated or sparsely vegetated habitats	H3.6 Weathered rock and outcrop habitats	65.4	0.3%
Agricultural Areas	I1.1 Intensive unmixed crops	3643.1	18.6%
	I1.3 Arable land with unmixed crops grown by low-intensity agricultural methods	3923.0	20.0%
	I2.2 Small-scale ornamental and domestic garden areas	142.7	0.7%
Constructed, industrial and other artificial habitats	J1.2 Residential buildings of villages and urban peripheries	242.0	1.2%

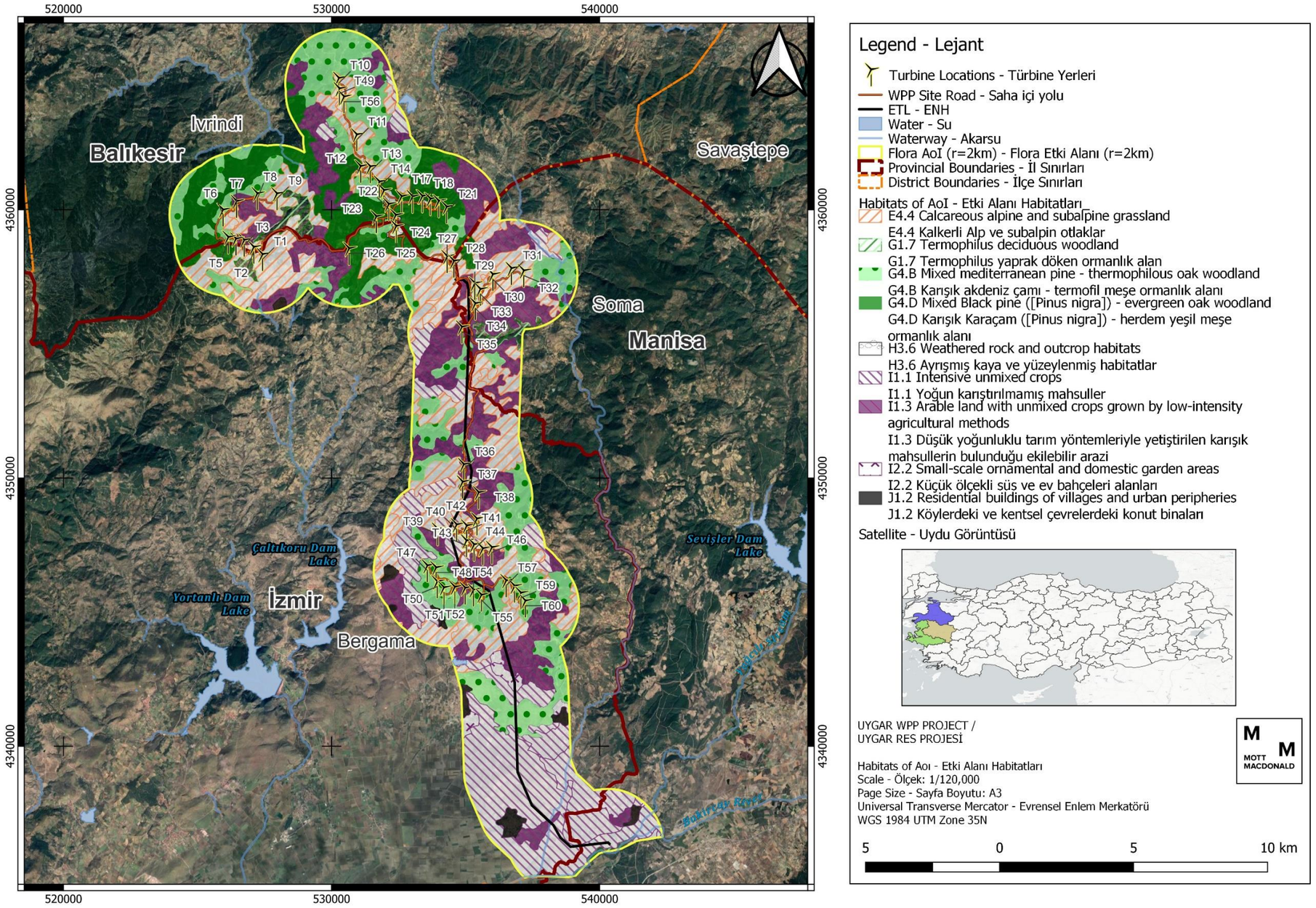


Figure 12.5: Habitat Types of the Project AoI

The amount of habitat loss due to project activities is listed below.

Table 12-6: Habitat Loss on Site Roads

EUNIS	Area (ha)	Percentage
E4.4 Calcareous alpine and subalpine grassland	25.8	0.6%
G1.7 Termophilus deciduous woodland	2.3	0.7%
G4.B Mixed mediterranean pine - thermophilous oak woodland	9.8	0.2%
G4.D Mixed Black pine ([Pinus nigra]) - evergreen oak woodland	10.9	0.5%
H3.6 Weathered rock and outcrop habitats	3.8	5.9%
I1.1 Intensive unmixed crops	5.2	0.1%
I1.3 Arable land with unmixed crops grown by low-intensity agricultural methods	17.4	0.4%
Total	75.2	

Table 12-7: Habitat Loss on Turbine Footprint

EUNIS	Area (ha)	Percentage
E4.4 Calcareous alpine and subalpine grassland	32.9	0.7%
G1.7 Termophilus deciduous woodland	2.7	0.8%
G4.B Mixed mediterranean pine - thermophilous oak woodland	17.1	0.4%
G4.D Mixed Black pine ([Pinus nigra]) - evergreen oak woodland	8.2	0.4%
H3.6 Weathered rock and outcrop habitats	10.2	15.6%
I1.1 Intensive unmixed crops	6.4	0.2%
I1.3 Arable land with unmixed crops grown by low-intensity agricultural methods	11.9	0.3%
Total	89.4	

Table 12-8: Habitat Loss on Switchyard Area

EUNIS	Area	Percentage
E4.4 Calcareous alpine and subalpine grassland	6.2	0.1%
G1.7 Termophilus deciduous woodland	0.0	0.0%
G4.B Mixed mediterranean pine - thermophilous oak woodland	0.0	0.0%
G4.D Mixed Black pine ([Pinus nigra]) - evergreen oak woodland	0.0	0.0%
H3.6 Weathered rock and outcrop habitats	0.0	0.0%
I1.1 Intensive unmixed crops	0.0	0.0%
I1.3 Arable land with unmixed crops grown by low-intensity agricultural methods	4.1	0.1%
Total	10.3	

Table 12-9 Habitat Loss on ETL

EUNIS	Area (ha)	Percentage
E4.4 Calcareous alpine and subalpine grassland	26.7	0.6%
G4.B Mixed mediterranean pine - thermophilous oak woodland	27.8	0.6%
I1.1 Intensive unmixed crops	55.4	1.5%
I1.3 Arable land with unmixed crops grown by low-intensity agricultural methods	35.5	0.9%
I2.2 Small-scale ornamental and domestic garden areas	3.1	2.2%
Total	148.6	

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 area is provided in National EIA. A total of 420 plant taxa were identified. The full list of species is not presented in this document, vulnerable endemic species are listed in Table 12-10. 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 AoI

Taxon	National Red List Category
Carlina oligocephala subsp. pallescens	VU
Digitalis trojana	VU
Stipa cacuminis	VU
Ferulago trojana	VU
Cirsium balikesirense	VU
Ranunculus heterorrhizus	VU

12.3.4 Birds

For ornithological studies, three separate surveys were conducted as part of National EIA:

- Study 1 was 3 days of point counts conducted on 11,12, and 13 May 2022;
- Study 2 was point and transect counts carried out over 30 days each in Autumn 2022 (7 August – 3 October 2022) and Spring 2023 (10 March – 25 May);
- Study 3 was a Vantage Point survey conducted over 3 days, 5-6-7 March 2023.

Point and transect counts are useful for determining presence/absence of species during a certain time period. Study 1 provides a “possible species list for the Project” but does not differentiate method of indication for the Project area (observation vs literature). Study 2 provides count totals but does not define any VPs or quantify survey effort, but the count totals broken down by month are informative. As for study 3, it is conducted using VP methodology, but the survey period is extremely limited (3 days in early March, when migration had not truly commenced).

The following deficiencies are noted about Study 3 (VP study) in meeting lender standards:

1. Visual coverage of the VPs of the current turbine layout is not sufficient.
2. The viewing angles and visual coverage of the turbines from the VPs were not provided.
3. Effort duration was 27 hours per VP (should be at least 36 hours per VP).
4. Species are only reported on a presence / absence basis, counts were not reported.
5. Target species list was not defined or provided.
6. The surveys did not cover significant time periods for migration: rest of the spring season after early March, and any of autumn season.
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.

The Project area is located close to the minor migratory route of birds on the Aegean shore, and the ETL is close to the Dardanelles routes[142]. Some level of migrant activity, including that of large soaring species which are documented in Turkish migration counts, is expected for the Project area. Although study 2 does not quantify effort duration, the total counts for each month is useful in understanding that there is evidence of migratory activity at the site.

The Project area is vast and comprises many types of land uses and habitats, including residential areas, sub-alpine grasslands, agricultural fields, young and mature *Quercus* and *Pinus* forest, shrubs, rocky areas and exposed cliff walls etc. The area can carry a moderate amount of resident large soaring species due to availability of habitats, including nesting structures, and hunting/feeding areas. Common and 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, along with mountain species like Golden Eagle (*Aquila chrysaetos*) and Peregrine Falcon (*Falco peregrinus).* As such these species were documented in the National EIA studies.

Three groups of bird species are specifically important for the site: (1) large soaring migratory species (storks, pelicans, eagles, buzzards, sparrowhawks, falcons, harriers, kites), (2) large soaring resident species and (3) other resident species of conservation significance. Based on the three groups identified earlier that are significant for the site, target species are provided on Table 12-11.

Table 12-11: List of significant bird species and conservation status

English name	Scientific name	IUCN	National	Bird directive	BERN	L/O*
Levant Sparrowhawk	*Accipiter brevipes*	LC	VU	Annex I	Appendix II	L
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
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
Long-eared Owl	*Asio otus*	LC	LC	-	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

[142] Erciyas Yavuz, K. 2014. Türkiye'deki Kus Hareketliligi Haritalari; movebank.org and eBird data.

English name	Scientific name	IUCN	National	Bird directive	BERN	L/O*
Greater Spotted Eagle	*Clanga clanga*	VU	VU	Annex I	Appendix II	L
Lesser Spotted Eagle	*Clanga pomarina*	LC	EN	Annex I	Appendix II	L
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	O
Eleonora's Falcon	*Falco eleonorae*	LC	EN	Annex I	Appendix II	L
Lesser Kestrel	*Falco naumanni*	LC	VU	Annex I	Appendix II	L
Peregrine Falcon	*Falco peregrinus*	LC	VU	Annex I	Appendix II	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	L
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	L
Red Kite	*Milvus milvus*	LC	DD	Annex I	Appendix II	L
Egyptian Vulture	*Neophron percnopterus*	EN	VU	Annex I	Appendix II	O
Osprey	*Pandion haliaetus*	LC	DD	Annex I	Appendix II	L
Dalmatian Pelican	*Pelecanus crispus*	NT	VU	Annex I	Appendix II	O
Great White Pelican	*Pelecanus onocrotalus*	LC	EN	Annex I	Appendix II	L
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
European Turtle-Dove	*Streptopelia turtur*	VU	VU	Annex II B	Appendix III	O

*L: Literature, O: Observation

Vantage Point Survey (Study 3)

For the VP survey component of ornithological surveys as part of National EIA, the site was visited over 3 days, 5-6-7 March 2023. Four Vantage Points were utilized (Figure 12.6, Table 12-12). Effort duration at each Vantage Point for each survey was 27 hours. Study 3 only reports presence/absence information, counts are not reported. Presence absence information from study 2 was reported on Table 12-11.

Table 12-12: Locations of the Vantage Points (WGS 84 UTM 35S)

Vantage Point	N	E
1	4364040.38	530457.99
2	4360325.41	532604.98
3	4356333.43	535354.96
4	4347489.49	535024.96

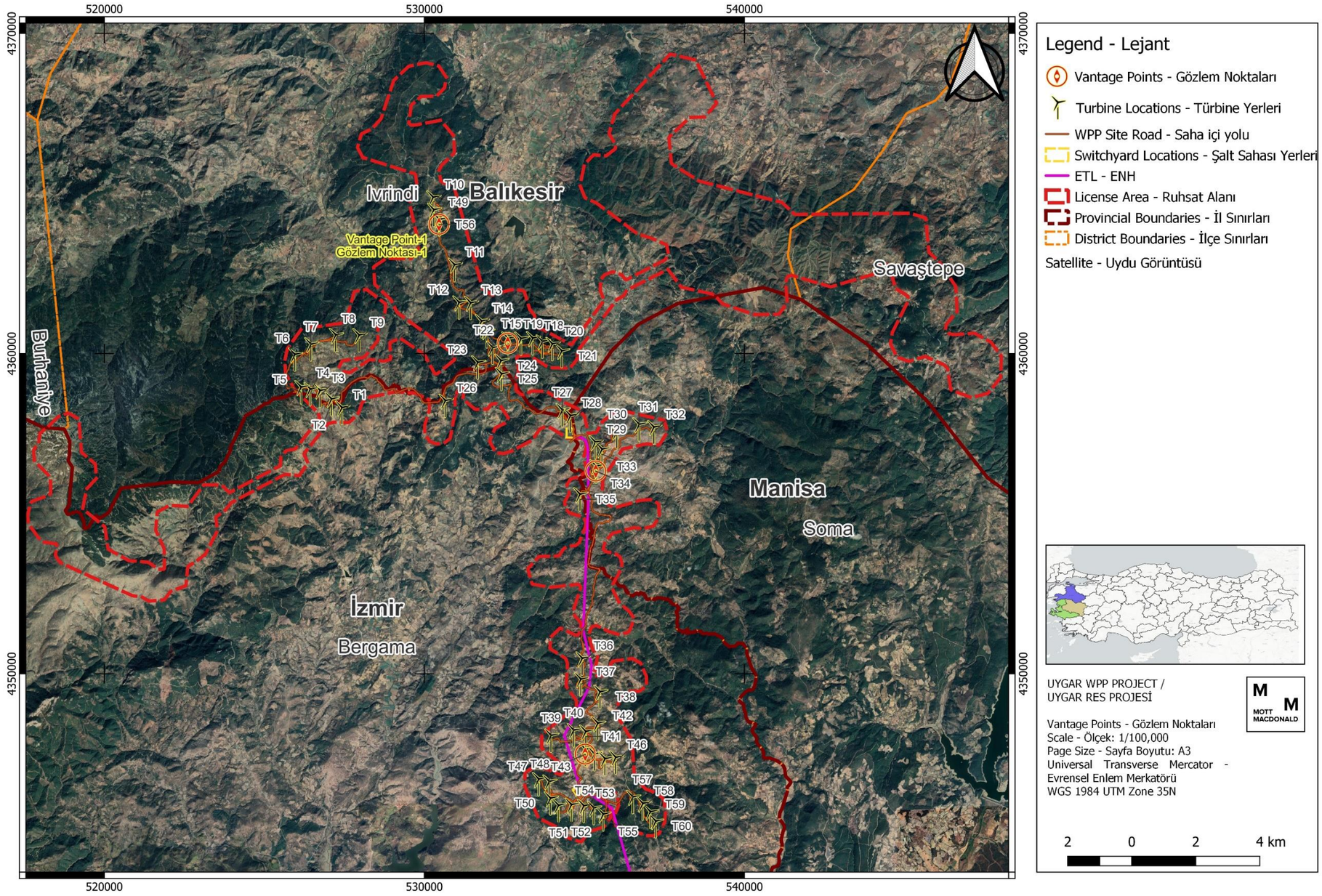


Figure 12.6: The vantage points used in VP studies (study 3).

Transect and Point Counts Survey (Study 2)

The National EIA includes a survey that was conducted via point and transect methodologies carried out over 30 days each in Autumn 2022 (7 August – 3 October 2022) and Spring 2023 (10 March – 25 May 2023). This report does not provide location information for points or transects but monthly totals are reported, which are summarized by season in Table 12-13 below 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.

Table 12-13: Counts of target species for each migratory season

Common Name	Scientific name	Autumn	Spring
Northern Goshawk	*Accipiter gentilis*	8	8
Eurasian Sparrowhawk	*Accipiter nisus*	13	10
Golden Eagle	*Aquila chrysaetos*	21	22
Gray Heron	*Ardea cinerea*	37	34
Purple Heron	*Ardea purpurea*	20	20
Long-eared Owl	*Asio otus*	9	6
Common Buzzard	*Buteo buteo*	24	22
Long-legged Buzzard	*Buteo rufinus*	20	20
White Stork	*Ciconia ciconia*	232	146
Black Stork	*Ciconia nigra*	6	7
Short-toed Snake-Eagle	*Circaetus gallicus*	20	20
Eurasian Marsh-Harrier	*Circus aeruginosus*	4	4
Hen Harrier	*Circus cyaneus*	6	6
Montagu's Harrier	*Circus pygargus*	20	19
Merlin	*Falco columbarius*	1	2
Peregrine Falcon	*Falco peregrinus*	20	17
Eurasian Hobby	*Falco subbuteo*	5	5
Eurasian Kestrel	*Falco tinnunculus*	6	6
Red-footed Falcon	*Falco vespertinus*	5	5
Booted Eagle	*Hieraaetus pennatus*	3	3
European Honey-buzzard	*Pernis apivorus*	10	10
European Turtle-Dove	*Streptopelia turtur*	23	23

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, two separate surveys were presented. Study 1 was mainly a desktop study, that presents a species list based on recorded species from nearby wind farm studies, with three days site visit component conducted in June 2022 presumably for investigation of habitat suitability. Study 2 was carried out over 5 days in May 2023.

The following deficiencies are noted about the bat surveys in meeting lender standards:

1. Roost survey methodology was not detailed and results were not clearly shown.
2. Details regarding acoustic sampling equipment, field methodology and sound analysis methodology not provided.

3. Locations of static sampling points and justification for selection not provided.
4. Details regarding static sampling are not sufficiently provided.
5. Details regarding transect sampling are not sufficiently provided.
6. Bat Activity Index not available.
7. Heat maps are not available.
8. Surveys only cover one season (summer). At least 3 seasons need to be covered.
9. Environmental parameters and survey conditions of each date were not provided.
10. Transect locations, distances and effort durations not provided.
11. 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 field study reports 12 species, however recording numbers are not provided either in tables or graphs. The study reports relative abundance of *Pipistrellus pipistrellus* as high, and *Nyctalus noctule, Hypsugo savii, Myotis myotis, Miniopterus schreibersii* (VU), and *Vespertilio murinus* as medium. Sufficient temporal (year-on-year and seasonal) and spatial coverage in addition to quantitative data 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, conservation status, collision risk

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
Bechstein's Myotis	*Myotis bechsteinii*	NT	VU	NT	I, II	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
Daubenton's Myotis	*Myotis daubentonii*	LC	-	-	II	IV	Low	L
Geoffroy's Bat	*Myotis emarginatus*	LC	LC	LC	I, II	II, IV	Low	O
Greater Mouse-eared Bat	*Myotis myotis*	LC	LC	LC	I, II	II, IV	Low	O
Whiskered Myotis	*Myotis mystacinus*	LC	LC	LC	II	IV	Low	L
Natterer's Bat	*Myotis nattereri*	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	L
Brown Long-eared Bat	*Plecotus auritus*	LC	-	-	II	IV	Low	L
Grey Long-eared Bat	*Plecotus austriacus*	NT	NT	-	II	IV	Low	L
Mediterranean Long-eared Bat	*Plecotus kolombatovici*	LC	NT	LC	II	IV	Low	L

*L: Literature, O: Observation

12.3.6 Terrestrial fauna (non-bat mammals, reptiles, amphibians)

During the National EIA terrestrial fauna studies, 8 amphibian species, 25 reptile species and 21 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 were not provided
3. Quantitative and geospatial data was 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. Marbled polecat is listed in literature and might be a rare occurrence.

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 indicated at the Project area in National EIA. Presence of a good Roe Deer population in the area was confirmed with conservations with locals.

Note that the same fauna study also included a freshwater fish survey where several species were identified near the Project, but since the Project footprint is not expected to interact with significant freshwater features, these studies are not reported as the species are scoped out.

Table 12-15: List of significant terrestrial fauna

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	-	L
Marbled polecat	*Vormela peregusna*	VU	Appendix I-II	Appendix II-IV	L

***L: Literature, O: Observation

12.3.7 Invertebrates

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 this 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)[143], 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, beekeeping 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, Thymus spp. and Hypericum spp.collecting in the area. The collected species are not traded, and it has been stated that they are collected only for domestic use. The removal of trees has the potential to impact on regulating and provisioning 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 invasive alien species (IAS) in Turkey have been rather limited, Turkey 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 Turkey: *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[144]

[143] Milennium Ecosystems Assessment (MA). 2005. Ecosystems and Human Well-being: Biodiversity Synthesis. Washington, D.C.: World Resources Institute.

[144] 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.

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.. The national EIA includes an invasive species list. However, these species are opportunistic species for modified habitats such as agricultural lands. Therefore, the relevant species are not referred to as invasive in this section.

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.

Table 12-16: Summary of Main Biodiversity Receptors

Receptor	Sensitivity	Brief Description
Terrestrial Natural Habitats	Medium	G4.B Mixed mediterranean pine - thermophilous oak woodland G4.D Mixed Black pine ([Pinus nigra]) - evergreen oak woodland G1.7 Termophilus deciduous woodland E4.4 Alpine and subalpine grasslands H3.6 Weathered rock and outcrop habitats
Terrestrial Modified Habitats	Low	Modified Habitats
Terrestrial flora	Medium	*Digitalis trojana* *Cirsium balikesirense*
Terrestrial flora	Low	All other flora species within the AoI
Terrestrial fauna	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* *Myotis capaccinii* *Nyctalus lasiopterus* *Nyctalus leisleri* *Nyctalus noctula* *Pipistrellus nathusii* *Pipistrellus pipistrellus* *Pipistrellus pygmaeus*
Bats	Medium	All other bat species within the AoI

Birds	High	Large soaring migrants of Turkish flyways Large soaring resident species CR, EN, VU 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
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

Habitats

The Project AoI supports several types of natural habitats. Approximate effected habitats for each type is as follows: *Pinus nigra*-oak woodland *Pinus brutia*-oak woodland, Termophilus deciduous woodland, Weathered rock and outcrop habitats, Subalphin meadows. The possibility of construction activities to affect basic biodiversity features is medium. High amounts of tree felling are expected for the turbine area and access roads as well as the ETL. 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 major magnitude during construction.

Flora

Six VU species were identified by National EIA within Project AoI. These species are likely to be affected by project construction activities such as dust impacts. Addition of AIS during construction will impact native biodiversity and vegetation removal in the areas of agricultural crops, herbaceous vegetation (including grassland) 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 moderate.

Terrestrial fauna (amphibians, reptiles, non-bat mammals)

No threatened or protected mammals (excluding bats) 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. Common tortoise was observed at the Project but the species is widespread and has robust populations in Türkiye. 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. Construction impact on these species will be reversible for the most part. The magnitude of this impact to fauna 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). KBA trigger species are primarily associated with cave structures within Kaz Mountain KBA and the interaction of the precise ETL route with such structures is not clear. Extensive loss of roosting structures is not expected except at the ETL route where forest will be cleared and mountainous terrain will be prepared 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. The impact on these species will be reversible for the most part. Construction impacts of the Project are limited and minor for the described impact types.

Birds

Construction activities will impact the 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. 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.

Ecosystem Services

The ecosystem services defined for the Project are agricultural activities, grazing, beekeeping and the benefits provided by forests. The project impact on this collection, which is carried out for domestic use by a few households, is low. 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,
- Introduction of alien invasive species (AIS) impacting native biodiversity,
- Loss of ecosystem services,
- 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

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*-oak woodland *Pinus brutia*-oak woodland, Termophilus deciduous woodland, Weathered rock and outcrop habitats, Subalphin meadows. High amounts of tree felling are expected for the turbine area and access roads. 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 site 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 major magnitude during operation.

Flora

Six VU species were identified by National EIA within Project AoI. Two of the identified species are literature data, while the other four were observed. Since the species were detected in the project area, related species might be impacted. It is estimated that the operational impacts will be major.

Terrestrial fauna (amphibians, reptiles, non-bat mammals)

No threatened or protected mammals (excluding bats) 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.

Bats

Considering the high collision / barotrauma mortality risk and migration processes, bat species with high sensitivity were identified, including two species which are KBA triggers which were also discussed under “International Recognised Areas (Kaz Mountains KBA)” in this section. 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. The project is located near minor routes. Some level of migrant activity might occur here, however sustained high rates of migration are not expected. This expectation needs to be confirmed and will be clarified in additional baseline collection.

For resident and breeding species, the Project AoI encompasses a variety of habitat configurations which can support a considerable level of activity. The Project AoI encompasses rock faces and cliffs, decidious, evergreen and mixed forests, several running and standing water features, and agricultural fields in the valleys. Both the variety of habitats, and the low level of anthropogenic influence at some parts (especially the northern side of the Project AoI) indicates that large bodied species would be attracted to the area for nesting, perching and hunting / feeding opportunities. The habitat configurations are expected to be attractive to virtually all large bodied species in the region, however the species specific comments can only be made following the additional baseline collection in 2024.

Other impact types during operational phase are displacement and avoidance and barrier effects (for migrants). These impacts are currently a challenge to measure or predict, but given the span of the external ETL, they are expected to be a significant impact type as well.

12.4.4 Summary

The impact assessment summary for construction and operation phases of the Project is given in Table 12-15.

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	Natural Habitats	Medium	Construction Operation	AoI	Irreversible	Certain	Major	Medium	Major
	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	Medium	Construction Operation	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
Habitat loss and degradation Air, soil and water pollution Dust emissions Disturbance	Bats	Low	Construction Operation	AoI	Reversible	Possible	Negligible	High	Negligible
		Low		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	Birds	Low	Construction	AoI	Reversible	Possible	Minor	High	Moderate

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Air, soil and water pollution Dust emissions		Low	Operation				Minor	Medium	Minor
Disturbance		Low					Minor	Low	Negligible
Collision / electrocution mortality	CR, EN. VU species 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
Artificial light	Birds	Medium	Operation	AoI	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	Terrestrial fauna	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	*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 site roads, turbine locations, 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 12.5.1 and 12.5.2 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 taken into account.

- 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 following general measures will be considered;

- 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 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, BAP Framework will include SDoD commitments.
    - The most widely used method involves observers strategically located at vantage points around the 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[145] .
- The Project components will be managed to not offer perching and nesting opportunities,
- Safe perching, roosting and nesting opportunities will be provided,
- A turbine curtailment approach for minimising bat mortality will be developed,
- Trainings will be provided to raise awareness of all site personnel.

[145] 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	Natural Habitats	Major	Moderate
Habitat loss and degradation Disturbance Air pollution AIS competition	Flora	Moderate	Minor
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	Major (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*	Minor	Negligible

12.6 Biodiversity Monitoring and Adaptive Management

Table 12-19 summarises additional biodiversity 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.

Biodiversity Action Plan (BAP) should be developed to define net gain targets for critical habitat trigger species. Please 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 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 Annually during operation	Construction	Revise Invasive Species Management Plan
Flora Seed Collection	Project Company Flora Expert	• *Digitalis trojana* • *Cirsium balikesirense*	*Digitalis trojana: T21* *Cirsium balikesirense: T10, T16, T27, T28, T29,T32, T33, T34,T49,T56*	2024 spring- summer season (May-September)	Construction	Revise Biodiversity Management Plan and Revise Critical Habitat Assessment regarding results of Monitoring Develop Net Gain Requirements (if necessary) Prepare Biodiversity Action Plan (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.	1. Migration monitoring regarding NatureScot methodology 18 Vantage Points covering (to be confirmed on-site prior to monitoring activities); • 5 VPs for the northern turbine cluster and ETL • 3 VPs for the southern turbine cluster and ETL	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 Breeding bird once a month (April – July)	Construction	Revise Biodiversity Management Plan and Revise Critical Habitat Assessment regarding results of baseline Develop Net Gain Requirements (if necessary) Prepare Biodiversity Action Plan (if necessary) Develop Shut-down on demand protocol

		• 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 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.	• 10 additional VPs for the external ETL coverage 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 turbine swept AoI (>70%), external ETL will achieve high coverage at areas of significance such as wetlands, KBA overlaps, known breeding territories of sensitive taxa etc.			
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.	NatureScot (2021) guidelines should be followed. 30 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 Biodiversity Management Plan and Revise Critical Habitat Assessment regarding results of baseline Develop Net Gain Requirements (if necessary) Prepare Biodiversity Action Plan (if necessary) Develop and implement turbine curtailment

		• Surveys will constitute 2nd year of baseline collection				

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
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 6 days total Spring 2024	Operation	Revise Biodiversity Management Plan and Revise Critical Habitat Assessment regarding results of Monitoring Develop Net Gain Requirements (if necessary) Prepare Biodiversity Action Plan (if necessary)
Invasive species	Project Company	Identification of invasive species	Working areas of Project and adjacent habitats (including access roads)	Annually	operation	Revise 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 Biodiversity Management Plan and Revise Critical Habitat Assessment 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 • Bird fatality monitoring • Bat fatality monitoring	All turbine locations and ETL's on Project area	Operation	Operation	Revise Biodiversity Management Plan and Revise Critical Habitat Assessment regarding results of Monitoring

		• Survey design will include appropriate carcass search methodology				Develop Net Gain Requirements (if necessary) Prepare Biodiversity Action Plan (if necessary)
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, (IAoI level) will be conducted.	2 years of Operation Same parameters as pre-operation Breeding raptor (IAoI level) will be determined targeting the breeding windows of species of concern	Operation	Revise Biodiversity Management Plan Develop Net Gain Requirements (if necessary) Prepare Biodiversity Action Plan (if necessary) Shut-down on demand protocol
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 by the Lenders. • Survey design will include appropriate carcass search methodology, experimental and control techniques. • Survey design will include the ETL route and produce robust statistical results for mortality at ETL.	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 Biodiversity Management Plan Develop Net Gain Requirements (if necessary) Prepare Biodiversity Action Plan (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 techniques, along with exploration of caves and cavities, roost counts,	NatureScot (2021) guidelines should be followed. 30 static sampling points at selected turbine locations, supplemented with transect	2 years and at least 3 seasons (spring, summer, autumn) to account for seasonal differences in environment, species	Operation	Revise Biodiversity Management Plan and Revise Critical Habitat Assessment regarding results of Monitoring

		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	coverage of roads and pads (to be confirmed on site).	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		Develop Net Gain Requirements (if necessary) Prepare Biodiversity Action Plan (if necessary)
Bats	Project Company Bat Expert	Post construction bat fatality monitoring (PCFM) (2023). • The operational phase surveys will 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 and produce robust statistical results for mortality at ETL.	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 Biodiversity Management Plan Develop Net Gain Requirements (if necessary) Prepare Biodiversity Action Plan (if necessary) Develop and implement turbine curtailment

13 Social Environment

13.1 Introduction

This Chapter provides the details of the social baseline conditions of the Project-affected neighbourhoods on the basis of district and neighbourhood 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 neighbourhoods 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 visits 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 the region 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 neighbourhoods 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 neighbourhoods, including the ones intersecting with the Project's access roads, were visited as part of the ESIA studies. The neighbourhoods located in the immediate vicinity of the Project area were visited, local residents in these neighbourhoods and key stakeholders (i.e., representatives of official institutions and neighbourhood mukhtars) were consulted, which are listed below:

- Mukhtar and residents of Çamoba neighbourhood (İzmir)
- Member of the mukhtar office (Aza) and residents of Alhatlı neighbourhood (İzmir)
- Bergama District Directorate of Agriculture and Forestry (İzmir)
- Mukhtar and residents of Durmuşlar neighbourhood (İzmir)
- Mukhtar and residents of Kiraz neighbourhood (Manisa)
- Mukhtar and residents of Haydar neighbourhood (Balıkesir)
- Mukhtar and residents of İkizce neighbourhood (Balıkesir)
- İvrindi District Directorate of Agriculture and Forestry (Balıkesir)

The information obtained from these consultations is provided as a separate document (see Appendix Section B) and the main findings of the site visit are given under Section 13.3.

Additionally, 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 IFC PS5/ EBRD PR5 and preparing a plan to eliminate gaps.

In this context, Community Level Survey (CLS), Household Level Survey (HLS) for Socio-Economic Baseline and Asset Inventory and Census studies were carried out. Although the results and details are discussed in the Project-specific Resettlement Action Plan (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 Project Affected Settlements (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 16 settlements based on the available expropriation data.	Semi-structured community level questionnaires with the 16 mukhtars in four4 Project Affected Settlements (PASs).
Households-level surveys	Full census The owners (300 PAPs) and users of affected 298 private lands. There are 45 affected public lands. Public lands include roads, bushes, raw soil, forestland etc. All of them are not suitable for agricultural activity.	151 owner/user households with 478 members of 246 affected private lands and 1 public land (informal user) have been included to HLS application. All identified users and HLS application status of the parcels have been added to the Asset Inventory and Census with their livelihood sources, vulnerabilities and total land holdings and impact rates. The owners of 49 (investors) of 298 private lands were not known to the headmen and local people. For this reason, they could not be included in the HLS application, but investors' lands are not used for income-generating purposes. 3 landowners could not be reached during the field visit or by phone. 3 landowners did not want to answer questions because their land was not used. 5 parcels had two users and therefore both users were included in the HLS application separately.

13.2.3 Limitations and Assumptions

Six out of 16 Project-affected neighbourhoods were visited by the Consultant as a part of the site visits conducted in October and December 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 neighbourhoods 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 neighbourhood 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.

Following these data collection processes, another site visit was conducted in February 2024 for land acquisition, expropriation and resettlement activities within the scope of the Project. The outcomes of this site visit are detailly reflected in the Resettlement Action Plan (RAP) prepared specific to the Project whereas the ESIA Report covers the summary of the RAP findings.

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. 3 landowners could not be reached during the field visit or by phone.
- It is learned that 49 of affected private lands are owned by people/investors who bought land in the region for investment purposes. They could not be reached.
- 3 landowners did not want to answer questions because their land was not used.
- 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 16 neighbourhoods in Bergama, Soma and İvrindi districts.These are the nearest settlements to the Project area including Alhatlı, Çamoba, Duğla, Durmuşlar, Haydar, İkizce, İneşir, Kaplan, Kaplan (Göçbeyli), Kiraz, Kozluca, Oruçlar, Sarıcaoğlu, Yalnızdam, Yayladalı, and Yukarıada neighbourhoods. Two site visits were conducted by Mott MacDonald Social Team on 26 October and 7-8 December 2023. During this site visits, baseline information on the neighbourhoods 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, the Project will improve local infrastructure capacity, such as improving the access roads of the neighbourhoods, 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 assessed 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.

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 neighbourhoods 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 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 below summarizes the communities located within the social AoI and the potential adverse impacts during the construction phase of the Project.

Table 13.2: Communities located within the Social Area of Influence (AoI) during construction phase of the Project

Neighbourhoods	Information on the Location	Impact Prioritization	Potential Adverse Impacts
Bergama District Neighbourhoods			
Kaplan (Göçbeyli)	Located to the southeast of the nearest turbine (T55) and the proximity of the turbine is around 3.9 km distance. The Project's licenced area is close to the settlement.	Primary	An urgent expropriation decision on agricultural lands for the road construction has been taken on December 11, 2023. The urgent expropriation process is still ongoing. Due to the proximity to the access road, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
İneşir	Located to the west of the nearest turbine (T35) and the proximity of the turbine is around 2.4 km distance. The Project's licenced area is close to the settlement.	Primary	An urgent expropriation decision on agricultural lands has been taken on December 11, 2023. The urgent expropriation process is still ongoing. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Durmuşlar	Located to the west of the nearest turbine (T47) and the proximity of the turbine is around 1.4 km distance. The Project's licenced area is close to the settlement.	Primary	An urgent expropriation decision on agricultural lands has been taken on December 11, 2023. The urgent expropriation process is still ongoing. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Çamoba	Located to the west of the nearest turbine (T51) and the proximity of the turbine is around 0.8 km distance. The Project's licenced area is close to the settlement.	Primary	An urgent expropriation decision on agricultural lands has been taken on December 11, 2023. The urgent expropriation process is still ongoing. Due to the proximity to the Project area, problems including dust, noise and traffic

			are expected to be experienced in the neighbourhood during the construction phase.
Alhatlı	Located to the west of the nearest turbine (T39) and the proximity of the turbine is around 1.3 km distance. The Project's licenced area is close to the settlement.	Primary	An urgent expropriation decision on agricultural lands has been taken on December 11, 2023. The urgent expropriation process is still ongoing. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Yalnızdam	Located to the east of the nearest turbine (T58) and the proximity of the turbine is around 1.4 km distance. The Project's licenced area is close to the settlement.	Primary	An urgent expropriation decision on agricultural lands has been taken on December 11, 2023. The urgent expropriation process is still ongoing. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Sarıcaoğlu	Located to the west of the nearest turbine (T36) and the proximity of the turbine is around 3.2 km distance. The Project's licenced area is close to the settlement.	Primary	An urgent expropriation decision on agricultural lands has been taken on December 11, 2023. The urgent expropriation process is still ongoing. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Kozluca	Located to the south of the nearest turbine (T60) and the proximity of the turbine is around 1.5 km distance. The Project's licenced area is close to the settlement.	Primary	The urgent expropriation process is ongoing, no official decision has been taken yet. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Oruçlar	Located to the west of the nearest turbine (T01) and the proximity of the turbine is around 1.4 km distance. The Project's licenced area is close to the settlement.	Primary	The urgent expropriation process is ongoing, no official decision has been taken yet. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Yukarıada	Located to the south of the nearest turbine (T26) and the proximity of the turbine is around 1.4 km distance. The Project's licenced area is close to the settlement.	Primary	The urgent expropriation process is ongoing, no official decision has been taken yet. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Soma District Neighbourhoods			
Yayladalı	Located to the east of the nearest turbine (T36) and the proximity of the turbine is around 3.7 km distance. The Project's licenced area is close to the settlement.	Primary	An urgent expropriation decision on agricultural lands has been taken on December 11, 2023. The urgent expropriation process is still ongoing. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Duğla	Located to the east of the nearest turbine (T31) and the proximity of the turbine is around 1.4 km distance. The Project's licenced area is close to the settlement.	Primary	The urgent expropriation process is ongoing, no official decision has been taken yet. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Kiraz	Located to the east of the nearest turbine (T34) and the proximity of the turbine is	Primary	An urgent expropriation decision on agricultural lands has been taken on December 11, 2023. The urgent

	around 1.5 km distance. The Project's licenced area is close to the settlement.		expropriation process is still ongoing. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
Kaplan	Located to the east of the nearest turbine (T35) and the proximity of the turbine is around 2.2 km distance. The Project's licenced area is close to the settlement.	Primary	An urgent expropriation decision on agricultural lands has been taken on December 11, 2023. The urgent expropriation process is still ongoing. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
İvrindi District Neighbourhoods			
Haydar	Located to the west of the nearest turbine (T11) and the proximity of the turbine is around 3.16 km distance. The Project's licenced area is close to the settlement.	Primary	The urgent expropriation process is ongoing, no official decision has been taken yet. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.
İkizce	Located to the west of the nearest turbine (T11) and the proximity of the turbine is around 1.8 km distance. The Project's licenced area is close to the settlement.	Primary	The urgent expropriation process is ongoing, no official decision has been taken yet. Due to the proximity to the Project area, problems including dust, noise and traffic are expected to be experienced in the neighbourhood during the construction phase.

The map presented in Figure 13.1: summarises the aforementioned settlements within the scope of the Project.

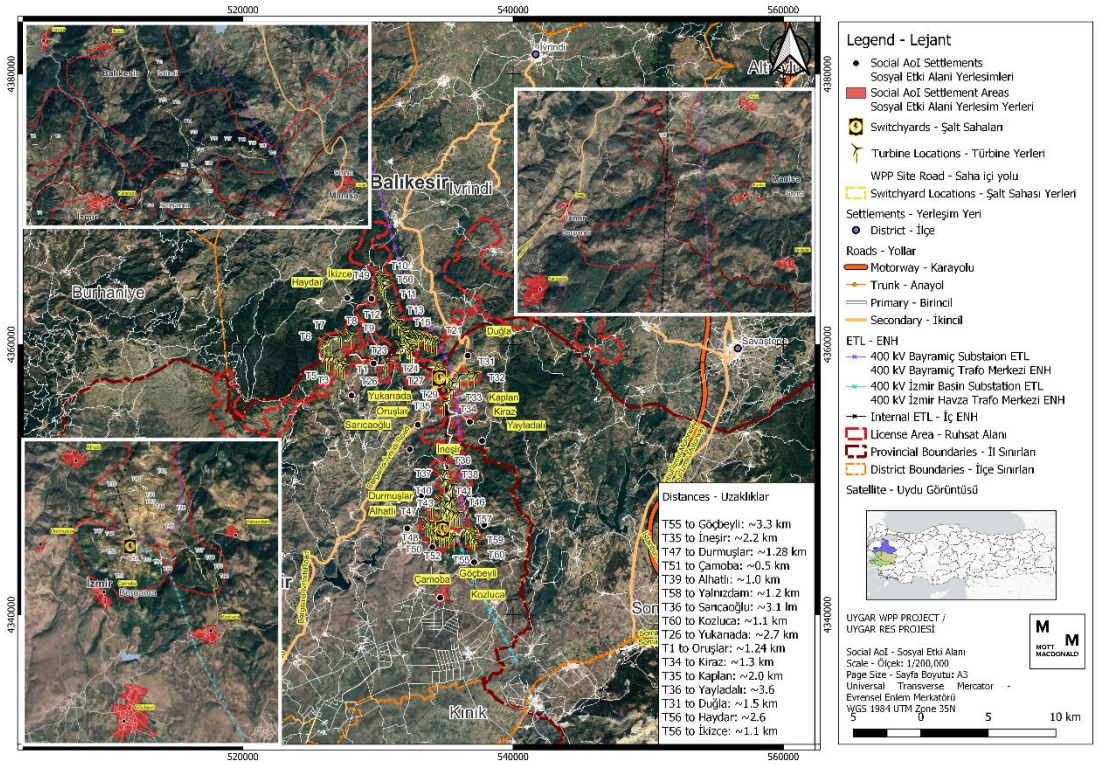


Figure 13.1: Project's area of influence for social impacts

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 13.3 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

Neighbourhoods	Information on the Location	Impact Prioritization	Potential Adverse Impacts
Bergama District Neighbourhoods			
Kaplan (Göçbeyli)	Located to the southeast of the nearest turbine (T55) and the proximity of the turbine is around 3.9 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
İneşir	Located to the west of the nearest turbine (T35) and the proximity of the turbine is around 2.4 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Durmuşlar	Located to the west of the nearest turbine (T47) and the proximity of the turbine is around 1.4 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Çamoba	Located to the west of the nearest turbine (T51) and the proximity of the turbine is around 0.8 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Alhatlı	Located to the west of the nearest turbine (T39) and the proximity of the turbine is around 1.3 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Yalnızdam	Located to the east of the nearest turbine (T58) and the proximity of the turbine is around 1.4 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Sarıcaoğlu	Located to the west of the nearest turbine (T36) and the proximity of the turbine is around 3.2 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.

Kozluca	Located to the south of the nearest turbine (T60) and the proximity of the turbine is around 1.5 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Oruçlar	Located to the west of the nearest turbine (T01) and the proximity of the turbine is around 1.4 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Yukarıada	Located to the south of the nearest turbine (T26) and the proximity of the turbine is around 1.4 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Soma District Neighbourhoods			
Kiraz	Located to the east of the nearest turbine (T34) and the proximity of the turbine is around 1.5 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Kaplan	Located to the east of the nearest turbine (T35) and the proximity of the turbine is around 2.2 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Yayladalı	Located to the east of the nearest turbine (T36) and the proximity of the turbine is around 3.7 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
Duğla	Located to the east of the nearest turbine (T31) and the proximity of the turbine is around 1.4 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
İvrindi District Neighbourhoods			
Haydar	Located to the west of the nearest turbine (T11) and the proximity of the turbine is around 3.16 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.
İkizce	Located to the west of the nearest turbine (T11) and the proximity of the turbine is around 1.8 km distance. The Project's licenced area is close to the settlement.	Secondary	Noise disturbance for the grazed animals which are grazing in the close vicinity of the turbines.

13.3 Baseline Conditions

13.3.1 Population and Population Changes

13.3.1.1 Bergama District (İzmir Province)

Bergama district is one of the 30 districts of İzmir. Bergama district, with a population of 105,754 in 2022, is the 14th most populous district in İzmir[146]. Population density of Germencik district was 67,53 person/km^2 in 2022[147]. There have been minor increases in the population over the 10 years. The male population ratio in the total population is 50.17%, while the female population ratio is 49.83%[148]. Average household size was 2.72 in 2022[149]. Table 13.4 given below shows the population of Bergama district by years.

Table 13.4: Population of Bergama District by years

Years	Total	Male	Female
2022	**105,754**	53,057	52,697
2021	**104,980**	52,773	52,207
2020	**104,944**	52,672	52,272
2019	**103,867**	52,355	51,512
2018	**103,185**	51,920	51,265
2017	**102,961**	51,766	51,195
2016	**102,090**	51,267	50,823
2015	**101,917**	51,214	50,703
2014	**101,813**	51,070	50,743
2013	**101,217**	50,667	50,550
2012	**101,004**	50,570	50,434

Source: nufusu.com, Statistics on Population, 2022 [150]

Population growth rate of Bergama district in 2022 was 0.74%.[151] There have been fluctuations in the rate of population growth throughout the years. It has shown a tendency to increase in recent years, except for the year 2021. The following Figure 13.2 shows the population growth rate of Bergama district throughout the years.

[146] Nufusune, 2022 Statistics on Population. Retrieved from nufusune.com/izmir-nufusu on 02 January 2024.

[147] Endeksa, 2022 Statistics on Population. Retrieved from endeksa.com/tr/analiz/turkiye/izmir/bergama/demografi on 02 January 2024.

[148] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/bergama_izmir-nufusu on 02 January 2024.

[149] Endeksa, 2022 Statistics on Population. Retrieved from endeksa.com/tr/analiz/turkiye/izmir/bergama/demografi on 02 January 2024.

[150] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/bergama_izmir-nufusu 02 January 2024.

[151] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/bergama_izmir-nufusu on 02 January 2024.

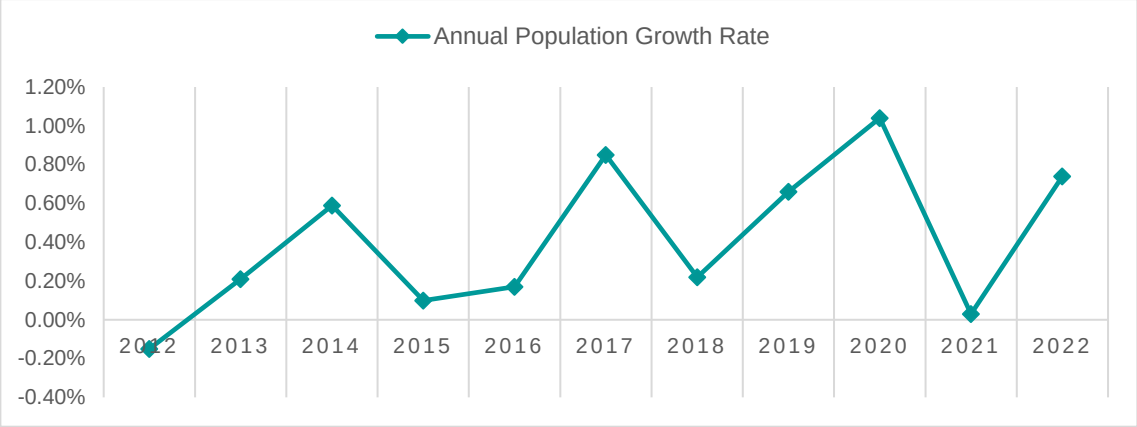


Figure 13.2: Population growth rate of Bergama district by years

Source: nufusu.com, Statistics on Population, 2022 [152]

Table 13.5 given below summarizes the population of Project affected neighbourhoods in Bergama district by gender.

Table 13.5: Population of the Project affected neighbourhoods of Bergama district (2022)

Name of the neighbourhoods	Total population	Male	%	Female	%
Kaplan (Göçbeyli)	1,549	754	48.7	795	51.3
İneşir	126	56	44.4	70	55.6
Durmuşlar	386	200	51.8	186	48.2
Çamoba	72	40	55.5	32	44.5
Alhatlı	247	117	47.4	130	52.6
Yalnızdam	79	29	36.7	50	63.3
Sarıcaoğlu	104	54	51.9	50	48.1
Kozluca	252	119	47.2	133	52.8
Oruşlar	404	211	52.2	193	47.8
Yukarıada	365	199	54.5	166	45.5
Alhatlı	247	117	47.4	130	52.6
Yalnızdam	79	29	36.7	50	63.3
Sarıcaoğlu	104	54	51.9	50	48.1
Kozluca	252	119	47.2	133	52.8
Oruşlar	404	211	52.2	193	47.8
Yukarıada	365	199	54.5	166	45.5

Source: Nufusune, Statistics on Population, 2022[153]

Kaplan (Göçbeyli) neighbourhood is approximately 3.9 km distance to the nearest turbine in the Project area. With a population of 1,549 people, it is the neighbourhood with the highest population among the neighbourhoods in Bergama district located within the Project AoI. The male population rate is 48.7% while the female population rate is 51.3%.

[152] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/bergama_izmir-nufusu on 02 January 2024.

[153] Nufusune, 2022 Statistics on Population. Retrieved from nufusune.com/bergama-ilce-nufusu-izmir on 02 January 2024.

İneşir neighbourhood is approximately 2.4 km distance to the nearest turbine in the Project area. The population of İneşir neighbourhood in 2022 was 126. The male population rate is 44.4% while the female population rate is 55.6%.

Durmuşlar neighbourhood is approximately 1.4 km distance to the nearest turbine in the Project area. The population of Durmuşlar neighbourhood in 2022 was 386. The male population rate is 51.8% while the female population rate is 48.2%.

Çamoba neighbourhood is approximately 0.8 km distance to the nearest turbine in the Project area. With a population of 72 people, it is the neighbourhood with the lowest population among the neighbourhoods in Bergama district located within the Project AoI. The male population rate is 55.5% while the female population rate is 44.5%.

Alhatlı neighbourhood is approximately 1.30 km distance to the nearest turbine in the Project area. The population of Alhatlı neighbourhood in 2022 was 247. The male population rate is 47.4% while the female population rate is 52.6%.

Yalnızdam neighbourhood is approximately 1.40 km distance to the nearest turbine in the Project area. The population of Yalnızdam neighbourhood in 2022 was 79. The male population rate is 36.7% while the female population rate is 63.3%.

Sarıcaoğlu neighbourhood is approximately 3.2 km distance to the nearest turbine in the Project area. The population of Sarıcaoğlu neighbourhood in 2022 was 104. The male population rate is 51.9% while the female population rate is 48.1%.

Kozluca neighbourhood is approximately 1.5 km distance to the nearest turbine in the Project area. The population of Kozluca neighbourhood in 2022 was 252. The male population rate is 47.2% while the female population rate is 52.8%.

Oruşlar neighbourhood is approximately 1.4 km distance to the nearest turbine in the Project area. The population of Oruşlar neighbourhood in 2022 was 404. The male population rate is 52.2% while the female population rate is 47.8%.

Yukarıada neighbourhood is approximately 1.40 km distance to the nearest turbine in the Project area. The population of Yukarıada neighbourhood in 2022 was 365. The male population rate is 52.1% while the female population rate is 47.9%.

13.3.1.2 Soma District (Manisa Province)

Soma district is one of the 17 districts of Manisa. Soma district, with a population of 111,789 in 2022, is the sixth most populous district in Manisa[154]. Population density of Soma district was 132,92 person/km^2 in 2022[155]. There have been minor increases in the population over the 10 years. The male population ratio in the total population is 50.17%, while the female population ratio is 49.83%[156]. Average household size was 3.02 in 2022[157]. Table 13.6 given below shows the population of Soma district by years.

Table 13.6: Population of Soma District by years

Years	Total	Male	Female

[154] Nufusune, 2022 Statistics on Population. Retrieved from nufusune.com/manisa-nufusu on 02 January 2024.

[155] Endeksa, 2022 Statistics on Population. Retrieved from endeksa.com/tr/analiz/turkiye/manisa/soma/demografi on 02 January 2024.

[156] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/soma_manisa-nufusu on 02 January 2024.

[157] Endeksa, 2022 Statistics on Population. Retrieved from endeksa.com/tr/analiz/turkiye/manisa/soma/demografi on 02 January 2024.

2022	**111,789**	56,089	55,700
2021	**111,218**	55,752	55,466
2020	**110,935**	55,626	55,309
2019	**109,946**	55,284	54,662
2018	**108,981**	54,832	54,149
2017	**108,838**	54,707	54,131
2016	**108,213**	54,387	53,826
2015	**107,075**	53,876	53,199
2014	**105,518**	53,092	52,426
2013	**105,391**	53,227	52,164
2012	**102,666**	51,507	51,159

Source: nufusu.com, Statistics on Population, 2022[158]

Population growth rate of Soma district in 2022 was 0.51%.[159] There have been fluctuations in the rate of population growth throughout the years. The following Figure 13.3 shows the population growth rate of Soma district throughout the years.

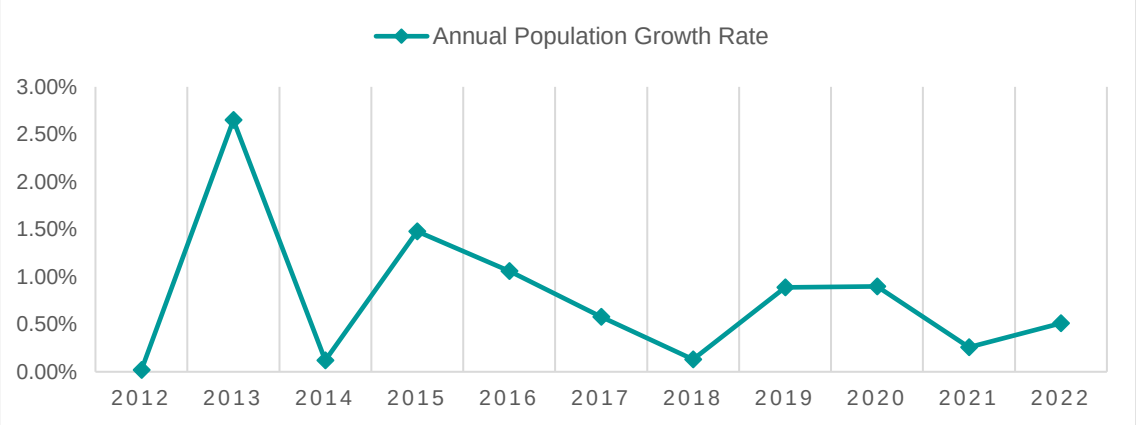


Figure 13.3: Population growth rate of Soma district by years

Source: nufusu.com, Statistics on Population, 2022[160]

Table 13.7 given below summarizes the population of Project affected neighbourhoods in Soma district by gender.

Table 13.7: Population of the Project affected neighbourhoods of Soma district (2022)

Name of the neighbourhoods	Total population	Male	%	Female	%
Kiraz	124	58	46.8	66	53.2
Kaplan	51	24	47	27	53
Yayladalı	32	16	50	16	50

[158] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/soma_manisa-nufusu on 02 January 2024.

[159] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/soma_manisa-nufusu on 02 January 2024.

[160] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/soma_manisa-nufusu on 02 January 2024.

Duğla	94	46	48.9	48	51.1

Source: Nufusune, Statistics on Population, 2022[161]

Kiraz neighbourhood is approximately 1.5 km distance to the nearest turbine in the Project area. With a population of 124 people, it is the neighbourhood with the highest population among the neighbourhoods in Soma district located within the Project AoI. The male population rate is 46.8% while the female population rate is 53.2%.

Kaplan neighbourhood is approximately 2.2 km distance to the nearest turbine in the Project area. The population of Kaplan neighbourhood in 2022 was 51. The male population rate is 47% while the female population rate is 53%.

Yayladalı neighbourhood is approximately 3.7 km distance to the nearest turbine in the Project area. With a population of 32 people, it is the neighbourhood with the lowest population among the neighbourhoods in Soma district located within the Project AoI. The male and female population rates are equal.

Duğla neighbourhood is approximately 1.40 km distance to the nearest turbine in the Project area. The population of Duğla neighbourhood in 2022 was 94. The male population rate is 48.9% while the female population rate is 51.1%.

13.3.1.3 İvrindi District (Balıkesir Province)

İvrindi district is one of the 20 districts of Balıkesir. İvrindi district, with a population of 31,512 in 2022, is the eighth least populous district in Balıkesir[162]. Population density of İvrindi district was 37,47 person/km^2 in 2022[163]. There have been minor decreases in the population over the 10 years. The male population ratio in the total population is 49.93%, while the female population ratio is 50.07%[164]. Average household size was 2.56 in 2022[165]. Table 13.8 given below shows the population of İvrindi district by years.

Table 13.8: Population of İvrindi District by years

Years	Total	Male	Female
2022	**31.512**	15.735	15.777
2021	**31.897**	15.922	15.975
2020	**32.319**	16.092	16.227
2019	**32.492**	16.235	16.257
2018	**32.758**	16.341	16.417
2017	**32.882**	16.402	16.480
2016	**33.427**	16.731	16.696
2015	**33.710**	16.856	16.854
2014	**34.207**	17.111	17.096
2013	**34.643**	17.344	17.299

[161] Nufusune, 2022 Statistics on Population. Retrieved from nufusune.com/soma-ilce-nufusu-manisa on 02 January 2024.

[162] Nufusune, 2022 Statistics on Population. Retrieved from nufusune.com/balikesir-nufusu on 02 January 2024.

[163] Endeksa, 2022 Statistics on Population. Retrieved from endeksa.com/tr/analiz/turkiye/balikesir/ivrindi/demografi on 02 January 2024.

[164] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/ivrindi_balikesir-nufusu on 02 January 2024.

[165] Endeksa, 2022 Statistics on Population. Retrieved from endeksa.com/tr/analiz/turkiye/balikesir/ivrindi/demografi on 02 January 2024.

2012	**35.209**	17.637	17.572

Source: nufusu.com, Statistics on Population, 2022[166]

Population growth rate of İvrindi district in 2022 was -1.21%.[167] There have been fluctuations in the rate of population growth throughout the years. The following Figure 13.4 shows the population growth rate of İvrindi district throughout the years.

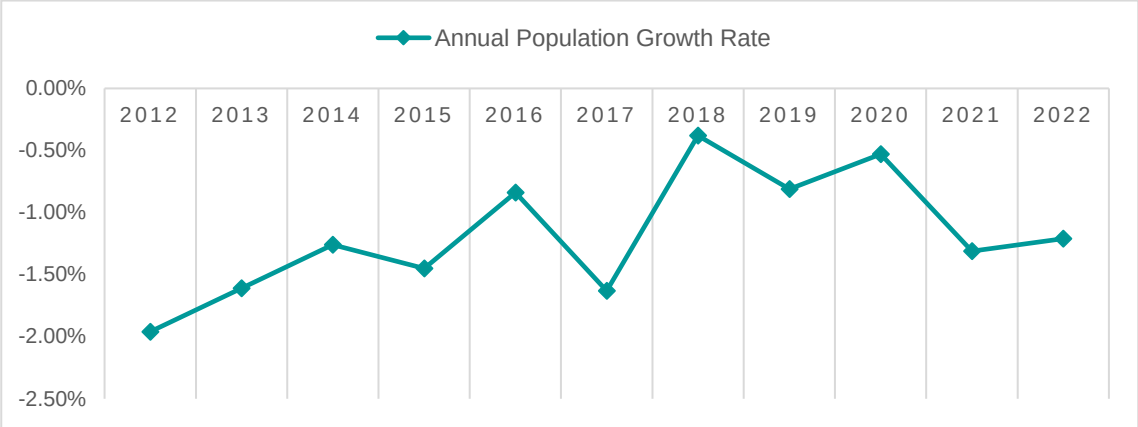


Figure 13.4: Population growth rate of İvrindi district by years

Source: nufusu.com, Statistics on Population, 2022[168]

Table 13.9 given below summarizes the population of Project affected neighbourhoods in İvrindi district by gender.

Table 13.9: Population of the Project affected neighbourhoods of İvrindi district (2022)

Name of the neighbourhoods	Total population	Male	%	Female	%
Haydar	247	120	48.6	127	51.4
İkizce	201	105	52.2	96	47.8

Source: Nufusune, Statistics on Population, 2022[169]

Haydar neighbourhood is approximately 3.16 km distance to the nearest turbine in the Project area. The population of Haydar neighbourhood in 2022 was 247. The male population rate is 48.6% while the female population rate is 51.4%.

İkizce neighbourhood is approximately 1.8 km distance to the nearest turbine in the Project area. The population of İkizce neighbourhood in 2022 was 201. The male population rate is 52.2% while the female population rate is 47.8%.

[166] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/ivrindi_balikesir-nufusu on 02 January 2024.

[167] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/ivrindi_balikesir-nufusu on 02 January 2024.

[168] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/ivrindi_balikesir-nufusu on 02 January 2024.

[169] Nufusune, 2022 Statistics on Population. Retrieved from nufusune.com/ivrindi-ilce-nufusu-balikesir_on 02 January 2024.

13.3.2 Education Services

Figure 13-15 below shows the locations of the educational services in the Project affected neighbourhoods.

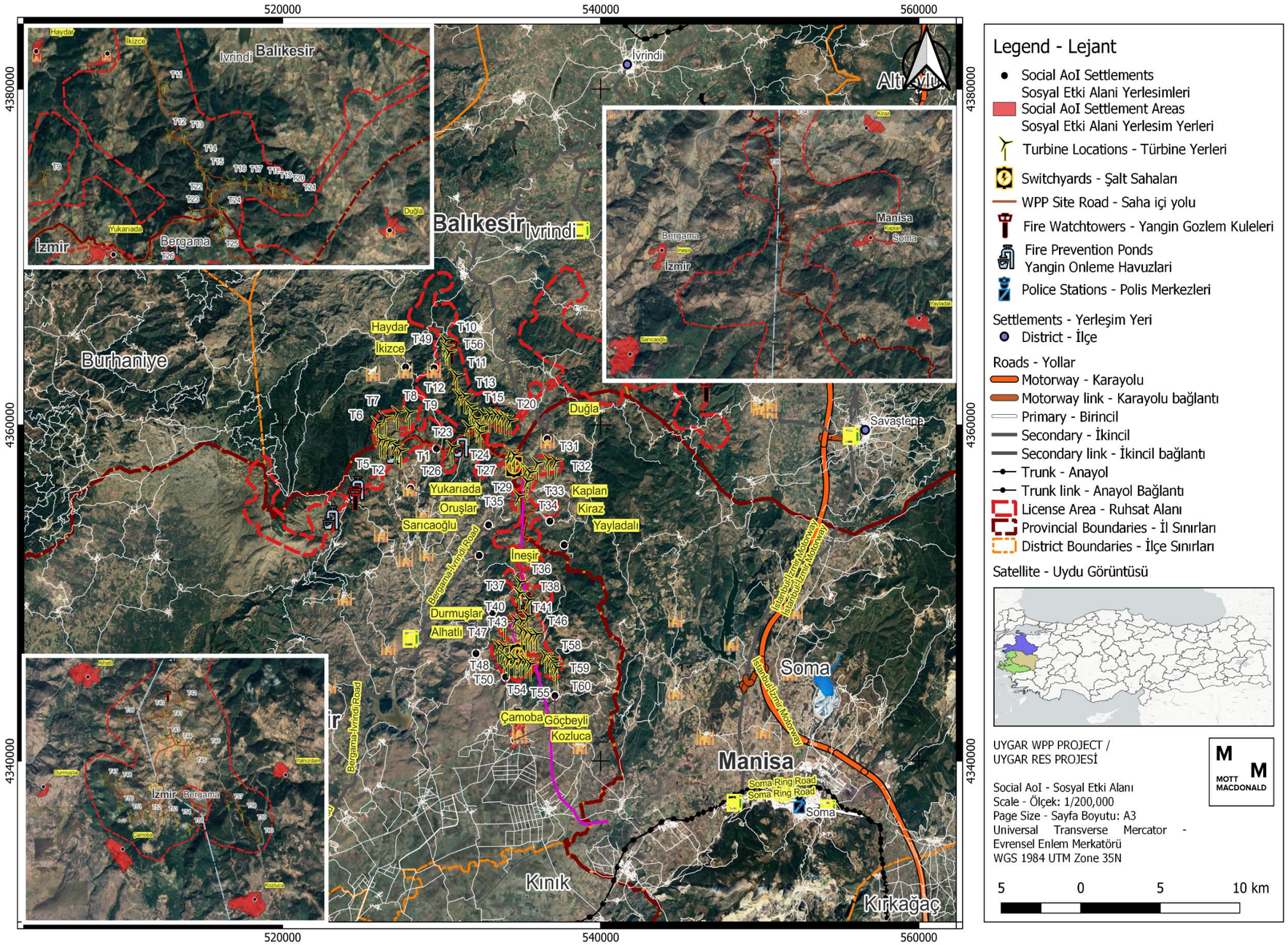


Figure 13.5: The locations of social infrastructures for Project's area of influence

13.3.2.1 Bergama District (İzmir Province)

Bergama district has three kindergartens, 57 primary schools, and 16 high schools. There is also a Public Education Centre, a Vocational Education Centre, a Guidance and Research Centre, a Teacher's House and Evening Art School, a Science and Art Centre, a Science and Art Centre, and many private vocational and educational institutions within the district. [170] Table 13.10 given below summarizes the educational level of the residents in Bergama district.

Table 13.10: Education rates in Bergama District (%)

Education level	Population (%)
Illiterate	1.5
Literate/ not graduate	8.8
Primary school	57.3
High school	18.5
University or higher degree	13.6
Unknown	0.3
Total	**100**

Source: Endeksa, Statistics on Educational Levels (2022)[171]

In Bergama district, 89% of the total population has at least a primary school degree, which shows the high rates of literacy in the region. Less than one in each 10 people are within the category of "literate but do not have a diploma" whereas the illiterate people constitute less than 2% of the population.

There is an unused school in Çamoba neighbourhood. Students receive education through mobile education.

There is no educational facility in Durmuşlar neighbourhood. There are a total of 35 students in the neighbourhood who receive education in Göçbeyli neighbourhood through mobile education. School buses pick up students at 8.30 a.m. and bring them back around 4 p.m.

Desktop studies cannot provide sufficient and reliable information on educational services for the other Project-affected neighbourhoods in Bergama district. On the other hand, limited time to complete the site visit studies remained as a limitation to receive detailed data on these issues.

13.3.2.2 Soma District (Manisa Province)

Soma district has nine kindergartens, 46 primary schools, and 11 high schools. There is also a Public Education Centre, a Special Education and Rehabilitation Centre, Teacher's House and Evening Art School, and many private vocational and educational institutions within the district. [172] Table 13.11 given below summarizes the educational level of the residents in Soma district.

Table 13.11: Education rates in Soma District (%)

Education level	Population (%)
Illiterate	1.1
Literate/ not graduate	9.3
Primary school	55.1

[170] Bergama District Directorate of National Education, 2022. Educational Institutions Statistics. Retrieved from bergama.meb.gov.tr/ on 03 January 2024.

[171] Endeksa, 2022 Statistics on Educational Levels. Retrieved from endeksa.com/tr/analiz/turkiye/izmir/bergama/demografi on 03 January 2024.

[172] Soma District Directorate of National Education, 2022. Educational Institutions Statistics. Retrieved from soma.meb.gov.tr/ on 03 January 2024.

High school	20.6
University or higher degree	13.7
Unknown	0.2
Total	**100**

Source: Endeksa, Statistics on Educational Levels (2022)[173]

In Soma district, 89% of the total population has at least a primary school degree, which shows the high rates of literacy in the region. Less than one in each 10 people are within the category of “literate but do not have a diploma” whereas the illiterate people constitute less than 1.5% of the population.

There is no educational facility in Kiraz neighbourhood. There are a total of 10 students in the neighbourhood who receive education in Soma district through mobile education. School bus picks up students at 7:30 a.m. and bring them back around 4:30 p.m.

Desktop studies cannot provide sufficient and reliable information on educational services for the other Project-affected neighbourhoods in Soma district. On the other hand, limited time to complete the site visit studies remained as a limitation to receive detailed data on these issues.

13.3.2.3 İvrindi District (Balıkesir Province)

İvrindi district has one kindergarten, 28 primary schools, and seven high schools. There is also a Public Education Centre, a Special Education and Rehabilitation Centre, a Vocational School for the Special Education Students, and private vocational and educational institutions within the district.[174] Table 13.12 given below summarizes the educational level of the residents in İvrindi district.

Table 13.12: Education rates in İvrindi District (%)

Education level	Population (%)
Illiterate	3.9
Literate/ not graduate	10.3
Primary school	61.6
High school	15.7
University or higher degree	8.2
Unknown	0.3
Total	**100**

Source: Endeksa, Statistics on Educational Levels (2022)[175]

In İvrindi district, 85% of the total population has at least a primary school degree, which shows the high rates of literacy in the region. Less than two in each 10 people are within the category of “literate but do not have a diploma” whereas the illiterate people constitute less than 4% of the population.

There is not an educational facility in Haydar neighbourhood. Students go to Korucu neighbourhood through mobile education. School bus picks up students at 8 a.m. and bring them back around 3 p.m.

[173] Endeksa, 2022 Statistics on Educational Levels. Retrieved from endeksa.com/tr/analiz/turkiye/manisa/soma/demografi on 03 January 2024.

[174] İvrindi District Directorate of National Education, 2022. Educational Institutions Statistics. Retrieved from mebbis.meb.gov.tr/KurumListesi.aspx on 03 January 2024.

[175] Endeksa, 2022 Statistics on Educational Levels. Retrieved from endeksa.com/tr/analiz/turkiye/balikesir/ivrindi/demografi on 03 January 2024.

There is not an educational facility in İkizce neighbourhood. There are a total of 10-15 students in the neighbourhood who receive education in Büyükyenice neighbourhood through mobile education.

13.3.3 Land Use and Ownership of Assets

When it comes to the agricultural suitability of the lands in question, differences come to the fore in the settlements included in the Project's impact area. Settlements are predominantly forest and forest border neighbourhoods. Cereal cultivation and olive cultivation are intensive. In neighbourhoods with high altitude, people also engage in different agricultural activities such as chestnut cultivation. In addition, in the Project affected neighbourhoods including İkizce, different crops such as walnut, pepper or barley are grown. Therefore, the agricultural use of the lands is tried to be utilised by the inhabitants of the neighbourhood in the widest way possible.

Many local community members are involved in animal husbandry. It has been observed and informed that in all of the neighbourhoods within the impact area of the project, there are residents who are engaged in animal husbandry; engaged in milk production/trade or cattle trade through cooperatives; and benefiting from the animals owned for individual use without receiving a large volume of trade and added value.

13.3.3.1 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 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” (PID) is taken by the administration as a requisite for requesting the Presidency to take an “Urgent Expropriation Decision”. The PID 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.

13.3.3.1 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 construction areas (i.e., turbine locations and access roads to the Project area).

Areas are needed on 343 parcels located in 16 settlements in three districts of three provinces. 45 of them are public lands and 1,562,575.19 m^2 forestland. The distribution of the affected areas is given in in Figure 13.6.

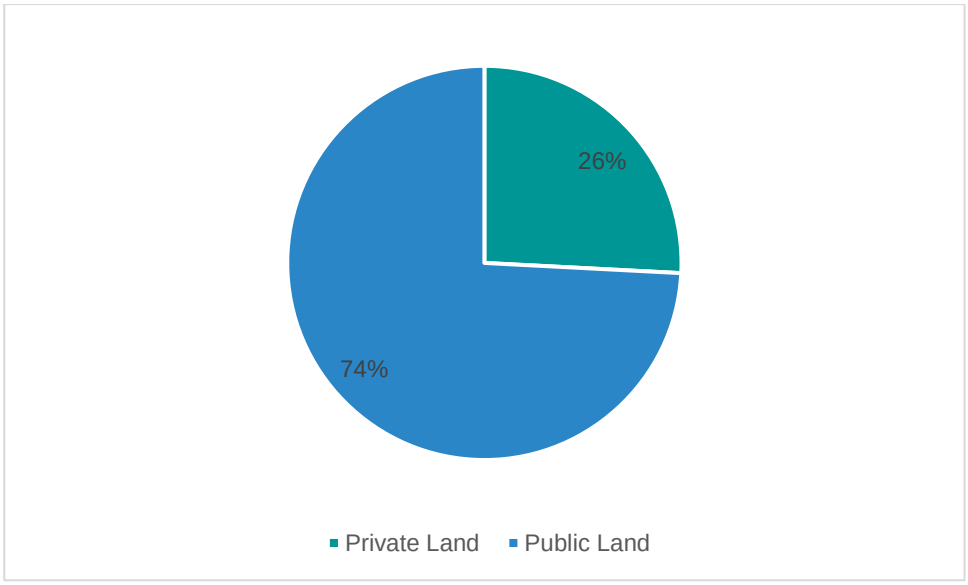


Figure 13.6: Distribution of Affected Parcels by Surface Areas (m^2)

26% of size of the affected areas constitute private lands. The owners/shareholders of 298 private lands are 300 PAPs and 5 companies. 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 13.13.

Table 13.13: 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)
İzmir	Bergama	Alhatlı	64	138,083.58	56	5	3,819.93	
İzmir	Bergama	Çamoba	56	79,243.26	63[176]	6	4,352.76	
Manisa	Soma	Dugla	1	4,766.36	1	0	-	
İzmir	Bergama	Durmuşlar	65	130,118.73	72[177]	0	-	
Balıkesir	İvrindi	Haydar	17	55,130.45	16	4	11,332.61	
Balıkesir	İvrindi	İkizce	8	19,497.56	8	8	8,073.61	1,562,575.19
İzmir	Bergama	İneşir	3	14,273.98	3	1	631.03	
Manisa	Soma	Kaplan	19	25,910.36	19[178]	2	611.79	
İzmir	Bergama	Kaplan(Göçbeyli)	17	19,318.78	13	2	2,168.28	
Manisa	Soma	Kiraz	31	57,527.09	18	11	16,814.92	

[176] Two of them are companies.
[177] Two of them are companies
[178] One of them is a company.

İzmir	Bergama	Kozluca	3	1,436.13	2	0	-	
İzmir	Bergama	Oruçlar	1	1,215.92	16	0	-	
İzmir	Bergama	Sarıcaoğlu	5	5,431.09	5	1	71.74	
İzmir	Bergama	Yalnızdam	1	2,294.50	1	1	3,399.67	
Manisa	Soma	Yayladalı	1	2,588.64	1	0	-	
İzmir	Bergama	Yukarıada	6	6,216.06	11	4	3,262.26	
Total lands			**298**	**563,052.49**	**305**	**45**	**54,538.60**	**1,562,575.19**

Source: Enerjisa Üretim, Uygar 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.

13.3.3.2 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 1 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.
- **Deed of Consent (Muvafakatname):** Even though the expropriation process has not been completed, some lands can be entered with a deed of consent from the owners.
- **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 Capital Markets Board (CMB) as will be explained in detail in the Resettlement Action Plan (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.

13.3.3.3 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.

13.3.3.4 ETL Construction Design and Land Use

The Project involves two ETLs:

- A 400 kV single-circuit internal ETL covering approximately 13.1 km, which will connect to the existing İzmir Havza Transformer Substation (TS).

- Another 400 kV single-circuit ETL, spanning approximately 123 km, will connect to the existing Bayramiç Havza TS, currently operated by TEİAS.

The project will commence with the construction of a single line, which will be connected to the Izmir Havza TS. Once this line is operational, the energy production will begin. The second line, which is connected to the Bayramiç Havza TS, will be constructed by TEIAS in line with their own investment programme.

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 and Duru, 2023, ETL Project Final Project Description Document, there are various lands within the ETL master plan. The areas within the ETL that are considered within the scope of the Environmental Plan in the Zoning Law are listed as Agricultural Land and Forest Land. In addition, no construction work will be carried out on Pasture Land. This information will be updated when the exact parcels to be crossed by ETL are revealed.

Land transactions have not yet started for these two ETLs, both within and outside the licence area. Since location of the pylons are not certain, land acquisition and expropriation activities will become clear in later stages of the Project. Therefore, there is no information regarding ETL-based expropriation activities within the scope of this Final Draft ESIA. 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.

13.3.4 Local Economy, Livelihood Sources and Employment

13.3.4.1 Bergama District (İzmir Province)

The main sources of income in Bergama district are based on agriculture and animal husbandry. Tobacco, cotton, olives, and grapes are grown in the Bakırçay Plain. Pine nuts are an important source of income in the Kozak plateau. Beekeeping is gradually developing and becoming an important source of income, especially in mountain neighbourhoods. Agriculture-based industry has also been developing in recent years. Carpet weaving and rug weaving are one of the economic areas developed in the district.[179]

Bergama is a district with 41,958 hectares of arable crops. 59.6% of this land is used as agricultural land, 28.5% as fruit land, 11.4% as vegetable land, 0.3% as grove land, and 0.2% as fallow pasture.

Table 13.14 given below shows areas arable crops and their purpose of the land use in Bergama district.

Table 13.14: Arable crops and their purpose of the land use in Bergama district

Type	Area (ha)	Percentage (%)
Agricultural land	25,013	59.6%

[179] Governorship of İzmir. General Information About Bergama District. Retrieved from http://www.izmir.gov.tr/bergama on 03 January 2024.

Fruit land	11,959	28.5%
Vegetable land	4,776	11.4%
Grove land	135	0.3%
Fallow pasture	75	0.2%
Total	41,958	100%

Source: Research on Potential Investment Topics in Izmir Province[180]

Bergama region has a potential for the mining sector. The mineral deposits being operated are granite, marble, gold, perlite, and quarries. The region is also rich in natural hot springs and water resources. In addition to these, Bergama district also has a high potential in terms of tourism as it hosts many ancient cities.[181]

Bergama district is ranked 241st among 973 districts in the "Socio-Economic Development Ranking of Districts Research" conducted by the Ministry of Industry and Technology in 2022, whose variables were based on demographics, employment and social security, education, health, finance, competitiveness, innovation, and quality of life. It ranked 25th among the 30 districts of İzmir.[182]

The main sources of income in Çamoba neighbourhood are based on agriculture, animal husbandry, olive cultivation, and mushroom picking. A few households in the neighbourhood also carry out beekeeping activities. It has been said that the Çamoba neighbourhood is very well known for beekeeping, and people from surrounding districts come to this neighbourhood for beekeeping activities. While tobacco farming was an important source of income in the neighbourhood before, it was informed that no activities are currently being carried out. There are around two or three households who carry out animal husbandry activities. There are 70 cattle and approximately 500-600 small cattle in the neighbourhood. It has been stated that cattle farming has decreased compared to previous periods. Mushrooms collected in rainy weather in autumn are sold in the market. It has been said that olive growing activities have increased compared to the past. Both olives and olive oil are being produced in the neighbourhood. Agricultural activities are also carried out in the settlement. It has been stated that they plant fruit for their own consumption.

The main sources of income in Alhatlı neighbourhood are based on tobacco farming, wheat farming, and animal husbandry.

The main sources of income in Durmuşlar neighbourhood are based on agriculture and animal husbandry. Agricultural activities in the neighbourhood are largely based on tobacco farming. There are 700-800 cattle and 2,000-2500 small cattle in the neighbourhood. Residents who have animals perform forest grazing for three-five months in a year. There is no mushroom picking activity in the neighbourhood.

Desktop studies cannot provide sufficient and reliable information on local economy, livelihood sources and employment for the other Project-affected neighbourhoods in Bergama district. On the other hand, limited time to complete the site visit studies remained as a limitation to receive detailed data on these issues.

[180] Research on Potential Investment Topics in Izmir Province (2012). İzmir Development Agency. Retrieved from kalkinmakutuphanesi.gov.tr/assets/upload/dosyalar/izmir-yatirim-alanlari-on-fizibilite-raporu.pdf on 03 January 2024.

[181] Municipality of Bergama District. About Bergama District. Retrieved from bergama.bel.tr/bergama/bergama-hakkinda/ on 03 January 2024.

[182] Socio-Economic Development Ranking of Districts Research (2022). Retrieved from sanayi.gov.tr/assets/pdf/birimler/2022-ilce-sege.pdf on 03 January 2024.

13.3.4.2 Soma District (Manisa Province)

The main sources of income in Soma district are based on mining and agricultural industry. The main basis of the economy in the district is based on lignite mining and related developed sectors. Some of the mined coal is used in the Soma Thermal Power Plant. Soma Thermal Power Plant meets 10% of Türkiye's electricity needs. Flour and vegetable oil factories are the main industrial establishments in the district. The main agricultural products grown in the plains are wheat, barley, olives, chickpeas, and corn. Small amounts of cotton, sesame, cherries, and grapes are also grown.[183]

Soma is a district with 218,470 decares of arable crops. 51.6% of this land is used as agricultural land, 34.9% as fruit land, 7.8% as vegetable land, 4.6% as unused agricultural land, and 1.1% as fallow pasture.

Table 13.15 given below shows areas arable crops and their purpose of the land use in Soma district.

Table 13.15: Arable crops and their purpose of the land use in Soma district

Type	Area (da)	Percentage (%)
Agricultural land	112,699	51.6%
Fruit land (including olive)	76,266	34.9%
Vegetable land	16,965	7.8%
Ornamental land	20	0.9%
Unused agricultural land	10,000	4.6%
Fallow pasture	2,520	1.1%
Total	218,470	100%

Source: Manisa District Directorate of Agriculture and Forestry Activity Report Briefing (2020)[184]

Soma district is ranked 235th among 973 districts in the "Socio-Economic Development Ranking of Districts Research" conducted by the Ministry of Industry and Technology in 2022, whose variables were based on demographics, employment and social security, education, health, finance, competitiveness, innovation, and quality of life. It ranked 6th among the 17 districts of Manisa.[185]

The main sources of income in Kiraz neighbourhood are based on lagriculture and animal husbandry. Residents also produce dairy products in the neighbourhood and since there is no cooperation, they sell their products by themselves in Soma and Bergama districts. There is no beekeeping activity in the neighbourhood. There are some residents who perform mushroom picking for both individual consumption and economic income.

Desktop studies cannot provide sufficient and reliable information on local economy, livelihood sources and employment for the other Project-affected neighbourhoods in Soma district. On the other hand, limited time to complete the site visit studies remained as a limitation to receive detailed data on these issues.

[183] Manisa Metropolitan Municipality. Soma Development Plan (2020). Retrieved from 7c85420866a348fd9f95d19b4ac1bcfe.pdf (manisa.bel.tr) on 03 January 2024.

[184] Manisa District Directorate of Agriculture and Forestry. Activity Report Briefing (2020). Retrieved from manisa.tarimorman.gov.tr/Belgeler/Brifing 2020/2020 Brifing.pdf on 03 January 2024.

[185] Socio-Economic Development Ranking of Districts Research (2022). Retrieved from sanayi.gov.tr/assets/pdf/birimler/2022-ilce-sege.pdf on 03 January 2024.

13.3.4.3 İvrindi District (Balıkesir Province)

The main sources of income in İvrindi district are based on animal husbandry and agriculture. In terms of agriculture, mostly the grain cultivation is performed in the district. In addition, forage crops are also planted intensively. In recent years, there have been important breakthroughs in the field of fruit growing in İvrindi district, especially fruit gardens on walnuts, apples, and cherries have been established. Vegetable growing and silage corn production are mainly carried out in irrigated areas. There are 20,000 cattle, 65,000 sheep and 15,000 poultry in the district. Beekeeping activities and dairy production are also carried out in İvrindi district.[186]

İvrindi is a district with 30,990 decares of arable crops. 92.2% of this land is used as agricultural land, 2.1% as fruit land, 4.8% as vegetable land, and 0.9% as fallow pasture.

Table 13.16 given below shows areas arable crops and their purpose of the land use in İvrindi district.

Table 13.16: Arable crops and their purpose of the land use in İvrindi district

Type	Area (da)	Percentage (%)
Agricultural land	30,990	92.2%
Fruit land (including olive)	700	2.1%
Vegetable land	1,600	4.8%
Vineyard land	10	0%
Fallow pasture	300	0.9%
Total	33,600	100%

Source: Statistics on İvrindi Agriculture[187]

In addition to the agricultural and animal husbandry activities carried out in İvrindi, there are copper, hard coal, lignite, antimony, and kaolin deposits in the district. There are 4 modern industrial facilities in İvrindi.[188]

As Ivrindi District Directorate of Agriculture stated, the part of the Project entering the İvrindi district consists mainly of forest land. It is stated that the product yield of the region is not quite high. There are mobile beekeepers and more than 4,000 beehives in İvrindi district. It is stated that some holdings in the region buy unused agricultural lands in order to plant medical aromatic products there. It is said that it is difficult to do standard agriculture in the Project area, whereas it is suitable for medical aromatic plant production such as sage and thyme. It is stated that the investments of other companies have a positive effect on employment opportunities. Young people work mostly in the service sector. Young workers in the region generally work in the mining sector.[189]

İvrindi district is ranked 620th among 973 districts in the "Socio-Economic Development Ranking of Districts Research" conducted by the Ministry of Industry and Technology in 2022, whose variables were based on demographics, employment and social security, education, health,

[186] İvrindi District Directorate of Agriculture. Statistics on İvrindi Agriculture. Retrieved from ivrindi.gov.tr/ilce-tarim-mudurlugu on 03 January 2024.

[187] İvrindi District Directorate of Agriculture. Statistics on İvrindi Agriculture. Retrieved from ivrindi.gov.tr/ilce-tarim-mudurlugu on 03 January 2024.

[188] Balıkesir City Council. Economy and Investment. Retrieved from balikesirkentkonseyi.org/sayfa/ekonomi-ve-yatirim.html on 03 January 2024.

[189] According to the site visit notes made to the İvrindi District Directorate of Agriculture in December 2023.

finance, competitiveness, innovation, and quality of life. It ranked 18th among the 20 districts of Balıkesir.[190]

The main sources of income in Haydar neighbourhood are based on walnuts, animal husbandry, and gardening. Beekeeping and mushroom picking are not common economic activities in the neighbourhood. Forest grazing is performed for animal husbandry. Products such as crop, shell beans, hot pepper are cultivated. Residents stated that they planted the product which makes them earn more money.

The main sources of income in İkizce neighbourhood are based on agriculture and animal husbandry. It is stated that there are total of 100 cattle and small cattle in the neighbourhood. It is said that the number of the residents who perform forest grazing decreased compared to the past. Products such as walnuts, wheat, barley, and pepper are cultivated in the neighbourhood. Mushroom picking as a source of income is commonly performed. There are also beekeeping activities in the neighbourhood. Approximately 80 residents in the neighbourhood work in a mining company.

13.3.5 Infrastructure: Health, Water Supply and Sewerage

Figure 13.7 below shows the locations of the social infrastructural services (i.e., educational institutions, local shops, and mosques) in Project affected neighbourhoods.

[190] Socio-Economic Development Ranking of Districts Research (2022). Retrieved from sanayi.gov.tr/assets/pdf/birimler/2022-ilce-sege.pdf on 03 January 2024.

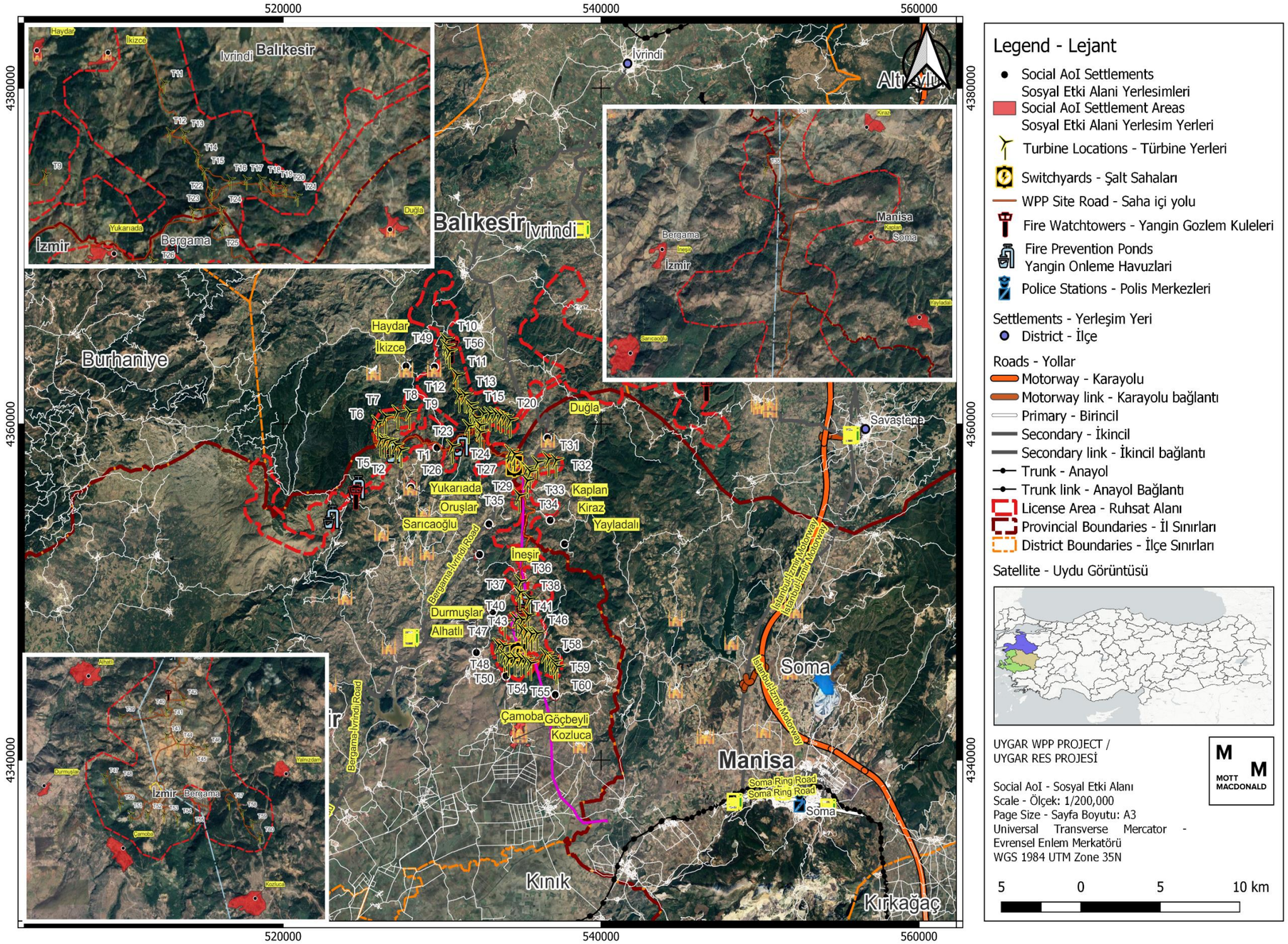


Figure 13.7: Social infrastructural services in Project affected neighbourhoods

13.3.5.1 Bergama District (İzmir Province)

There is an electricity network and a landline telephone in Çamoba neighbourhood. New drilling for water has been done in the neighbourhood. Residents stated that they are satisfied with the quality of the water. For more detailed information please see *Chapter 5: Water Quality, Hydrology and Hydrogeology*. There is a sewerage system in the neighbourhood. For more detailed information please see *Chapter 11: Waste and Resources*. The road providing access to the neighbourhood is asphalt. The roads connecting the neighbourhoods to agricultural areas are mostly stabilised roads. There is no health facility in the neighbourhood. Residents who have a health issue go to Göçbeyli neighbourhood (4.6 km away) or Bergama Public Hospital (25.8 km away) for treatment.

There is an electricity network and a landline telephone in Durmuşlar neighbourhood. It has been stated that there is a general problem for accessing the water resources in the region. Transported water is used in the neighbourhood. There is a septic tank which is emptied regularly by the municipality. The road providing access to the neighbourhood is asphalt. The roads connecting the neighbourhoods to agricultural areas are mostly stabilised roads.

Desktop studies cannot provide sufficient and reliable information on infrastructure for the other Project-affected neighbourhoods in Bergama district. On the other hand, limited time to complete the site visit studies remained as a limitation to receive detailed data on these issues.

13.3.5.2 Soma District (Manisa Province)

There is no health facility in Kiraz neighbourhood. Residents who have a health issue go to Soma district for treatment.

Desktop studies cannot provide sufficient and reliable information on infrastructure for the Project-affected neighbourhoods in Soma district. On the other hand, limited time to complete the site visit studies remained as a limitation to receive detailed data on these issues.

13.3.5.3 İvrindi District (Balıkesir Province)

There is an electricity network and a landline telephone in Haydar neighbourhood. The neighbourhood is rich in terms of water resources. There is a septic tank which is emptied by the municipality. The road providing access to the neighbourhood is asphalt. The roads connecting the neighbourhoods to agricultural areas are mostly stabilised roads. Access roads are narrow and winding. Mukhtar stated that there is a health facility in the neighbourhood and a doctor comes for check-ups every week. In case of emergency, residents go to Korucu neighbourhood (9.7 km away) in İvrindi district.

There is an electricity network and a landline telephone in İkizce neighbourhood. Drilling and tanker water are used as water sources. Residents stated that they experience water shortage in summer. It has been stated that transportation becomes difficult during the winter months due to infrastructural deficiencies and sometimes disasters such as floods occur. There is a sewerage system in the neighbourhood. As mukhtar stated, there is no health facility in the neighbourhood. A doctor comes to the neighbourhood every two weeks for check-ups. The nearest health care facility to the neighbourhood is in the Korucu neighbourhood, which located approximately 9.4 km away from the neighbourhood.

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[191].

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[192]. 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[193]. 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[194]. 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[195].

At provincial level, İzmir, Manisa, and Balıkesir were ranked as 2nd, 18th, and 10th, respectively, amongst 81 provinces for gender equality according to 2020 Gender Equality Assessment in 81 provinces conducted by TSKB, Tepav, and TOBB[196]. This finding illustrates that İzmir, Manisa, and Aydın provinces have lower gender equality gaps than the overall average of Türkiye; however, there is still need for progress.

Within the scope of the ESIA studies of the Project, the district or neighbourhood 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 neighbourhood.

At neighbourhood 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. It is known that the women's participation in business life is supported, at least partially. Women in these neighbourhoods provide support for the livelihood activities including harvesting in agriculture, mushroom picking, and animal husbandry. On the other hand, men are regarded as the breadwinner of the household who has a paid labour outside the house. Therefore, it is possible to say that some traditional codes still maintain their influence. 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 and December 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.

---

[191] World Economic Forum, Global Gender Gap Report. June 2023. Retrieved from https://www3.weforum.org/docs/WEF_GGGR_2023.pdf on 22 December 2023.

[192] Turkish Statistical Institute, Women in Statistics, 2022. Retrieved from TÜİK Kurumsal (tuik.gov.tr) on 04 January 2024.

[193] Turkish Statistical Institute, Women in Statistics, 2022. Retrieved from TÜİK Kurumsal (tuik.gov.tr) on 04 January 2024.

[194] Members of the 28th Term Turkish Parliament. Retrieved from Türkiye Büyük Millet Meclisi (tbmm.gov.tr) on 04 January 2024.

[195] World Economic Forum, Global Gender Gap Report. June 2023. Retrieved from https://www3.weforum.org/docs/WEF_GGGR_2023.pdf on 04 January 2024.

[196] TSKB, Tepav and TOBB, Gender Equality Assessment in 81 Provinces, 2020. Retrieved from https://www.tskb.com.tr/uploads/file/8c1cb7177b044d3e4d0aaae6a7ed121c-1639646238384.pdf on 04 January 2024.

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 neighbourhoods 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, women, woman-headed households, the landless/homeless, students, Syrians under temporary protection (SuTP), refugees under international protection (UIP), and the unemployed.

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 has not yet initiated.

There is one disabled individual in Çamoba neighbourhood. The number of the elder population is quite high in the neighbourhood. It has been stated that the number of people in need of help and care is high. As reported by the mukhtar, there are 8 older women and six older men living alone in the neighbourhood. The mukhtar stated that he asks for help regularly from the district municipality and governorship for the needs of the residents. Students receive education through mobile education.

In Alhatlı neighbourhood, the rate of young population is quite high. It has been stated by the mukhtar that there are people who in need of care. There is one Syrian woman living in the neighbourhood.

There are 6 disabled individuals in Durmuşlar neighbourhood. As stated by the mukhtar, the rate of young population is quite high. There are 100-150 young people living in the neighbourhood. There are approximately 10 senior residents. As reported by the mukhtar, there are 30 residents who receive social support in the neighbourhood. There are 35 students who receive education through mobile education.

In Kiraz neighbourhood, there are 15 older people living alone. The young population goes to Soma district to work. There are a total of 10 students in the neighbourhood who receive education in Soma district through mobile education.

There are five disabled individuals in Haydar neighbourhood. The majority of the population of Haydar neighbourhood consists of young people. There are 10-15 older people living in the neighbourhood. As stated by the mukhtar, there are seven residents who receive social support.

There are six disabled individuals in İkizce neighbourhood. The number of the elder population is quite high in the neighbourhood. It is stated that the number of retired people is high. There is one older woman living alone in the neighbourhood. There are residents who receive support from the district governorship and receive old-age pension and three-month salary. There are 10-15 students who receive education through mobile education.Especially in İkizler and

Çamoba neighbourhoods, the retired population is quite high. The majority of the population consists of elderly people. It has been stated that the reason for young people to migrate is that there are few job opportunities in the neighbourhood.

There is a balanced gender distribution within the populations of the Project affected neighbourhoods. As reported by the mukhtars, mostly the older women live alone in the Project affected neighbourhoods, 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 neighbourhoods is reported as high by the mukhtars. While some households have income ranging from the old age and retirement pension to higher levels of income through various types of economic activities (agriculture, animal husbandry and wage labour), young population living in the Project-affected neighbourhoods stated that the unemployment rate is quite high.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 neighbourhoods. 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.

There is no SuTP population in the Project-affected neighbourhoods. The data for district level is not available. However, it is assumed that the SuTP population is low in the Balıkesir and Manisa since the SuTP population in these provinces are only 0.34% and 0.86% of the whole population, respectively[197]. İzmir has a higher rate (2.73%) of SuTP population than Balıkesir and Manisa provinces, however it can be assumed that since Bergama is a local district compared to other districts in İzmir, SuTP population lives in districts of İzmir which receive immigration more. There is also no official data available at neighbourhood, district, or provincial level about the refugees UIP. None of the consulted stakeholders (mukhtars, local community members and district directors of agricultural and forestry) mentioned the specified groups.

13.4 Impact Assessment

13.4.1 Construction

13.4.1.1 Population Influx

Considering the population structure of the settlements in the AoI, it is seen that the annual population growth rates have low values (0.74% in Bergama, 0.51% in Soma, and -1.21% in İvrindi)[198]. Regarding the potential impacts on population, it is true that hiring workers for a brief period of time during the construction phase is vital, but it cannot be claimed that this would result in a large influx of workers and a stable employment area that will alter the population's trajectory over time.

It is crucial that new workers arriving in the settlements from outside are oriented in line with the social codes of the nearby Project affected neighbourhoods and incorporated into everyday life in case the essential skilled and semi-skilled workers cannot be found within the areas. On the

[197] Turkish Presidency of Migration Management, 2023. Retrieved from goc.gov.tr/gecici-koruma5638 on 04 January 2024.

[198] Nufusu, 2022 Statistics on Population. Retrieved from nufusu.com/ilce/bergama_izmir-nufusu, nufusu.com/ilce/soma_manisa-nufusu, nufusu.com/ilce/ivrindi_balikesir-nufusu on 04 January 2024.

other hand, employing the local people during the construction or operation phases will not create a situation that will directly affect the change graph of the population, since job opportunities are limited and with very low quotas.

According to the data provided by the Project Company representatives in December 2023, the estimated number of workforce may increase up to 610 depending on the scope and timeline of the Project during the construction phase, and 10 personnel within this workforce will be the Project Company employees. Project Company representatives added that since 610 workers are not expected to work at the Project area at the same time due to the different phases of construction and land acquisition processes, it is estimated that it will not create a major population influx in the Project social AoI.

For the operation phase, the number of workforce is estimated to be 22, three of whom will be subcontractors. However, local employment opportunities may 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. In this regard, influx impacts associated with non-local workers' use of local infrastructure (i.e., shops, mosques) are also not estimated to occur in the scope of the Project.

13.4.1.2 Education

As per the corporate social responsibility activities of the Project Company conducted within the scope of previous projects, it is seen that educational institutions take a significant place for the Project Company in terms of collaboration (i.e., student visits to the Project, renovation of the schools). In this regard, it is possible to say that the Project may lead students to receive further opportunities in access to education. The magnitude of the impact is minor and the sensitivity of the social receptors regarding this impact is assessed as low. Overall, this leads to a negligible significance within the impact evaluation.

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. In 16 settlements across three districts in three provinces, there is a requirement for land on 343 parcels. Among these parcels, 45 are public lands, covering an area of 1,562,575.19 square meters, which is primarily forestland. The remaining 26% of the affected areas consist of private lands. Specifically, there are 298 private landowners or shareholders, including 300 PAPs and 5 companies. Turbines will be located on both private and public parcels. Similarly, both types of land will be utilised for the access road.

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 PS5/PR5 and the preparation of a plan to address the gaps. Apart from the information on informal users in the Project’s social AoI, other findings of the site visit in February 2024 can be summarized as follows:

- During community level survey with representatives of the settlements, it was learned that mukhtars have knowledge on land acquisition activities.
- Households' main and three auxiliary/supplementary sources of income were asked, and 404 answers received from 151 households. "Agriculture" is among the four most main sources of income for 92.5% of households. Animal husbandry is among the primary sources of income for 81% of households. The second most important source of income for households is pension.

- Household representatives, specifically those engaged in agriculture, were consulted to gather their opinions regarding the problems arising from land acquisition and land use for the Project. Among the respondents:
  - 136 household representatives expressed their expectation of adverse impacts on their livelihoods due to the Project.
  - When asked about the reasons for these impacts, a total of 310 responses were received from 151 household representatives (since some provided multiple answers). Notably, 34.2% of the household representatives cited loss of land, while 21.6% mentioned loss of land value as contributing factors.
- There are 45 public lands which will be affected by the Project. One informal user was identified and entitlements according to economic impact is presented in RAP and in entitlement matrix.
- All respondents were asked whether they use forests to have products such as wood, medicinal plants and mushrooms, and 92 of the household representatives responded positively. Five households benefit from the forestland for commercial purpose.
- 48 of forestland users think that the animal grazing activity might be affected by the land acquisition activities of the Project
- Six household representatives declared that they were engaged in fishing activities in the water resources around the settlement for household consumption. Two of them consider that the Project's land acquisition/use may adversely impact access to fishing activity.
- 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.
- According to available expropriation data, there is one residential building on a private land affected by the land acquisition of the Project. However, these houses are outside the expropriation area. Project Company confirms that the houses in question are not affected by the land acquisition of the Project. If the house is affected due to design change, Addendum will be prepared for the RAP.
- 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.
- There are no workplaces or commercial buildings affected by the land acquisition of the Project.
- 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 scope of the RAP field study, vulnerabilities of all affected household members were examined. Among the total household population of 478 members in directly affected households, 75 vulnerable individuals were identified. These vulnerabilities include elderly people in need of care and social assistance, people with disabilities (both mental and physical), unemployed individuals actively seeking jobs, women who lost their spouses or divorced, homebound individuals due to chronic illness, illiterate adults, people who do not speak Turkish, and ethnic minority groups.

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 these land acquisition activities, urgent expropriation process and potential economic/physical displacements due to construction, 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 (including mushroom) in proximity due to dust generated on the route. As reported by the participants during the site visit, the dust decreases the quality of the products and their sale value. The critical periods for cultivating activities in the Project's social AoI should be consulted with the local community members and considered during the construction activities in order to reduce the risk of dust and loss of livelihood.

Although beekeeping activities are observed in the Project's social AoI, no impacts on beekeepers are estimated to occur since the locations of the beehives are reported as far away from the Project Licence Area.

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.

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, Water Supply and Sewerage

There are health facilities in some of the neighbourhoods, which a doctor visits for check-ups at regular intervals and prescribe medication for those in need. However, people with more serious health problems have to go to the central districts. The 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. No impacts are anticipated on the access to education due to the Project's construction activities. However, increased traffic volume during the construction phase throughout the access roads to the Project area may result in road traffic safety risks for the passengers on İvrindi-Bergama Road. Please see Section 15.4.1.4 for impact assessment on traffic safety.

All consulted neighbourhoods have electricity network and landline telephone. During the construction phase, temporary 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 mukhtars of the neighbourhoods did not report any concern related to the damage to the water resources due to the Project's construction activities during the consultations held by the 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.

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

Within the scope of the gender considerations, the most important subject is that the gender-based violence and harassment (GBVH) risks. 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. 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 neighbourhoods.

It was observed that most of the mushroom picking activities are carried out by women in the Project affected neighbourhoods. When the impacts on livelihood (i.e., dust, access road construction) are considered from the gender perspective, women's participation on income generation might be adversely affected from the construction activities.

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 neighbourhoods 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. At the time of preparation of the ESIA, no camp site and mobilization area have been designated and started to be established. Hence, the potential influx of male workers into neighbourhoods due to the Project construction activities and its potential impacts on women's daily lives and livelihood activities are not known. If the camp sites will be close to the residential areas of the neighbourhood and some of the construction activities within the scope of the Project are carried out on agricultural lands where women also work, potential risks may occur. However, as only a limited number of women stakeholders in the Project affected neighbourhoods 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.

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. In general, the impacts on students are assessed with a particular focus on traffic management, while no negative impacts are expected for non-school-age children. During the construction phase, increased traffic volumes on the access roads to the Project area may lead to road safety risks. Although no impacts are anticipated on the access to education due to the Project's construction activities, increased traffic volume during the construction phase throughout the access roads to the Project area may result in road traffic safety risks for the passengers on Ivrindi-Bergama 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, as reported by the mukhtars of the nearby neighbourhoods, some residents have the adequate skills to be employed in certain fields of the Project throughout the operation phase such as security.

On the other hand, there are agricultural 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 agriculture.

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 13.17: 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
Education	Inaccessibility to educational services	Restrictions and safety risks when accessing to educational services	Difficulties when accessing to educational services	No obstacles in terms of access to educational services
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,	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

Subject	High	Medium	Low	Negligible
	high rates of unemployment			
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 13.18: 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 settlements	Low	Construction	AoI	Reversible	Unlikely	Negligible	Negligible	Negligible
Education	Local community members / Project affected settlements	Medium	Construction	AoI	Reversible	Occurring under specific conditions	Minor	Low	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 settlements	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

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Vulnerable Groups	Local community members who are in a more disadvantaged position /	Medium	Construction	AoI	Irreversible under specific conditions	Possible	Minor	Negligible	Negligible

Table 13.19: 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 Education

- 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 teachers and students to raise their grievances.

13.5.1.3 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 neighbourhoods 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 Resettlement Action Plan (RAP) in line with the IFC PS 5 and EBRD PR 5 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.
- Technical and feasible measures will be explored to provide access to water resources for the PAPs who engage fishing economically, and proper passages will be provided to restore access after construction by the Project Company.

13.5.1.4 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 neighbourhoods 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.

13.5.1.5 Infrastructure: Health, 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.

13.5.1.6 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 neighbourhoods to the extent possible.
- The CLO will organize specific meetings with women in the Project affected neighbourhoods.
- 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.
- Socioeconomic development projects for women empowerment should be developed and implemented in collaboration with relevant governmental and non-governmental stakeholders.
- 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.
- To ensure women participation during the construction and operation phases of the Project. Bi-monthly women meetings will be held by the female CLO.

13.5.1.7 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 neighbourhoods will have the chance to raise their requests regarding the employment and procurement opportunities.

13.5.3 Summary

Table 13.20: Residual impact during construction

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Population	Local community members / Project affected neighbourhoods	Negligible	Negligible
Education	Local community members / Project affected neighbourhoods	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 neighbourhoods	Minor	Negligible
Gender	Local community members	Negligible	Negligible
Vulnerable Groups	Local community members who are in a more disadvantaged position	Negligible	Negligible

Table 13.21: 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 two site visits to the Project area, which were conducted by Mott MacDonald Social Team on 26 October 2023 and 7-8 December 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 in 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.
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.**

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	19.12.2007	26735
Türkiye Earthquake Regulation for Buildings	20.11.2021	31665

Source: T.R. Presidential Complex General Directorate of Law and Legislation[199]

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

[199] 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.S. International Development Finance Corporation (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[200]

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[201]

[200] Retrieved from: Conventions ratified by Türkiye (ILO-Ankara) on 21 November 2023
[201] Retrieved 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[202]:

- **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

[202] 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 (CoC):** 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 (CoC):** 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 CoC applies to all suppliers of goods and services to Enercon worldwide. Enercon expects its suppliers to agree to the principles in this Supplier CoC. 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[203]. 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 610 depending on the scope and timeline of the Project during the construction phase, and 10 personnel within this workforce will be the Project Company employees. 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 22, three of whom will be 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.

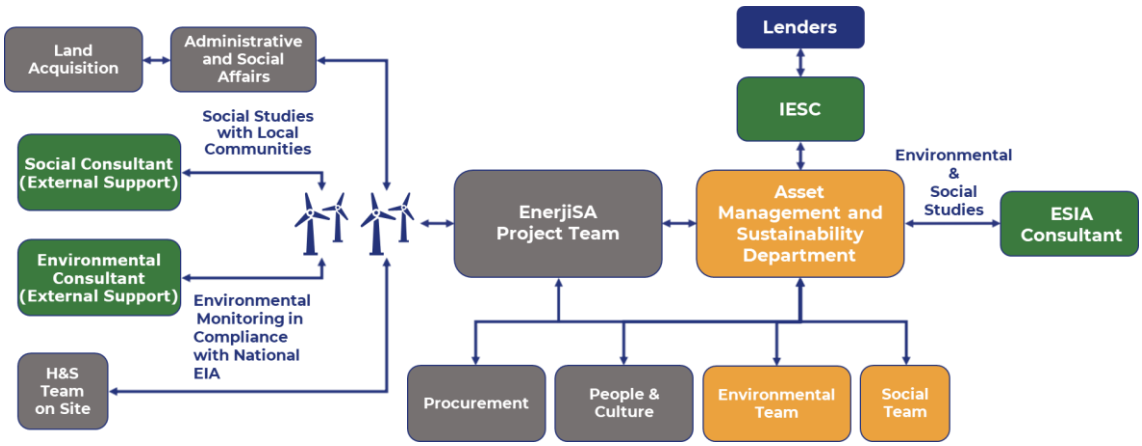


Figure 14.1: The organizational structure of the Project Company for E&S Governance
Source: Enerjisa Üretim

As per the international requirements, an HR Policy describing the way the Project Company will manage its Project workforce needs to be developed. HR policy allows the Project Company to communicate with the workforce (including contractors and subcontractors), 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.

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

[203]Retrieved from https://tureb.com.tr/lib/edergi/20/20.pdf on 16 November 2023.

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 neighbourhoods 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 the accommodation needs of workers who will work during the construction and operation phases will be arranged through the businesses providing accommodation services and rental housing in nearby settlements.

There will be working offices where technical works will be carried out, a kitchen, a tea stove and a toilet in order to meet daily needs of the workers in the Project construction area. Similarly, the social/technical infrastructure needs of the personnel who will work during the operation phase of the Project will be provided at the administrative and social building that is planned to be established. The administrative building will include working offices where technical work is carried out, a kitchen, a tea stove and a toilet in order to meet daily needs.

For food and beverage need of the workforce that will work during the construction and operation phases, the Project Company works with a contracted catering company to provide services in the Project's mobilization 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 gender-based violence and harassment (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[204] 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.

[204] 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.

- 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 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 CoC 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 CoC, 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 and 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 neighbourhoods 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 neighbourhoods. People living in neighbourhoods 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.

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 neighbourhoods 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)

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 conditions and terms of employment	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 conditions and terms of employment	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 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

Subject	High	Medium	Low	Negligible
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 International Requirements	All Project workers	Medium	Construction	Construction area	Irreversible unless compensated	Occurring under specific conditions	Moderate	Medium	Moderate
Gender-Based Violence and Harassment (GBVH) Risks	All Project workers/ Local community members residing in the nearby neighbourhoods	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

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
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 neighbourhoods	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	Worker's Organisations	All Project workers
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 neighbourhoods	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 neighbourhood	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

Receptor	Risk Summary	Receptor Sensitivity	Risk Likelihood	Risk Severity	Risk Rating
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.
- CoC 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. CoC 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 CoC in line with the Lenders' standards and requirements.

- Corporate level Security Personnel CoC 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 CoC 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 developed and 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.
- CoC 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. CoC will be disclosed to all Project staff.
- Corporate level Security Personnel CoC 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 CoC 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 Visitors	Risk of accidents in result of poor safety culture	High	1: Extremely Improbable	C: Major	1C: Low Risk
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 the multifaceted aspects of community well-being throughout the construction and operation phases of wind power initiatives are delved into, it becomes evident that fostering a balance between renewable energy development and the preservation of community health and safety is deemed paramount. This section unfolds an intricate tapestry of considerations, 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 section 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 have been identified.

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 neighbourhoods 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 neighbourhoods 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 Environmental Impact Assessment (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 Performance Standard 4, IFC General EHS Guidelines: Community Health and Safety, IFC EHS Guidelines: Wind Energy, and EBRD Performance Requirement 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 Performance Standard 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 Performance Requirement 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 Performance Standard 4, IFC General EHS Guidelines: Community Health and Safety, IFC EHS Guidelines: Wind Energy, and EBRD Performance Requirement 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. . Moreover, as indicated in ETL's PID, there is no agricultural infrastructure in the Lisence Area. 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 hospitals around the Project area in different districts including Bergama, Soma and Edremit. There are different fire watchtowers and fire prevention ponds nearby the Project. When the proximity of fire stations analysed, it is seen that the closest fire station is located in Burhaniye.

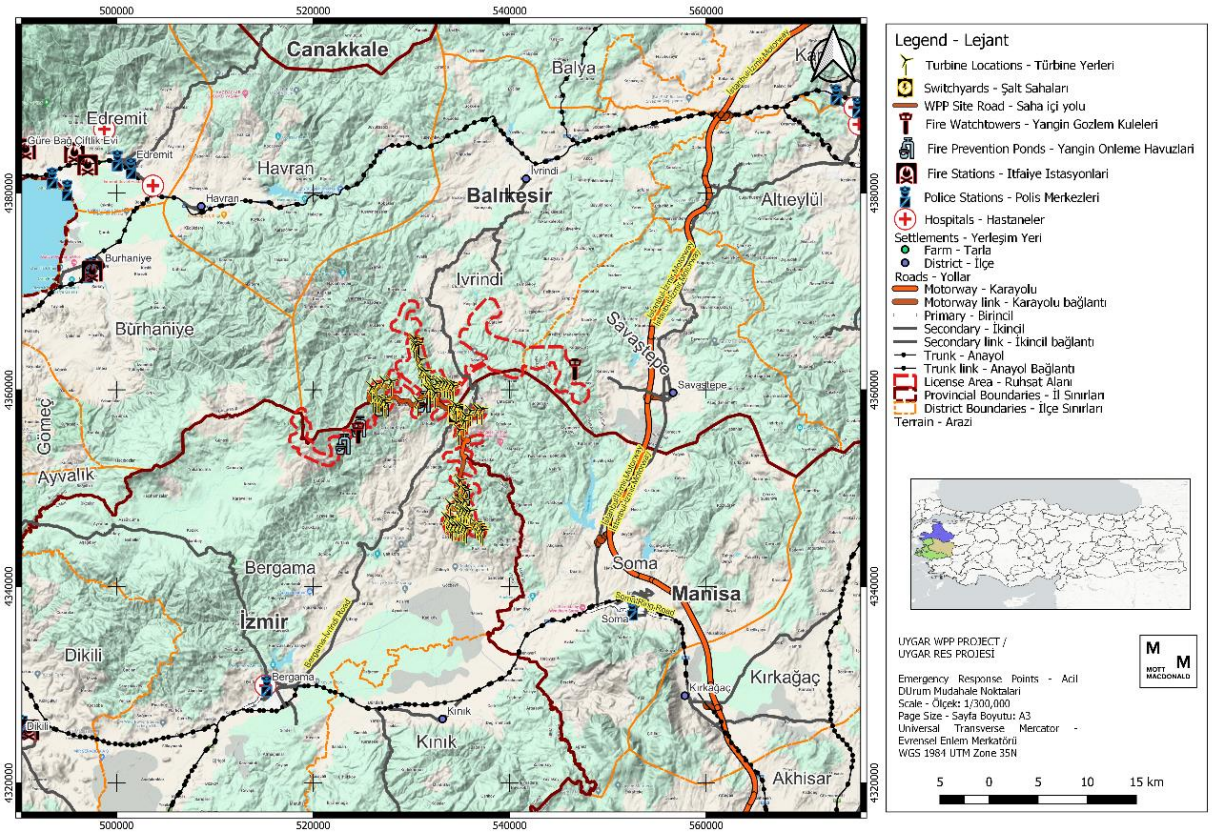


Figure 15.1: Emergency response points

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:

- Uygar WPP National EIA Report, 2023, Nartus

- Open Street Map Geodatabase (https://www.openstreetmap.org/)
- Google Earth Satellite Images
- General Directorate of Highways, 2nd Regional Division Traffic Volume Maps
- General Directorate of Highways, 14th Regional Division Traffic Volume Maps

Access to the Project area will be via Bergama – İvrindi Road, rehabilitation of existing roads as much as possible, and if not possible, new road construction in sections where there is no access. The potential road widening works, which will be carried out simultaneously with the land acquisition process, are planned to be realised by distributing from Bergama-İvrindi road.

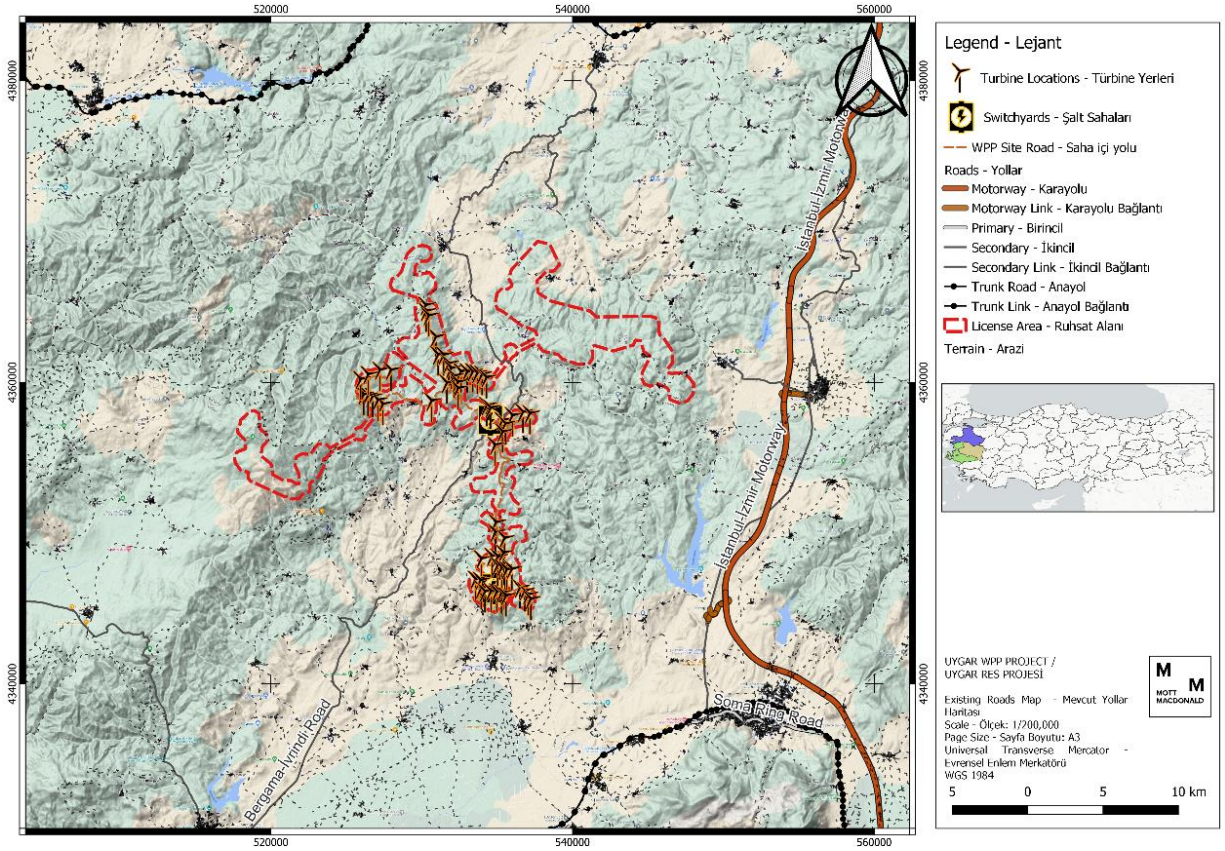


Figure 15.2: Available roads around the Project area

The Project area is under the responsibility of the 2nd and 14th Regional Directorate of Highways. The transports to be made within the scope of the Project will be carried out in accordance with the Highways Traffic Law No. 2918, the permits specified in the laws and regulations will be obtained in advance for the transports to be made on the roads in the maintenance network and no new connection will be made to the road other than the existing connections.

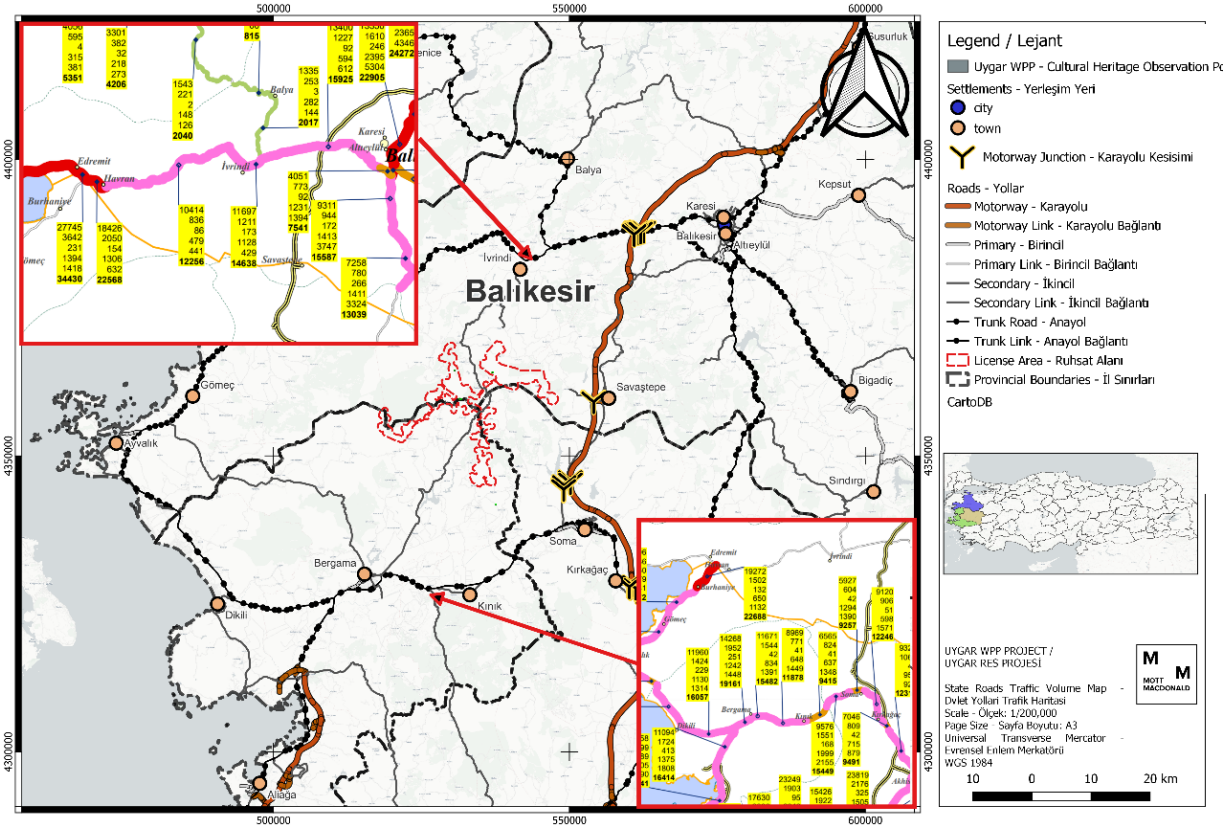


Figure 15.3: General Directorate of Highways, 2nd and 14th Regional Division Highway traffic volume

In addition, traffic volume estimations of the state roads within the General Directorate of Highways, 2nd Regional Division jurisdiction is also evaluated. The closest junctions to the Project area are located near the İvrindi and Kınık districts. Accordingly, it is estimated that total of 14,638 vehicles (11,697 Automobiles, 1211 medium load commercial vehicles, 173 busses, 1128 trucks, and 429 trailers, tractors, semi-trailers) passing through Ivrindi, and 15,482 vehicles (11,671 Automobiles, 1544 medium load commercial vehicles, 42 busses, 834 trucks, and 1391 trailers, tractors, semi-trailers) passing through Kınık.(Figure 15.3).

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 chapters of this 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 *Chapter 18: Stakeholder Engagement, Information Disclosure and Consultation*.

Other than this, the Project Company has been organizing stakeholder engagement and consultation activities together with the support of the appointed social consultancy company. It is understood from both the documents provided by the Project Company and the site visit that

local community members have some concerns related to limited public access to the Project area where the pasture lands are located, interruptions in the access to natural spring water, road traffic safety issues, noise, and dust.

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 details 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, pile driving, 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. According to the National EIA studies, the presence of active landslides and old landslides has been detected within the WPP License area, and there is no movement area formed as a result of slippage, or old landslide surface strength. Hence, that no nearby buildings / structures are at risk from ground instability / landslides caused by the planned access road construction works. Moreover, according to the National EIA Report, turbine location has Degree 3: Severe level erosion or Degree 4: Very severe erosion risks. However, 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 (L&FS)

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.

There are operating police departments and hospitals around the Project area in different districts including Bergama, Soma and Edremit. There are different fire watchtowers and fire prevention ponds nearby the Project. When the proximity of fire stations analysed, it is seen that the closest fire station is located in Burhaniye. Emergency points are shown in Figure 15.1.

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
JBC loader	2
Sprinkler	1
Tower crane	1
Excavator	6
Truck	40
Road Grader	2
Road Cylinder	1
TOTAL	**53**

As described in Section 15.3.3, it is estimated that total of 14,638 vehicles passing through Ivrindi, and 15,482 vehicles passing through Kınık (Figure 15.3). 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.

$$\%\ Impact\ on\ Traffic\ Load = {Project\acute{}s\ Traffic\ load}\Big/{(Project\acute{}s\ Traffic\ load + Exisiting\ Traffic\ Load)}$$

For the road passing through Ivrindi:

$$\%\ Impact\ on\ Traffic\ Load = {53}\Big/{(53 + 14{,}638\ )} = \mathbf{0.36}\%$$

For the road passing through Kınık:

$$\%\ Impact\ on\ Traffic\ Load = {53}\Big/{(53 + 15{,}482\ )} = \mathbf{0.34}\ \%$$

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:

For the road passing through Ivrindi:

$$\%\ Impact\ on\ Traffic\ Load = {}^{8}/_{(8 + 14{,}638\ )} = \mathbf{0.055}\%$$

For the road passing through Kınık:

$$\%\ Impact\ on\ Traffic\ Load = {}^{8}/_{(8 + 15{,}482\ )} = \mathbf{0.052}\ \%$$

No impacts are anticipated on the access to education due to the Project's construction activities. However, increased traffic volume during the construction phase throughout the access roads to the Project area may result in road traffic safety risks for the passengers on Ivrindi-Bergama 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 40.

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 600 workers at peak during the construction phase of the Project. At the time of preparation of the ESIA, no camp site and mobilization area have been designated and started to be established.

All in all, the receptor sensitivity of the students and passengers are considered to be high and medium respectively due to the heavy vehicle load during the construction period. Moreover, the magnitude of impact for both is considered to be moderate owing to the condition of the road and transportation system. Hence, the overall impact magnitude is moderate for passengers on state road and major 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 15.4) until the materials reach the access roads within the Project area, which is ideal for well-maintained transportation of large items across settlement areas. 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	Menemen-Maltepe Road	İzmir	Bergama	İzmir-Çanakkale Road
		İzmir-Çanakkale Road			Çandarlı Road Street
	Aliağa	İzmir-Çanakkale Road			Çandarlı Connection Road
	Bergama	İzmir-Çanakkale Road			Çandarlı Port Connection Road
		İzmir-Bergama Road			İzmir-Çanakkale Road
		Begama-Ring Road			İzmir-Bergama Road
		Bergama-İvrindi Road			Begama-Ring Road
					Bergama-İvrindi Road

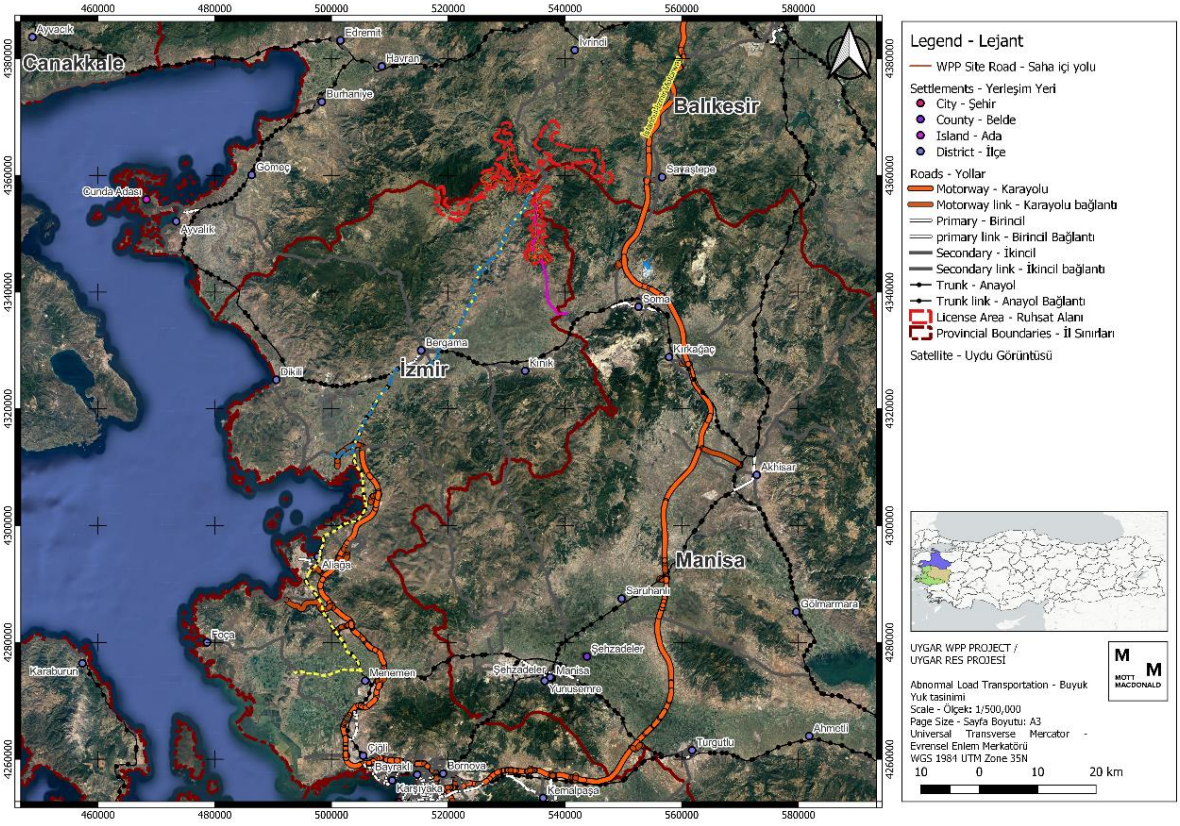


Figure 15.4: Route of Transfer for Turbine Blade and Tower

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
- 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

- 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
- 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
- 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
- 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, ammonium nitrate / fuel oil (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:

- Balikesir Regional Directorate of Forestry
- Izmir Regional Directorate of Forestry
- Manisa Regional Directorate of of Forestry
- Burhaniye District Municipality, Directorate of Sanitation
- Bergama District Municipality, Directorate of Sanitation
- Ministry of Environment, Urbanization and Climate Change
- General Directorate of Protection of Natural Assets
- Directorate of State Hydraulic Works (DSİ)
- Ministry of Agriculture and Forestry
- Ministry of Agriculture and Forestry
- General Directorate of Forestry
- Izmir, Manisa and Balikesir Provincial Directorate of Agriculture and Forestry
- General Directorate of Forestry
- Ministry of Agriculture and Forestry

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 Action Plan (RAP) field studies of the Project that was conducted in February 2024, informal user identification has been also made. Accordingly, one informal user of one of the Project affected public lands has been identified within the scope of the RAP studies. The user was informed about the Project during the field studies. CLOs will regularly engage with the user as per the SEP. Additionally, Project's grievance mechanism will be in place to raise any Project-related grievances regarding ecosystem services. As of May 2024, no grievances were received about the ecosystem services.

Table 15.4: Description of each Ecosystem Sevice 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
Burhaniye District Municipality, Directorate of Sanitation	The municipality's responsibilities include garbage collection, street cleaning, marketplace cleaning, solid waste removal, garbage container repair, citizen complaints resolution, environmental protection, and legal action against pollution-causing entities through environmental inspections and environmental protection activities.	E27727236-757.0144679 30/03/2023	The acquisition of domestic solid waste generated by personnel during the construction and operation phases of the planned Project will be provided by the Authority.
Bergama District Municipality, Directorate of Sanitation		E87565185000-32690 11/04/2023	The domestic solid waste disposal fee determined in the 2023 tariffs by the Municipal Council will be collected, and the Sanitation Department will take the garbage trucks for disposal to the Bergama solid waste disposal facility.
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-97749335-250-6569952 06/06/2023	The Izmir Governorate's Directorate of Environment, Urbanisation, and Climate Change conducted examinations on a project area, which was determined not to fall within the Special Environmental Protection Area or Natural Site Area. However, a part of the project is located in a potential natural site area within the scope of the "Ecologically Based Scientific Research Project for Existing and Potential Natural Site Areas of the Provinces in the Ankara, Balikesir, Bursa, Edirne, Eskisehir, Istanbul, Izmir, Kocaeli Regions" initiated by the Authority in 2021 in Bergama district, Kozak Plateau. The Directorate requested the Authority's opinion in a letter dated 29 May 2023. The Authority's decision to continue the Environmental Impact Assessment (EIA) process was based on the digital data of the project in Burhaniye, Izmir, and Manisa provinces, and the Bergama district.
General Directorate of Protection of Natural Assets	To safeguard biological diversity and manage natural, historical, and cultural values with sustainability, coordinating sectors with an integrated approach to protected areas facing pressure from urbanization, tourism, agriculture, and industry, while considering a multi-dimensional perspective.		
Directorate of State Hydraulic Works (DSİ)	To drill or have drilled wells for groundwater surveys and researches; to allocate groundwater; to protect and register groundwater; to issue certificates of exploration, utilisation and reclamation-amendment	E-22549675-611.02[611.02]-3539268 19/06/2023	The General Directorate has reviewed the project revisions, determining that some turbines fall within the "Sarıcalar Dam Long-Distance Protection Area" under the responsibility of DSİ 2nd Regional Directorate. Wind energy facilities can be permitted within these areas, provided necessary environmental infrastructure measures are taken. A 1/25,000 scale map examination revealed a natural water source in the temporary topsoil storage area east of the T49 turbine area. Protective measures should be taken to preserve structures such as fountains, springs, and wells. If water sources are found within or around the planning area, the relevant Regional Directorate should be contacted. The precise locations of the turbines are crucial, with a minimum distance between construction boundaries and riverbeds being at least 20 meters. Access roads between turbine areas should intersect with seasonal flowing riverbeds, and structures that narrow the flow section of watercourses in riverbeds cannot be
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.		built. Compliance with the 2006/27 Prime Ministry Circular on "Riverbeds and Floods" and the "Flood and Sediment Control Regulation" is essential.
Ministry of Agriculture and Forestry General 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.	E-66995690-611.02-8999786 15/08/2023	The National EIA report for the proposed WPP project should include commitments to ensure the project does not affect fire towers' line of sight or aircraft and helicopters' water collection. It should also commit to installing an ENH system for daytime and night-time marking and lighting, halt facility operations in case of forest fire outbreaks, maintain trained personnel in fire management, and ensure the construction of fire pools and water collection pits. The report should also implement international standard marking and lighting in turbines and an IP camera system, with footage shared with authorities. The project will not conduct planning in ecologically valuable forest areas for future capacity expansion. It is crucial that the project does not grant rights under Law No. 6831 on Forests, does not substitute permits, and permits undergo re-evaluation. The General Directorate sees no obstacle to making a Final Decision within the EIA Process with these commitments.
Izmir Regional Directorate of Forestry Manisa Regional Directorate of Forestry Balıkesir 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 Izmir , Manisa and Balıkesir Regional Directorate of Forestry. However, • In case of excavation waste is planned to be stored within the forest area, Izmir, Manisa and Balıkesir Regional Directorate of Forestry will be consulted as stated in *Chapter 11: Waste and Resources.*
Izmir Provincial Directorate Agriculture and Forestry Manisa 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 Izmir, Manisa and Balıkesir Provincial Directorate Agriculture and Forestry. However, • In case of excavation waste is planned to be stored within the agricultural area Izmir and Manisa Provincial Directorate Agriculture and 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 potential 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:

$$B = 1.50\ x\ (111\ m + 138.6\ m) = 374\ m$$

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	3

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
11	111	138.6	374	-	No Impact
12	111	138.6	374	-	No Impact
13	111	138.6	374	-	No Impact
14	111	138.6	374	-	No Impact
15	111	138.6	374	-	No Impact
16	111	138.6	374	-	No Impact
17	111	138.6	374	-	No Impact
18	111	138.6	374	-	No Impact
19	111	138.6	374	-	No Impact

Turbine No	Hub Height (m)	Rotor Diameter (m)	Throwing Distance, (m)	Number of Building in Throwing Distance	Assessment
20	111	138.6	374	-	No Impact
21	111	138.6	374	-	No Impact
22	111	138.6	374	-	No Impact
23	111	138.6	374	-	No Impact
24	111	138.6	374	-	No Impact
25	111	138.6	374	-	No Impact
26	111	138.6	374	-	No Impact
27	111	138.6	374	-	No Impact
28	111	138.6	374	-	No Impact
29	111	138.6	374	-	No Impact
30	111	138.6	374	-	No Impact
31	111	138.6	374	-	No Impact
32	111	138.6	374	-	No Impact
33	111	138.6	374	-	No Impact
34	111	138.6	374	-	No Impact
35	111	138.6	374	-	No Impact
36	111	138.6	374	1	Possible Impact
37	111	138.6	374	-	No Impact
38	111	138.6	374	-	No Impact
39	111	138.6	374	-	No Impact
40	111	138.6	374	-	No Impact
41	111	138.6	374	-	No Impact
42	111	138.6	374	-	No Impact
43	111	138.6	374	-	No Impact
44	111	138.6	374	1	Possible Impact
45	111	138.6	374	1	Possible Impact
46	111	138.6	374	-	No Impact
47	111	138.6	374	-	No Impact
48	111	138.6	374	-	No Impact
49	111	138.6	374	-	No Impact
50	111	138.6	374	-	No Impact
51	111	138.6	374	-	No Impact
52	111	138.6	374	-	No Impact
53	111	138.6	374	-	No Impact
54	111	138.6	374	-	No Impact
55	111	138.6	374	-	No Impact
56	111	138.6	374	-	No Impact
57	111	138.6	374	-	No Impact
58	111	138.6	374	-	No Impact
59	111	138.6	374	-	No Impact

Turbine No	Hub Height (m)	Rotor Diameter (m)	Throwing Distance, (m)	Number of Building in Throwing Distance	Assessment
60	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 that there are 16 structures (four of them are secondary-use buildings e.g., seasonal houses or shelters.) in 178 m distance to the nearest turbine which makes the impact magnitude major and receptor sensitivity medium. Hence, the overall impact significance can be considered as major.

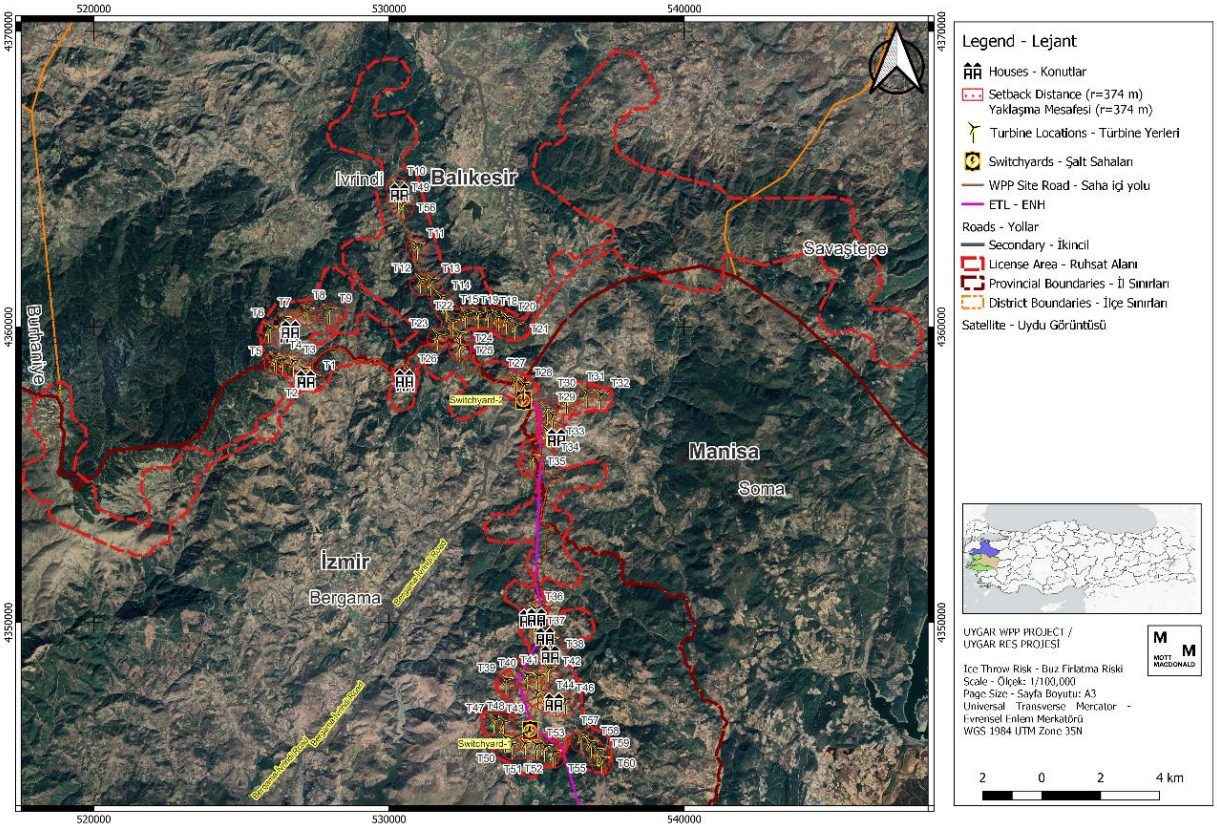


Figure 15.5: Ice Throw Risk Zones

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 Environmental, Health, And Safety Guidelines for Wind Energy[205]; 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 shows that, the blade throw risk can occur in different scenarios, and it may have different probabilities.

[205] Environmental, Health, And Safety Guidelines For Wind Energy, IFC, 2015

Table 15.7: Frequencies of occurrence of scenarios relevant for risk analysis. The recommended values correspond to the 95% upper limits[206]

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}
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)
Moreover, the wind is assumed to have an x-axis force and a 45°-degree throw effect

The maximum observed wind speed for Izmir is 42.5 m/s which was observed on 22.12.1996, for Balıkesir it is 28.8 m/s which was measured on 28.11.2021 and for Manisa it is 35.3 m/s which was measured on 29.03.1970 according to the General Directorate of Meteorology[207]. 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 6.5-8 m/s.[208].

[206] Guidelines on The Environmental Risk of Wind Turbines In The Netherlands, H. Braam, L.W.M.M. Rademakers, ECN Wind Energy. 2004

[207] Meteoroloji Genel Müdürlüğü (mgm.gov.tr)

[208] Meteoroloji Genel Müdürlüğü (mgm.gov.tr)

For the average wind speed,

$X = 844.35\ m$

For the maximum wind speed,(İzmir Wind speed)

$X = 1219.80\ m$

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 tem 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:

Table 15.8: Status of the Receptors regarding Blade Throw Risk

Receptor	Status
Houses and buildings	There are 16 structures in the setback zone (four of them are secondary-use buildings e.g., seasonal houses or shelters.) There are 2 structures and few villages located in the Risk Zone (avg. wind speed) There are no structures located 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 2.6×10^{-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 medium as there are structures[209] within the setback; 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

[209] 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.

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 zones and implement safety measures that minimize the risk of aviation-related incidents. Closest airport is Balikesir-Edremit Kocaseyit Airport which approximately 31 km away from the WPP License Area. (Figure 15.6).

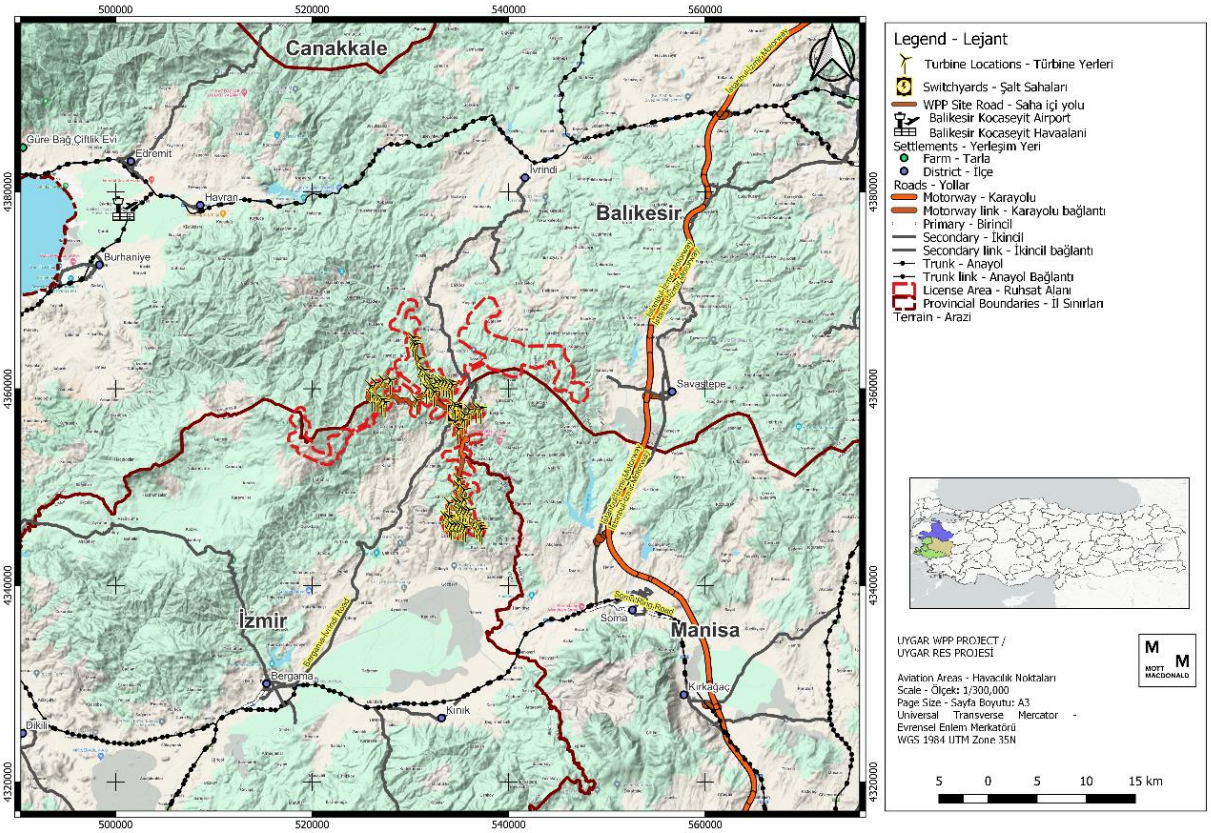


Figure 15.6: Nearest aviation areas

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[210].

[210] Aviation and wind farms: working together for a safer future (airport-technology.com)

- ***Turbulence:*** Wind farms generate turbulence due to the movement of their blades. This turbulence can affect nearby aircraft during take-off, 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[211].

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 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 Balikesir-Edremit Kocaseyit Airport in question is **30 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.

[211] https://www.airsight.de/projects/item/wind-energy-and-aviation/

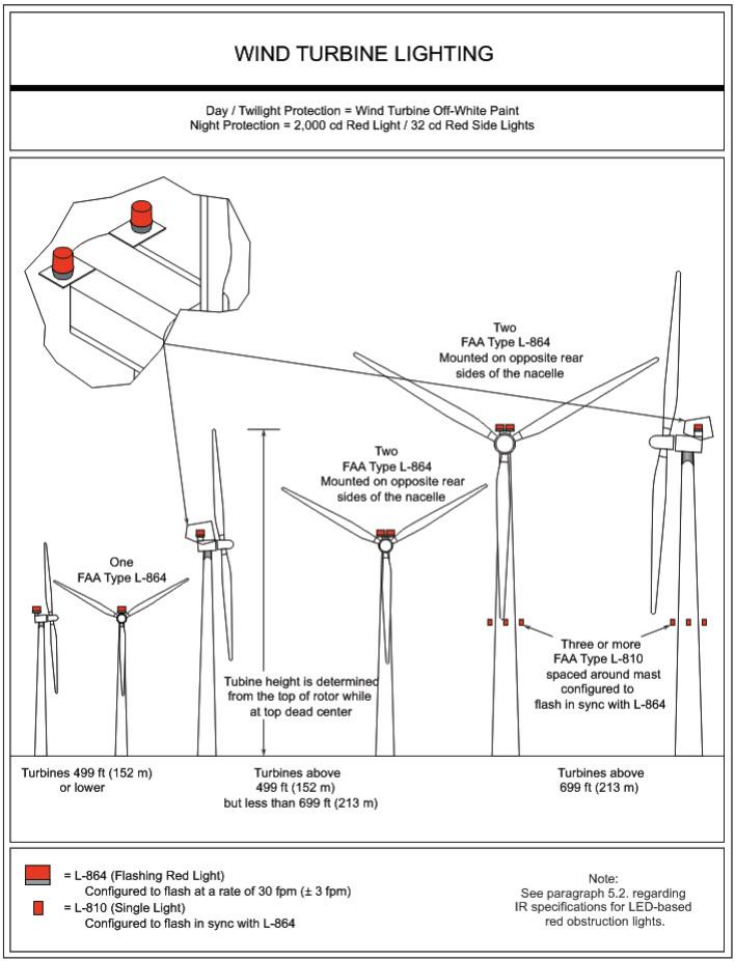


Figure 15.7: Wind Turbine Lighting Standards

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.

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. does not mean that it does not exist.

All in all, within the social AoI, which includes Balıkesir Province, Burhaniye, Savaştepe, Districts, Haydar, İkizce, Büyükyenice and Taşdibi Neighbourhoods İzmir Province, Bergama District, Oruçlar, Ürkütler, Yukarıada, İneşir, Alhatlı, Durmuşlar, Çamoba and Kozluca Neighbourhoods, Manisa Province, Soma District, Kiraz Neighbourhood, there will be no significant impact to the electromagnetic environment surrounding the Uygar 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 International Commission on Non-Ionizing Radiation Protection (ICNIRP), an international standard-preparing organization, and also 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 is Bergama-Ivrindi Road. 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 15.8, 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 15.8, nearest state road is Motorway is approximately 500 km away from the nearest wind turbine, T-28.

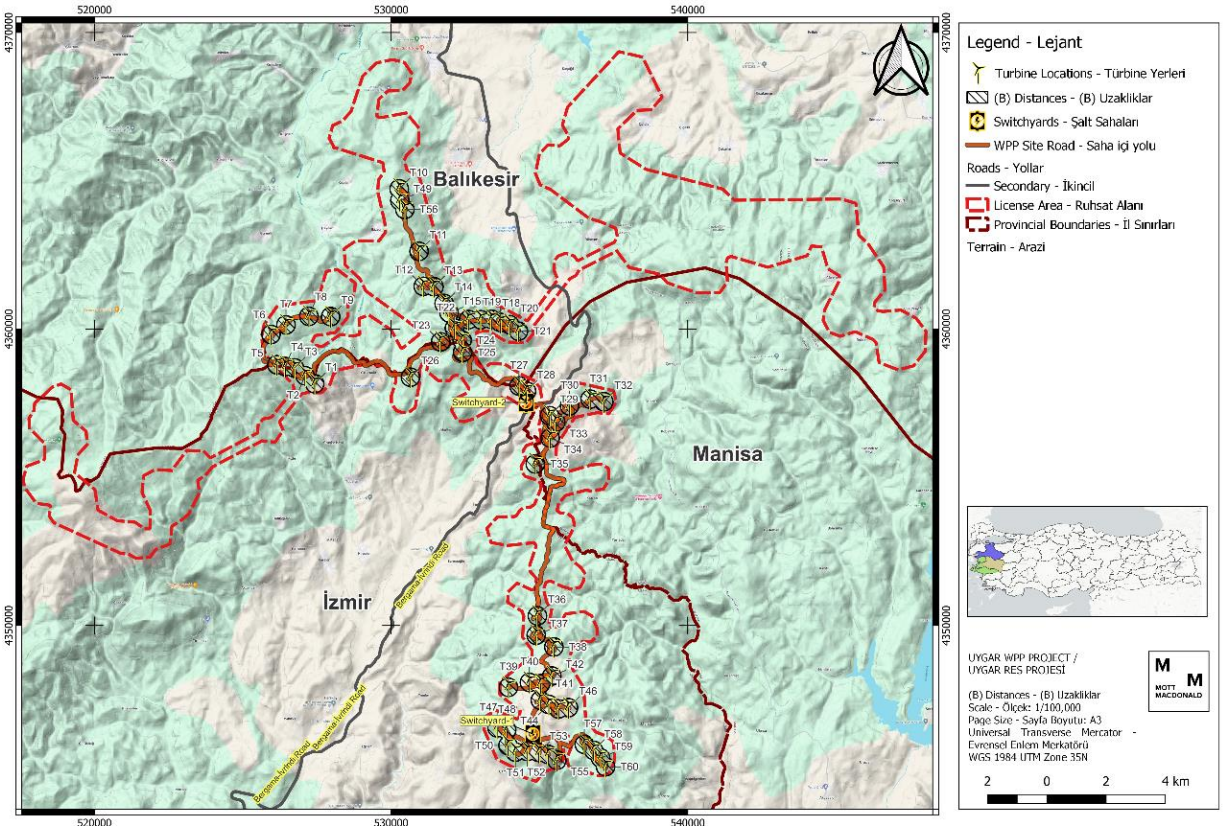


Figure 15.8: (B) Distances

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 management 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* 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[212].

- 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 components, as well as from the aerodynamic effects of the blades. Students, whose schools and/or houses are close to the turbines, may be affected from the noise during the operation phase. 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

[212] Addressing Security and Human Rights Challenges in Complex Environments (voluntaryprinciples.org)

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	Soils of Degree 4: Very severe erosion risk	Soils of Degree 3: Severe erosion risk	Soils of Degree 2: Moderate erosion risk	Soils of Degree 1: 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 neighbourhoods 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*, there are areas with severe erosion risk within the WPP License Area where the structural safety of the Project infrastructure sensitivity is high. 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 Bergama-Ivrindi Road 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 negligible.

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	Construction	AoI	Reversible	Possible	Negligible	Low	Minor
Noise	Local community members / nearby settlements	Low	Construction	AoI	Reversible	Possible	Negligible	Low	Minor
Structural safety of Project Infrastructure	Project Area / Components	Medium	Construction	AoI	Reversible	Possible	Moderate	High	Major
Life and Fire Safety	Forest Area	Medium	Construction	AoI	Reversible	Possible	Moderate	Medium	Moderate
Traffic Safety	Passengers on Bergama-Ivrindi Road	High	Construction	AoI	Irreversible in case of fatal accident	Occurring regularly under typical conditions	Moderate	Medium	Moderate

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
	Students	Medium	Construction	Access roads and highways	Irreversible in case of fatal accident	Occurring regularly under typical conditions	Moderate	High	Major
Abnormal Load Transportation	Passengers on Bergama-Ivrindi Road	Low	Construction / Tower transportation	AoI	Irreversible in case of fatal accident	Occurring regularly under typical conditions	Minor	Low	Negligible
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

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
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	Major	Medium	Major
Blade Throw	Local community members / nearby settlements and roads	Major	One time	Avg. and Throw Distance	Irreversible	Unlikely	Negligible	Medium	Negligible
		Major	One time	Max. Throw Distance	Irreversible	Unlikely	Negligible	Medium	Negligible

Impact Description	Receptor	Impact Magnitude					Overall Impact Magnitude	Receptor Sensitivity	Impact Significance
		Severity	Duration	Spatial Extent	Reversibility	Likelihood			
Aviation	Balikesir-Edremit Kocaseyit Airport	Low	Operation	AoI	Reversible	Unlikely	Negligible	Medium	Negligible
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	Low	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
Security Personnel	Local community members / nearby settlements	Low	Operation	AoI	Reversible	Unlikely	Negligible	Medium	Negligible
Noise	Local community members / Students	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 (L&FS)

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 Community Health and Safety (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 Procedure will be established and implemented throughout the construction phase. The content of the Procedure will define sensitive receptors, such as schools, on the access roads to the Project area. Relevant mitigation measures including regular consultations with school administration, awareness raising activities for children on road traffic safety, trainings to the drivers in terms of road safety, traffic regulations and speed limit will be identified in the Procedure. The Procedure will also specify the busy hours that are used by the students and try to avoid the utilization of trucks during these hours.

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 CoC 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.

Additionally, it shall be noted that, the WPP License Area is located 31 km away from the Balikesir-Edremit Kocaseyit Airport. Thus, no significant impact is expected.

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 plans 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, NGOs, neighboring 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*.

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 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.

15.5.2.8 Noise

A Project-specific Noise Management Plan will be in place. The content of the Plan will define sensitive receptors, such as schools, that are in close proximity to the turbines. Relevant mitigation measures including regular consultations with school administration 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 teachers and students 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
Noise	Local community members / nearby settlements	Negligible	Negligible

Impact	Receptor	Impact Significance without Mitigation	Residual Impact Significance
Structural safety of Project Infrastructure	Project Area / Components	Major	Minor
Life and Fire Safety	Forest Area	Moderate	Minor
Traffic Safety	Passengers on Bergama-Ivrindi Road	Moderate	Minor
	Students	Major	Minor
Abnormal Load Transportation	Passengers on Bergama-Ivrindi 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	Major	Minor
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	Balikesir-Edremit Kocaseyit Airport	Negligible	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 / Students	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 "Uygar Wind Power Plant Project" (the Project) which is located within Manisa (Soma District), İzmir (Bergama District) and Balıkesir (İvrindi District) Provinces; and to evaluate the potential impacts of the Project construction and operation activities on these cultural heritage assets.

This Chapter is prepared in line with the International Finance Corporation (IFC) Performance Standard 8 (PS8) and European Bank for Reconstruction and Development (EBRD) Performance Requirement 8 (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 aim 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 desktop study of the data available for the Project area and field surveys performed at the Project area conducted 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[213] 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 the 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 Property (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

[213] Unregistered sites may include: (i) sites in the process of registration by the related cultural heritage authorities; 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.

Property and identify the mitigation measures to be required by the authorities for those sites (e.g. measures to be taken by the Project Company prior to site entry).

- Providing upfront information on the cultural heritage sites and assets located within Project area 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 AoI of the Cultural Heritage Impact Assessment (CHIA) for tangible and intangible cultural heritage assets are as described in Table 16.1 and shown in Figure 16.1.

Table 16.1: CHIA Borders[214]

	Tangible Cultural Heritage	Intangible Cultural Heritage
Impact Assessment Boundaries	All Project Area[215]; • Project License Area, • Access and Site Roads, • Switchyard, ETL (Including ETL Pole Locations)[216] and Turbine Locations.	Bergama, İzmir- Alhatlı Neighbourhood, Bergama, İzmir - Yukarıada Neighbourhood, Bergama, İzmir – Durmuşlar Neighbourhood, İvrindi, Balıkesir - Korucu Neighbourhood, İvrindi, Balıkesir – Döşeme Neighbourhood, Soma, Manisa - Kiraz Neighbourhood.

[214] The impact area (AoI) for tangible cultural heritage was limited by the area where Project activities to be conducted, i.e., 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.

[215] The "archaeological walkover survey" to identify the possible cultural heritage assets within the Project area was carried out in accordance with two different digital datasets (“YEKA RES-2.kmz”–“Phase-1 Construction Projects.kmz” and “Energy Transmission Line.kmz” – “Approach Roads.kmz”). The Project Company has provided these datasets on 14 September 2023 and 18 September 2023, respectively. The conducted intensive surveys have only focused on turbine locations, access roads, switchyards, site roads, Energy Transmission Line (ETL), and other Project components in accordance with the submitted datasets. The remaining Project area has been observed and the data were collected. The updated Project digital dataset (labelled as 01_DESIGN) was submitted by the Project Company on 01 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 intensive surveys could not be carried out in the newly added areas to the Project. The general observation and obtained data for the Project area were taken into account for these revised locations to prepare this CHIA report for the Project.

[216] The ETL line and ETL Pole locations are presented in the "Uygar WPP ETL Project EIA Project Introduction File which was prepared in 2024. 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. Additionally, according to the national Uygar WPP ETL Project introduction file (please see page 3, Project Introduction File), the client has declared that the present roads which are in the Project license area will be used for access to the Project construction sites during the Project Construction Phase as much as possible.

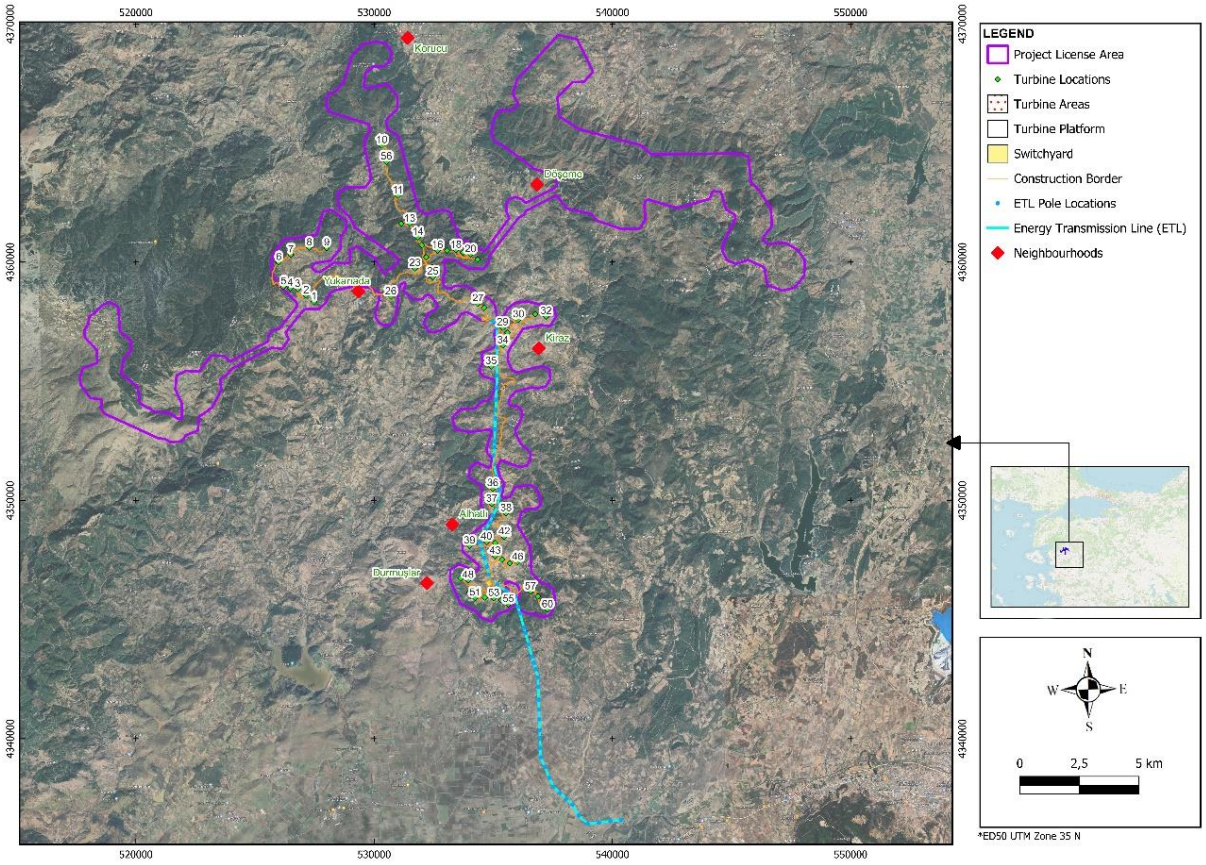


Figure 16.1: CHIA Study Area of the Project

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, which was published in the Official Gazette dated 23 July 1983 and numbered 18113. The cultural and natural heritage, which is protected by this 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 the 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 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 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 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 Usage dated 5 November 1999 and numbered 658, 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, Implementation Guidelines for Field Surveys, Test Pits and Excavation Works on Cultural and Natural Assets (Ministry approval dated 13 March 2013 and numbered 94949537-160.99-51264) define the procedures for salvage excavations, archaeological test pits and other 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 Requirements

16.2.2.1 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).
- International Council on Monuments and Sites (ICOMOS), Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, 2011.

16.2.2.2 International Standards

International Finance Corporation (IFC)

In the field of Cultural Heritage, IFC Performance Standard 8[217] (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".

European Bank for Reconstruction and Development (EBRD)

The European Bank for Reconstruction and Development (EBRD) specifies the implementation of Performance Requirements 8 (PR8) in order to understand the conservation and importance of cultural heritage[218]. 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 PR8 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.

---

[217] 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

[218] The European Bank for Reconstruction and Development. (2023). Guidance Note – EBRD Performance Requirement 8: Cultural Heritage. https://www.ebrd.com/cultural-heritage.pdf

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, 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 important 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.

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 Studies Phase
- Field Research Phase
- Impact Assessment Phase
- Reporting Phase

16.3.1.1 Desktop Research Studies Phase

Publications on archaeological and historical cultural heritage related to the area covered within the CHIA study and its immediate surroundings have been compiled in order to determine the cultural heritage potential of the Project impact area. Existence of archaeological or cultural heritage has been recorded in the Project area have been researched. Resources used during the desktop study were as follows:

- Inventory records of Regional Councils for the Conservation of Cultural Properties (Balıkesir and İzmir No:2)
- 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

16.3.1.2 Field Research Phase

Field research was conducted by the team of qualified experts between 16 October 2023 and 22 October 2023. The field research included research on both tangible and intangible cultural heritage assets.

Field Research on Tangible Cultural Heritage

The cultural heritage team of three (3) senior archaeologists[219] has conducted an archaeological walkover survey to all areas indicated in Table 16.1 in order to gather field data on the Project area and features of the tangible cultural heritage elements within the CHIA study 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 archaeological walkover survey, the field survey team walked within the Project 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 Project area were recorded on the Field Surveys Forms (kept in the ESIA 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[220] 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 given in Table 16.3.

Table 16.3: Details of Interviews Conducted for Intangible Cultural Heritage (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
İzmir/ Bergama - Yukarıada Neighbourhood	• Introduction • Briefing participants about the project and the purpose of the interview • Questioning whether International Intangible Cultural	4	

[219] 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.

[220] Verbal consent has been taken from each of the interviewees for visual recording (through photographs) of the interviews and the use of gathered information and taken photographs during the interviews.

Neighbourhood	Interview Topics	Number of Interviewed People	The Photos from the Interviews
İzmir/ Bergama – Durmuşlar Neighbourhood	Heritage Elements exist in the participant's neighbourhood ● 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	
Balıkesir/ İvrindi - Korucu Neighbourhood		2	
Balıkesir/ İvrindi – Döşeme Neighbourhood		3	
Manisa/ Soma - Kiraz Neighbourhood		2	

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 ICOMOS are provided in Section 16.5.

16.3.1.4 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.

16.3.2 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" of ICOMOS and adopted by the MoCT for its use to properly assess the impact of construction activities on cultural heritage sites. Accordingly, the cultural heritage assets identified within the Project area are classified based on their level of importance as described 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 (ICH) 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 by the State Party's laws	Nationally designated structures with standing remains.	Nationally designated historic landscape of outstanding interest.	Nationally - designated areas or activities associated with globally - important Intangible 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.

Grading	Archaeology	Built heritage or Historic Urban Landscape	Historic Landscape	Intangible Cultural Heritage or Associations
		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
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	Comprehensive changes to the setting.		

Impact Grading	Archaeological attributes	Built heritage or Historic Urban Landscape attributes	Historic landscape attributes	Intangible
	resource is totally altered.			
	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 limited change to historic landscape character.	Changes to area that affect the ICH activities or associations or visual links and cultural appreciation.
	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 used 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 CHIA, appropriate mitigation measures are reviewed and included to minimise any potential adverse impacts of the Project. The residual impacts are then determined.

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

Situated on the Madra Mountains, the Project area was located within the boundaries of the Aeolis Region in the ancient era. The wide plain area shaped by the Bakırçay River to the south of the Project area has been suitable for human settlement as per its geographical conditions. The region has always been a transition route for various cultures throughout history.

While mound-type settlements were found in the fertile, wide plains formed by Bakırçay River, castle-type settlements were observed to the north of the plain on the Madra Mountain for defensive purposes, where the Project area is located.

Traces of settlements have been identified in and around the Bakırçay plain since the Neolithic period. The research conducted around the project area revealed the traces of the Neolithic Period on the İncedere Mound[221] and the traces of the Chalcolithic Period were found in Bağlıtepe. Moreover, archeological findings dating back to the Early Bronze Age were revealed in Yortanlı Cemetery, Üveciktepe, Yenideğirmentepe, Sazlıdere Mound[222] and Çiftlik settlements. All the Early Bronze Age cultures in the region were named after the Yortanlı Cemetery and the region has been identified with the "Yortan Culture" since 3,000 BC. The

[221] http://www.tayproject.org/TAYmaster.fm$Retrieve?YerlesmeNo=8721&html=masterdetail.html&layout=web

[222] https://balikesir.ktb.gov.tr/TR-65876/savastepe.html

research conducted in the region revealed the traces of the Middle and Late Bronze Ages in Ahırkaya, Teuthrania, Pergamon, Çiftlik and Değirmentepe[223].

The oldest records regarding the historical periods of the region begin with the migrations in the 11th century BC. The Aeolians who had migrated from the north of Greece settled in the coastal part of the region, while the Mysians from Thrace had settled in the interior part. Lydians dominated the region in the first quarter of the 7th century BC. Ruled by the Persians from the 6th century BC to the 4th century BC, the region had come under the rule of Alexander the Great since 334 BC. After Alexander passed away, the region changed hands between his commanders Antigonos, Lysimachos and Seleufkos. The region was then dominated by the Kingdom of Pergamon until the end of the 3rd century BC and the beginning of the 2nd century BC, and then by the Roman Empire from the beginning of the 2nd century BC, and by Byzantium from 395 AD. The important settlements of the region in these periods were Asclepieia, Pergamon and Apollonia[224]. The region, which was briefly invaded by Arabs in the 8th century AD during the Byzantine rule, came under the rule of the Seljuks in Anatolia from the 11th century and then under the rule of the Karasids in 1301. The region has survived to the present day, with the domination of the Ottoman Empire starting from 1317 and then the Republic of Türkiye[225].

Known settlements having archaeological importance vicinity of the Project Area are presented in Figure 16.2 and Table 16.7.

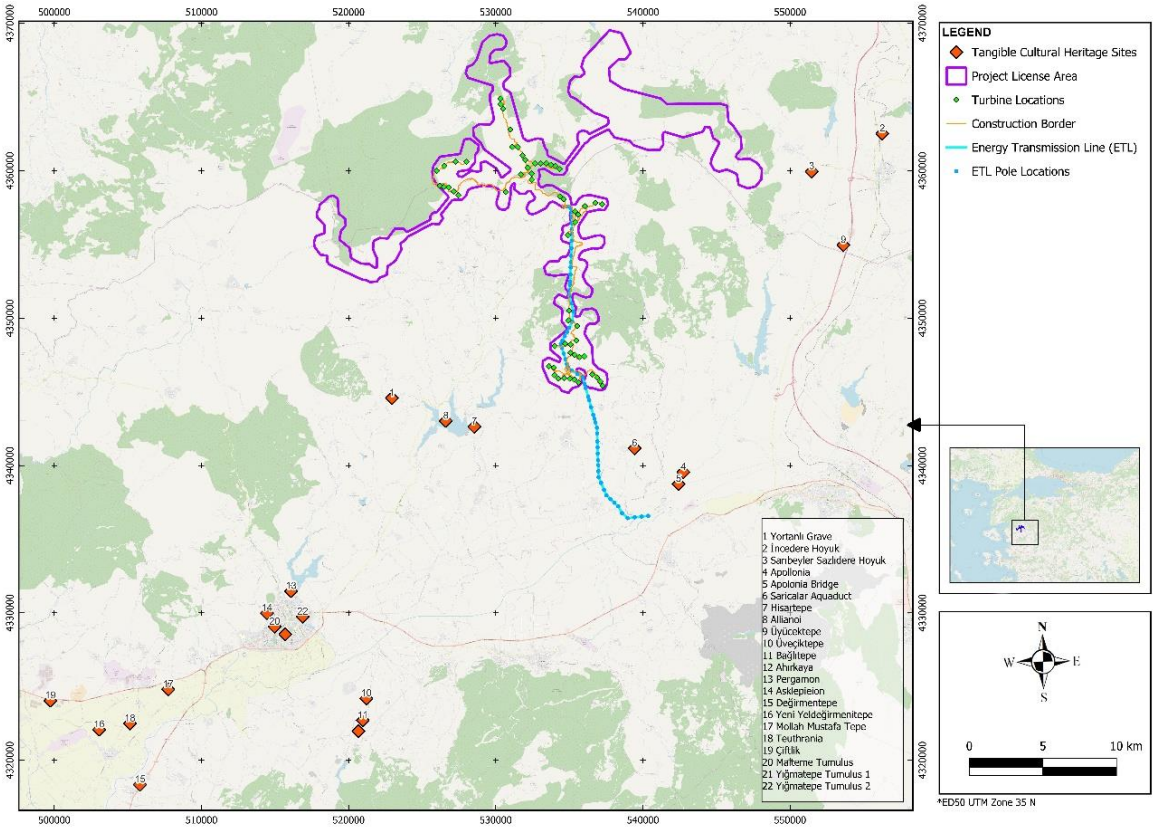


Figure 16.2: National Tangible Cultural Heritage Areas

[223] Horejs, B. (2014) Pergamon Anadolu'da Hellenistik Bir Başkent (Felix Pirson – Andreas Scholl) "Tarih Öncesi Dönemde Pergamon ve Bakırçay (Kaikos) Ovası" İstanbul.

[224] Strabon Geographka: Çev.Prof. Dr.Adnan Pekman Arkeoloji ve Sanat Yayınları 2000.

[225] Doğaner, S. (2019) Bakırçay Yöresi Kültürel Coğrafyası, Sosyal Bilimler Araştırmaları II, (Ed.M. Günay,Ö.A.Ördem), Akademisyen Yayınevi,ss.161-188, Ankara.

Table 16.7: National Tangible Cultural Heritage Areas

No	Name of Tangible Cultural Heritage Asset	Province	District	Neighbourhood	Distance to the Nearest Project Impacts Area (km)	Periods							
						Palaeolithic Period	Neolithic Period	Chalcolithic Period	Bronze Age	Hellenistic Period	Roman Period	Medieval	Late Ottoman
1	Yortanlı Grave	Manisa	Bergama	Yortanlı	10,5								
2	İncedere Hoyuk	Balıkesir	Savaştepe	Karacalar	8,5								
3	Sarıbeyler Sazlıdere Hoyuk			Sarıbeyler	3,5								
4	Apollonia	Manisa	Soma	Hamidiye	3,4								
5	Apolonia Bridge				2,8								
6	Saricalar Aquaduct	İzmir	Bergama	Sarıcalar	1,3								
7	Hisartepe			Çaltıkoru	5,8								
8	Allianoi			Paşaköy	7,4								
9	Üyücektepe	Manisa	Soma	Yağcılı	7,2								
10	Üveçiktepe	İzmir	Bergama	Kaşıkçı	22,7								
11	Bağlıtepe				23,8								
12	Ahırkaya		Kınık	Musacalı	24,5								
13	Pergamon		Bergama	Ulucami	22,4								
14	Asklepieion			Zafer	24,7								
15	Değirmentepe			Yeniköy	38,8								
16	Yeni Yeldeğirmenitepe			Aşağıkırıklar	39,8								
17	Mollah Mustafa Tepe			Çamköy	34,3								
18	Teuthrania			Ovacık	37,7								
19	Çiftlik			Soğancı	41,7								
20	Malteme Tumulus			Ertuğrul	24,8								
21	Yığmatepe Tumulus 1				24,6								
22	Yığmatepe Tumulus 2			İslamsaray	22,9								

World Heritage List[226] and World Heritage Tentative[227] 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 12 November 2023). Those located in the wider region of the Project area are listed in Table 16.8 and shown in Figure 16.3. The closest site to the Project is the “Pergamon and its Multi-Layered Cultural Landscape” in İzmir, which is located at a distance of 22 km to the southwest of the Project area.

Among the sites included in the World Heritage Tentative List of UNESCO, 3 sites are located in the wider region of the Project area. The closest site to the Project area is the “Historic Town of Birgi” in İzmir, which is located at a distance of 26 km to the west of the Project area.

None of the internationally recognised cultural heritage sites is overlapping with the Project area. Therefore, Project activities do not have any impact on the areas listed neither in the World Heritage List or the World Heritage Tentative list. In case alternative areas are needed to be identified during the construction or operation phase of the Project, such as quarries or dump sites, the areas listed in Table 16.8 below will 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	Pergamon and its Multi-Layered Cultural Landscape	İzmir	Bergama	22
2	Archaeological Site of Troy	Çanakkale	Merkez	105
World Heritage Tentative List of UNESCO				
3	Ayvalık Industrial Landscape	Balıkesir	Ayvalık	44
4	Trading Posts and Fortifications on Genoese Trade Routes from the Mediterranean to the Black Sea *Çandarlı Fortress *Foça Fortress	İzmir	 Çandarlı Foça	 53 85
5	Archaeological Site of Assos	Çanakkale	Behram	76
6	The Historical Port City of Izmir	İzmir	Merkez	90
7	The Ancient City of Sardis and the Lydian Tumuli of Bin Tepe	Manisa	Salihli	92

[226] UNESCO World Heritage Convention. (n.d.) *World Heritage List*. https://whc.unesco.org/en/list/
[227] UNESCO World Heritage Convention. (n.d.) *Tentative Lists*. http://whc.unesco.org/en/tentativelists/

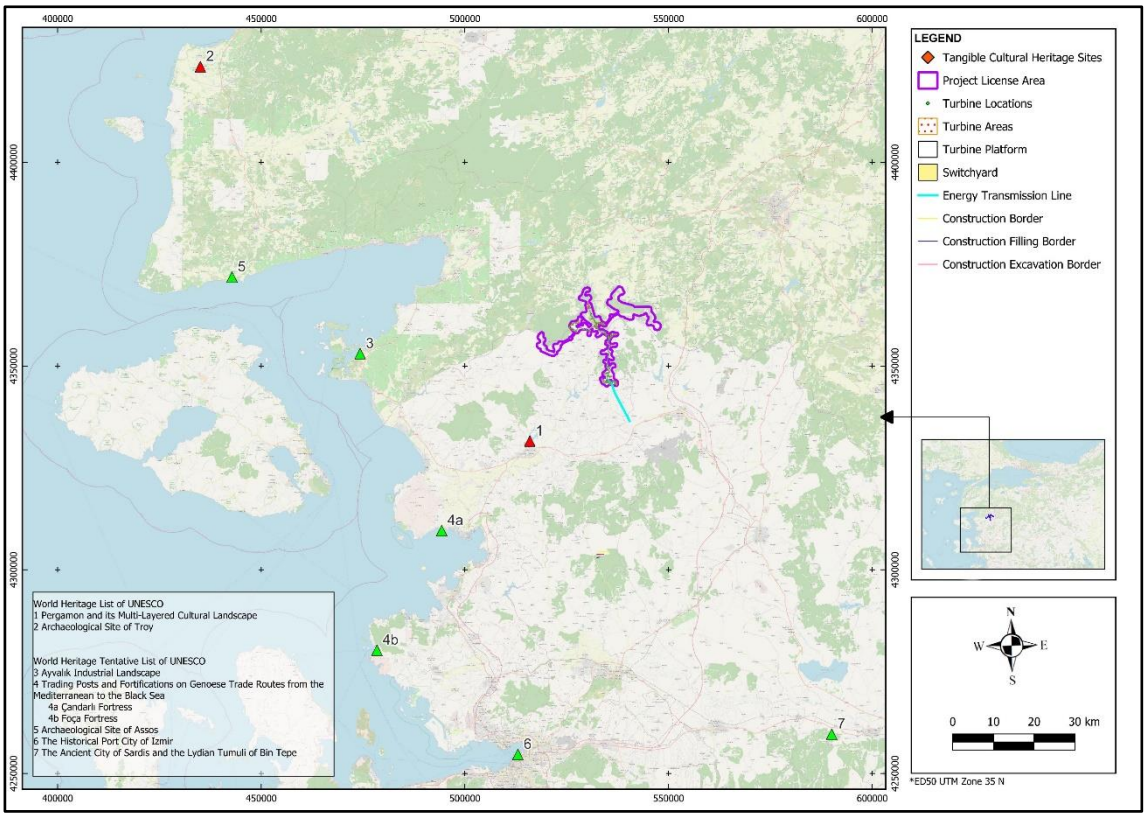


Figure 16.3: International Tangible Cultural Heritage Areas

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[228].

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.

After the Ottoman defeat at the First World War and the Mondros Amistice on 30 October 1918, İzmir and Aegean Region were taken over by Italians. Later the region was transferred to Greece. It is known that the people living in the occupied villages have escaped to highlands and hills. Among the local militia forces in the region against the Greek occupation, "Kuvayi Milliye" began to organize at the time. The narratives about the Çanakkale (Dardanelles) and Gelibolu (Gallipoli) Battles during the last years of the Ottoman Empire and the subsequent Turkish War of Independence are remembered by the locals in the region. These narratives are passed on to the future generations.

[228] UNESCO. 2003. Convention for the Safeguarding of the Intangible Cultural Heritage. https://unesdoc.unesco.org/ark:/48223/pf0000132540.

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 (e.g. Bakırçay 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 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 life style in this geography as seen in other regions in Anatolia as well (Avşar, Karakeçili, Bahadırlı, Karacalar, Kara-Kozluca, Çarukluğ etc.).

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 ten elements registered in the region where the Project area is located (İzmir/Bergama, Manisa/Soma and Balıkesir/İvrindi), as shown in Table 16.9**.**

Table 16.9: International Intangible Cultural Heritage Elements[229]

No	Intangible Cultural Heritage Element	Year of Admission to the UNESCO List
1	Âşıklık (minstrelsy) tradition	2009
2	Traditional Sohbet Meetings	2010
3	Semah, Alevi-Bektaşi ritual	2010
4	Ceremonial Keşkek tradition	2011
5	Turkish Coffee Culture and Tradition	2013
6	Flatbread Making and Sharing Culture: Lavash, Katyrma, Jupka, Yufka Katrıma, Jupka, Yufka	2016
7	Spring Celebration– Hıdrellez	2017
8	Culture of Çay (Tea), a Symbol of Identity, Hospitality and Social Interaction	2022
9	Iftar/Eftari/Iftar/Iftor and its socio-cultural traditions	2023
10	Traditional knowledge, methods and practices concerning olive cultivation	2023

Table 16.10: National Intangible Cultural Heritage Elements[230]

No	Element Group Titles	Inventory / Local Applications
Manisa		
1	Traditional Handicraft And Craftsmanship	Horse Pulling Wagon Making
2		Felt Making
3		Copper Workmanship
4		Gökeyüp Village Pottery Making
5		Blacksmithing
6		Saddlery
7		Saddlery And Harness Making

[229] Retrieved on 29 April, 2024, from https://ich.unesco.org/en/state/trkiye-TR

[230] Retrieved on 6 November, 2023, from https://aregem.ktb.gov.tr/TR-344757/somut-olmayan-kulturel-miras-turkiye-ulusal-envanteri.html

No	Element Group Titles	Inventory / Local Applications
8		Traditional Carved Wood Door And Door Decoration Mastery
9	Weaving Art and Traditions	Rug Weaving
10		Zili Weaving
11		Cicim Weaving
12		Carpet Weaving
13	Traditional Clothing Production And Use	Albez Clothing Production (Traditional Clothes For Yoruks)
14	Traditional Children's Games And Toys	Dörtel
15	Traditions Of Solidarity, Solidarity And Charity	Suyolculuk
16	Narrative Tradition and Traditional Rhetoric	Rain Charity
17		Dragon Tale
18	Turkish Culinary Culture/ Traditional Food and Beverage Making And Social Practices	Traditional Bagel
İzmir		
19	Traditional Handicraft and Craftsmanship	Making Evil Eye Beads
20		Felt Making
21		Karatabaklık / Parchment Making
22		Basketry
23		Traditional Stone Masonry And Stone Model Ware Making
24	Weaving Art And Traditions	Beledi Weaving
25	Embroidery, Sewing And Knitting Traditions	Needle Lace
26		Wire Wrapping
27	Traditional İnstrument Making And Performing	Kabak Kemane Making
28	Traditional Children's Games And Toys	Karambol (Carom) Traditional Game
29	Traditional Gatherings and Organizations	Lad's Rooms
30		Zeybek Tradition
31	Traditions Of Solidarity, Solidarity and Charity	Ridge
32		Bite
33	Pre/Postnatal And Childhood Traditions	Traditional Circumcision Bed Decoration
34	Marriage Traditions	Dowry And Dowry Laying
35	Faith, Celebration and Traditions Linked to The Calendar	Hıdırellez
36		Nevruz
37		Goat Shearing Ceremonies
38		Burns Night
39	Bards Tradition	Minstrelsy Tradition
40	Traditional Spectator Arts And Games	Canbazhane/Körmük Tradition
41	Traditional Sports	Archery
42	Agricultural And Vineyard-Garden Practices And Traditions	Olive, Olive Oil, Olive Farming
43	Traditional Animal Husbandry and Social Practices	Traditional Camel Shows
Balıkesir		
44	Traditional handicraft and craftsmanship	Felt making
45		Pottery making
46		Saddlery
47	Weaving art and traditions	Zili / Sili weaving
48	Traditional clothing making and usage traditions	Şayak-aba weaving

No	Element Group Titles	Inventory / Local Applications
49	Traditional meetings and organizations	Barana (sohbet and music meeting)
50	Charity, solidarity and charity traditions	Village charity tradition
51	Traditional Theatrical Arts and Games	Marriage By Eloping With A Girl In Village Entertainment Dramas
52	Traditional sports	Camel Play (Theatrıcal Vıllage Play)

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 CHIA study area have been identified by the cultural heritage team through ESIA surveys. The sites identified to be located within the CHIA 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 CHIA 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.)	
Balıkesir	İvrindi	Büyükyenice – İkizce	1[231]	-	-	**1**
		İkizce	-	-	2[232]	**2**
		Döşeme	-	-	1[233]	**1**
İzmir	Bergama	Kozluca	-	1[234]	-	**1**
Total			**1**	**1**	**3**	**5**

Distribution of the sites identified with respect to their location/position within the CHIA study area is provided in Table 16.13.

[231] Asartepe Fortress.
[232] Akmaz Cemetery, Akmaz Religious Visitation Place.
[233] Döşeme Cemetery.
[234] Sarıkaya Flat Settlement.

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 Energy Transmission Line
Registered	**1**	**-**
Unregistered	**3**	**1**
Total	**4**	**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 CHIA 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 Energy Transmission Line	Arch. Site	Other Cultural Heritage Site		
1	Asartepe Fortress	Balıkesir	İvrindi	Büyükyenice-İkizce	x		x		x		0	It is a registered (Balıkesir Regional Council for the Conservation of Cultural Property with official decision dated 31 March 2017 and numbered 6791) fortress. The area is most probably an ancient fortress remaining walls and stones dating back to the Roman and Byzantine ages. It is thought to be a garrison settlement. It is located on the "Asar Hill", on a hill overlooking its surroundings. It measures approximately 110 x 70 metres. The fortress structure is surrounded by a fortification wall (?) about 140 cm thick. Stone remains that is probably belong to a tower (approximately 10 x 10 metres sized) have been identified in the north. Roman and Byzantine Periods ceramic sherds and architectural traces have been observed on the surface of the fortress. The archaeological site is approximately 35 m away from the planned Project access road.
2	Akmaz Cemetery			İkizce		x	x			x	0	The Late Ottoman Period cemetery is located within the Project area (Turbine 23 area). The cemetery is unregistered.
3	Akmaz Religious Visitation Place					x	x			x	0	The Late Ottoman Periods religious visitation place is located within the Project area. The religious visitation place is unregistered.
4	Döşeme Cemetery			Döşeme		x	x			x	0	“Döşeme Cemetery” is located within the Project area. The cemetery includes late Ottoman Period graves. The cemetery is unregistered.
5	Sarıkaya Flat Settlement	İzmir	Bergama	Kozluca		x		x	x		3,2	The archaeological area is located outside the project license area. Conversely, the distance between the ETL and the flat settlement is around 660 m. The Flat Settlement contains a large number of ceramics fragments from the Byzantine Periods. The site is unregistered.

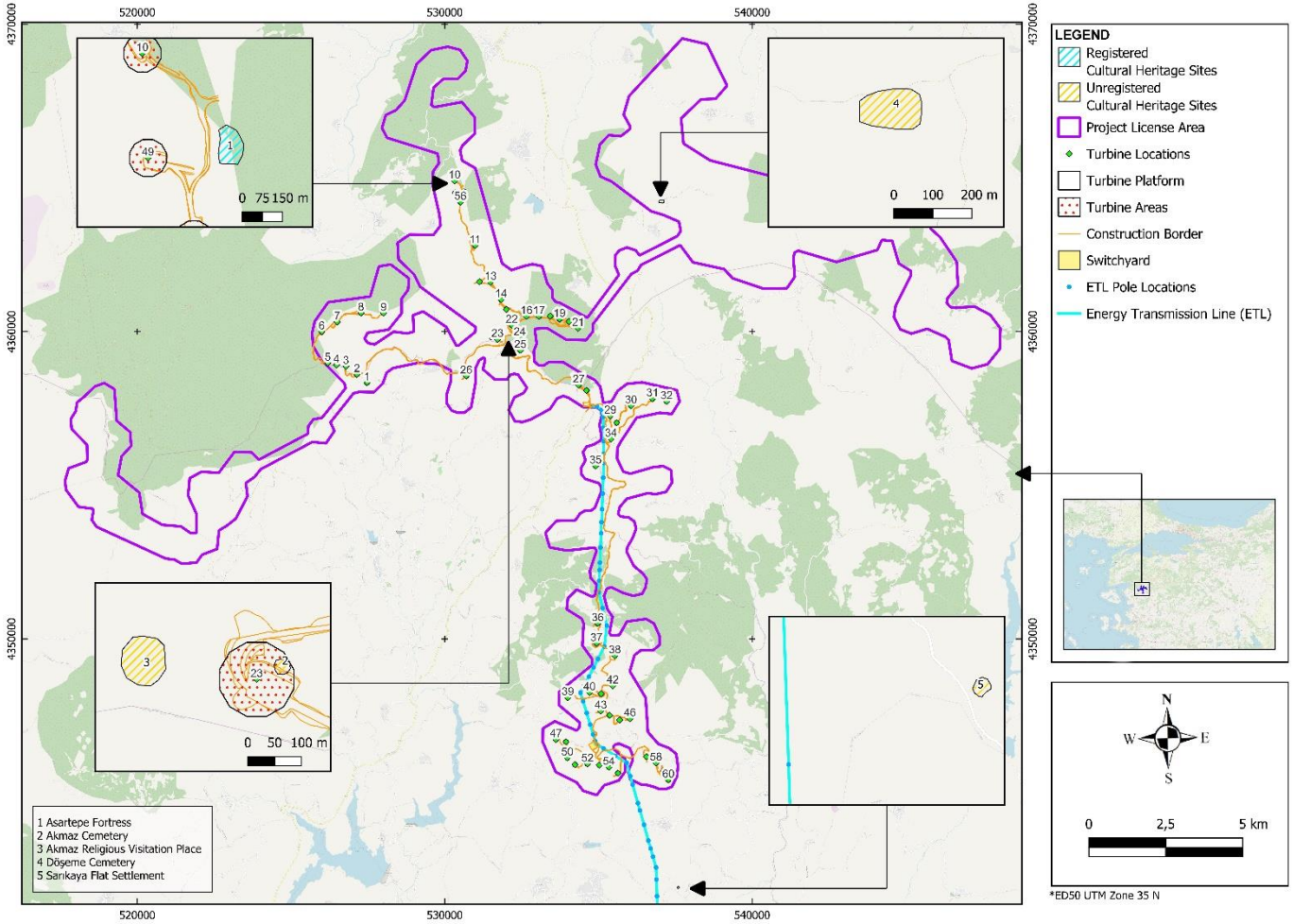
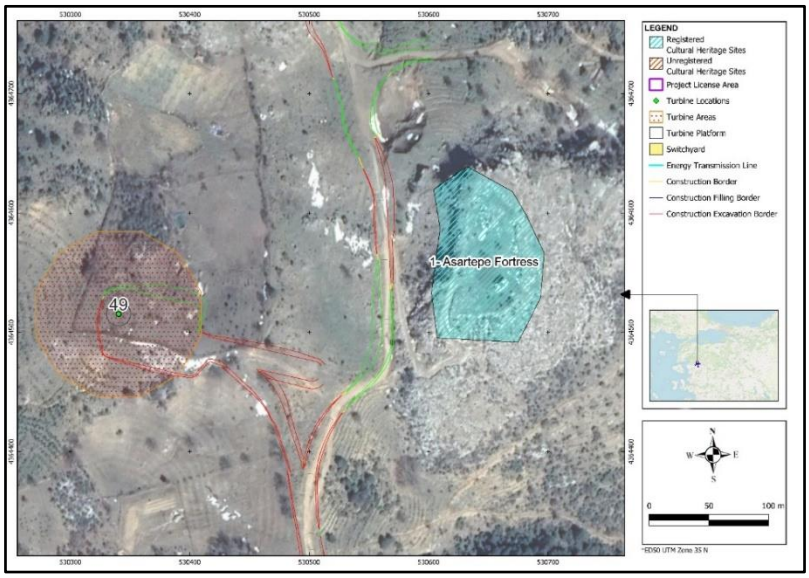


Figure 16.4: Locations of the Cultural Heritage Sites within the CHIA Study Area

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 layouts and photographs pertaining to the unregistered cultural heritage sites are presented below between Figure 16.5 and Figure 16.9.

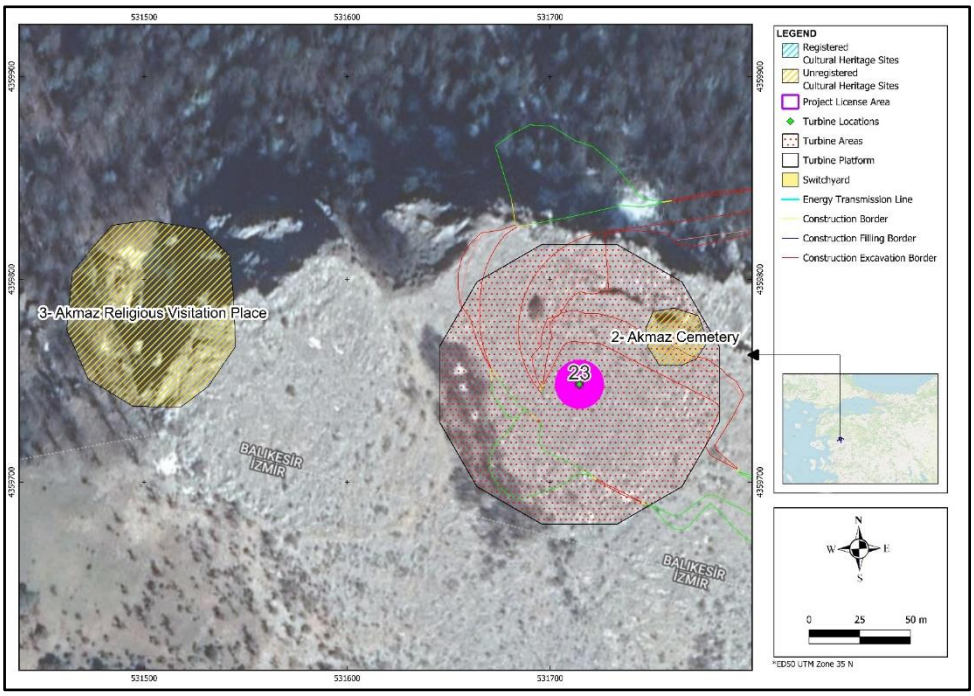
Asartepe Fortress



General View

Detailed View

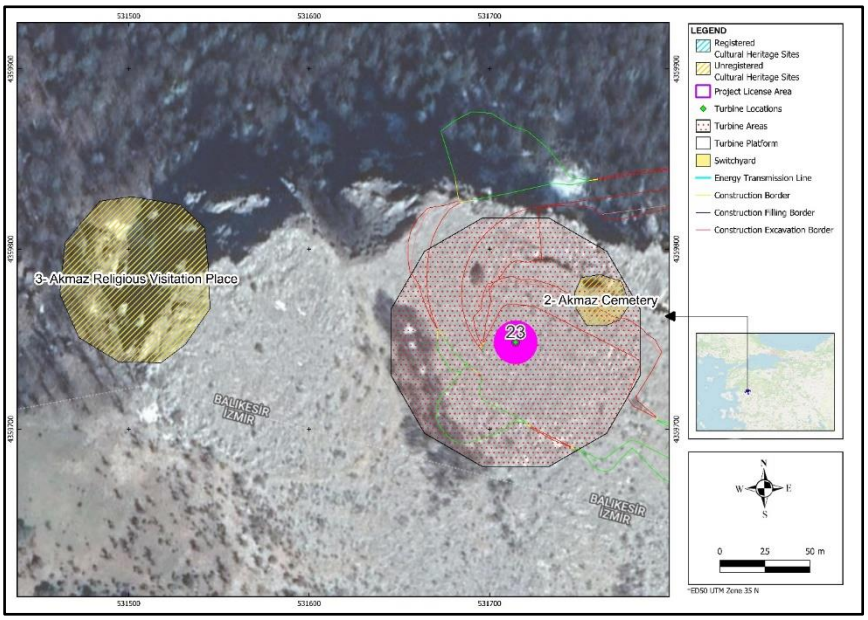
Figure 16.5: (1) Asartepe Fortress (registered) within the Project Area



General View

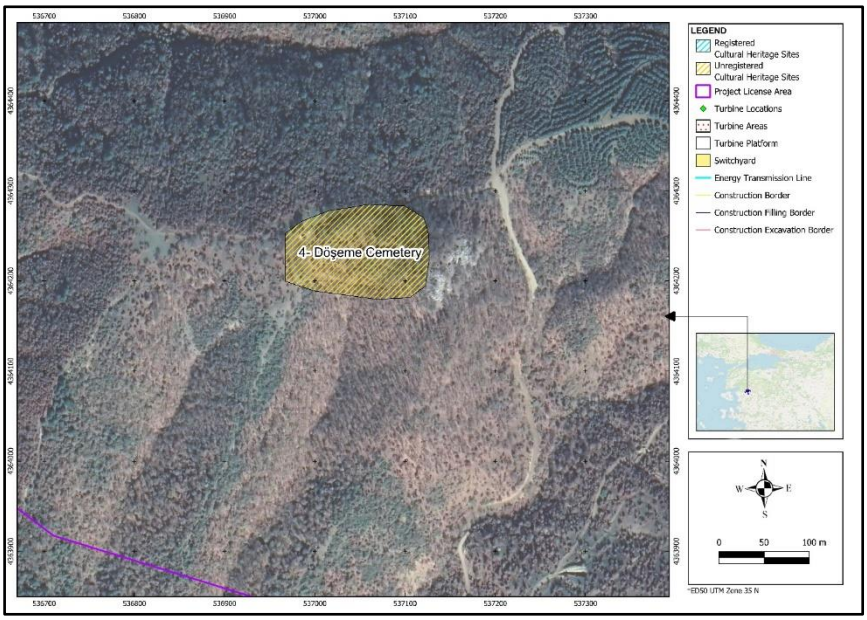
Detailed View

Figure 16.6: (2) Akmaz Cemetery (unregistered) within the Project Area (Turbine 23 area)



General View **Detailed View**

Figure 16.7: (3) Akmaz Religious Visitation Place (unregistered) within the Project Area



General View **Detailed View**

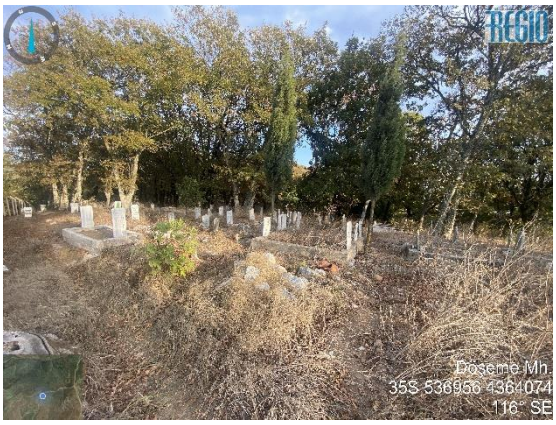
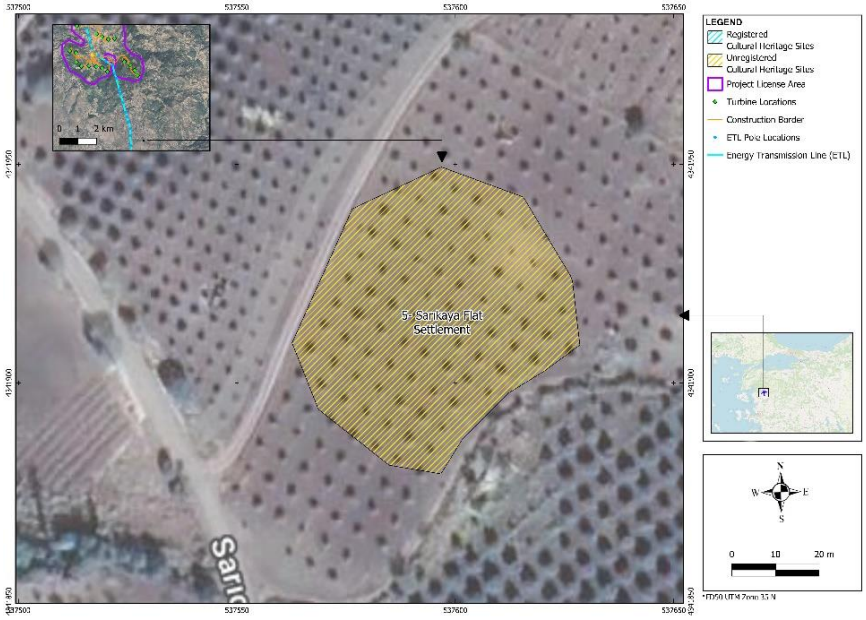


Figure 16.8: (4) Döşeme Cemetery (unregistered) within the Project Area



General View **Detailed View**

Figure 16.9: (5) Sarıkaya Flat Settlement (unregistered) outside the Project Area, within the Energy Transmission Line

16.4.2.2 Intangible Cultural Heritage based on Field Surveys

Findings of the intangible cultural heritage studies conducted under the scope of the Project are presented below;

- Yörük (Sunni Muslims) live around the Project area.
- İzmir, Manisa and Balıkesir regions 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.
- "Yukarıada", "Alhatlı", Durmuşlar and "Korucu" settlements which are located around the Project area are used as "plateau". The users of all plateau settlements consist of locals from the villages of Bergama (Yukarıada- Alhatlı- Durmuşlar) and İvrindi (Korucu) districts of İzmir and Balıkesir province. 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 İzmir and Balıkesir 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.
- Sunni Muslims lives around the Project area. Therefore, in some settlements covered with the study, there are places of worship and places of visit such as mosques, shrines and graves built following to the beliefs of Sunni Muslims. “Akmaz Cemetery” (Balıkesir - İvrindi / İkizce neighbourhood), “Akmaz Religious Visitation Place” (Balıkesir - İvrindi / İkizce neighbourhood) and “Döşeme Cemetery” (Balıkesir - İvrindi / Döşeme neighbourhood), identified in the tangible cultural heritage field studies is one of the examples of such places.
- "Akmaz Cemetery" and "Akmaz Religious Visitation Place" located in the İkizce neighbourhood of İvrindi in Balıkesir, are all defined as tangible cultural heritage assets in CHIA studies. These assets are well known by the local people who are living around the Project area. These cultural heritage assets are visited by local people on holy days and to come true of the personal wishes within the framework of intangible cultural heritage traditions.
- 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 (e.g. Hıdrellez) from the turning points of life are still known and people are yearning them.
- The dead are buried in the cemeteries at the entrance of the village in accordance with the Muslim traditions. The project does not have a negative effect on these graveyards.
- 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 intengible cultural heritage, it was understood that there is a "sheepherding" and "pasture" culture that continues with traditional methods in Yukarıada, Korucu, Durmuşlar and Alhatlı settlements within the Project area.
- Traditional animal husbandry and forestry are the main livelihoods of the local people who participated in the intangible cultural heritage study.
- It is observed that that traditional children’s games such as çelik çomak, dörtel, saklambaç (hide ans seek), aşık, misket and beştaş are still played by the locals.

16.5 Cultural Heritage Impact Assessment

In this Section, the results of desktop studies and field research on tangible and intangible cultural heritage assets are evaluated.

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,
- Identifying the risks that may arise due to the Project on intangible and tangible cultural heritage,
- Determining the necessary methods and suggestions to eliminate or minimize the risks on the intangible and tangible cultural heritage assets.

16.5.1 Construction Phase

Elements that may have an impact on cultural heritage assets during the construction phase of the Project are given 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	

16.5.1.1 Tangible and Intangible Cultural Heritage

The activities to be conducted during all Project phases may cause direct potential 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 due to plant, 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.

Baseline information on the internationally recognised cultural heritage areas has been provided in Section 16.4. 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 22 km in the southwest of the Project area (“Pergamon and its Multi-Layered Cultural Landscape” in İzmir). It is assessed that the Project will not have an impact on this site.

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 PS 8, EBRD PR 8 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 local 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, 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**
İzmir Bergama Museum Directorate	Project area within İzmir Province
Manisa Archaeology Museum Directorate	Project area within Manisa Province
Balıkesir Kuvayi Milliye Museum Directorate	Project area within Balıkesir Province
Project Related Regional Council for the Conservation of Cultural Property	**Duty Area**
İzmir Regional Council for the Conservation of Cultural Property 2	Project area within İzmir and Manisa Provinces
Balıkesir Regional Council for the Conservation of Cultural Property	Project area within Balıkesir Province

General management measures applicable to different types of sites are listed below. 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 (see Table 16.17).

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 Environmental and Social Management System (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 Project Company 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 components (e.g. camp sites, dump sites, access roads, site 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 (Law 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
		Registered	Unregistered	Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency[235]			
1	Asartepe Fortress	X		Minor Change	Irreversible	Short-term	One-off	High	Moderate/ Slight	The cultural heritage asset is a 1st degree registered archaeological site located within the Project area. The registered archaeological site is approximately 35 m away from the planned Project site road. Therefore, the cultural heritage and its surrounding landscape could be visually impacted by the Project. If additional electricity transmission lines, access roads, site roads, switchyards, or similar project facilities are needed under the expansion plan of the Project in the near future, the archaeological site may be at risk from the construction effects of these additional components. The following procedures about cultural assets will be conducted during the Project lifespan: ● No construction / physical intervention will be allowes before the permission of the Balıkesir Regional Council for the Conservation of Cultural Property, ● The identified location will be marked as a historically 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 historical site during the Project lifespan. ● Balıkesir Regional Council for the Conservation of Cultural Property has carried out a field survey within the Project area. According to the results of the field survey, remains of the Asartepe Fortress was encountered within the boundaries of the Project area. According to the field survey results, it was realized that the boundaries of the identified archaeological site overlapped with the previously designed turbine location boundaries. Afterwards, the archaeological area was registered as a 1st Degree Archaeological Site by the Balıkesir Regional Council for the Conservation of

[235] This column designates the possibility of impact recurrence.

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
		Registered	Unregistered	Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency[235]			
										Cultural Property. Therefore, Enerjisa Uretim had to revise the Project design to protect the archaeological site. In this revision, the location of the turbine was changed, and the archaeological site was avoided. The revised Project documents were submitted to the Balıkesir Regional Council for the Conservation of Cultural Property for official approval. The evaluation process for the official approval is still pending in the Balıkesir Regional Council for the Conservation of Cultural Property. Hence, no construction activity will be carried out in and around the archaeological site borders without the official release of the Council decision. ● There will not be blasting activities performed within turbines 10, 49 and 56 borders and their site roads near the archaeological site.
2	Akmaz Cemetery		X	Moderate Change	Irreversible	Short-term	One-off	Medium	Moderate	The cemetery is located within the Project area (Turbine 23 area). Therefore, the cemetery may be physically at risk from construction activities. Additionally, the cemetery and its landscape may be visually affected after the Project turbine installation. Due to the historical sensitivity of the area, construction area of the Turbine 23 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 Balıkesir Regional Council for the Conservation of Cultural Property. ● The identified location will be marked as a historically 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 historical site during the Project lifespan.

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
		Registered	Unregistered	Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency[235]			
										• If any ground-disturbing activities are to be carried out around the identified sensitive area borders, daily archaeological monitoring is necessary.
3	Akmaz Religious Visitation Place		X	Minor Change	Irreversible	Short-term	One-off	Medium	Slight	The cultural heritage asset is located within the Project area. Therefore, the cultural asset and its surrounding landscape could be visually impacted by the Project. 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 to the Balıkesir Regional Council for the Conservation of Cultural Property. • The identified location will be marked as a historically 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 historical site during the Project lifespan. • If any ground-disturbing activities are to be carried out around the identified sensitive area borders, daily archaeological monitoring is necessary.
4	Döşeme Cemetery		X	Minor Change	Irreversible	Short-term	One-off	Medium	Slight	The cultural heritage asset is located within the Project area. Therefore, the cultural asset and its surrounding landscape could be visually impacted by the Project. 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 to the Balıkesir Regional Council for the Conservation of Cultural Property. • The identified location will be marked as a historically sensitive area on project/construction drawings. • Any ground-disturbed activities will not be planned within the identified area.

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
		Registered	Unregistered	Scale & Severity of Change/ Impact	Reversibility	Duration	Frequency[235]			
										• The construction activities will be avoided from the identified historical site during the Project lifespan. • If any ground-disturbing activities are to be carried out around the identified sensitive area borders, daily archaeological monitoring is necessary.
5	Sarıkaya Flat Settlement		X	No Change	Irreversible	Short-term	One-off	Medium	Neutral	According to the initial project design, the flat settlement was located in the ETL impact area. The ETL route was revised according to the cultural heritage impact assessment field study results. As a result of the revisions on the ETL route, the archaeological site was avoided from the possible adverse effects of the ETL construction works. The ETL design revision is evaluated as a good practice example of the Project regarding the protection of cultural heritage. 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 to the İzmir Regional Council for the Conservation of Cultural Property 2. • The identified location will be marked as an archaeological sensitive area on project/construction drawings. • The construction activities will be avoided from the identified archaeological site during the Project lifespan.

Based on the results of impact assessment on the tangible cultural heritage;

- “Value of Heritage Asset” are defined as “Medium” in four areas and “High” in one area,
- “Scale & Severity of Change/ Impact” is defined as “No Change” in one, “Moderate Change” in one and “Minor Change” in three areas,
- “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, “Neutral” in one, “Moderate/ Slight” in one and “Slight” in two areas.

As the result of desktop studies and field works, any harm to intangible cultural heritage patterns due to the Project activities is not foreseen for all settlements in the CHIA study area.

16.5.3 Operation phase

Considering that the impact-mitigation measures will be taken during the construction phase of the Project, there will be no element (human movements etc.) that 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, five cultural heritage sites (4 unregistered, 1 registered) may 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 which will 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 -if required by as a result of the opinion of the Authority- will be prepared and the report will be shared with Project's shareholders and İzmir Regional Council for the Conservation of Cultural Property 2 and Balıkesir 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, will 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/ Sunni faith. Any change did not occur regarding the intangible cultural heritage assets of the settlements. “Akmaz Cemetery”, “Akmaz Religious Visitation Place” and “Döşeme Cemetery” are tangible cultural heritage assets. Although these cultural heritage assets are defined as tangible cultural heritage assets, these are where local intangible cultural heritage traditions are kept alive. Therefore, the specific mitigation measures described in Table 16.18 for these cultural heritage assets will be taken into account for these assets.

İzmir, Manisa and Balıkesir regions 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 impacts on intangible cultural heritage are expected to occur.

A possible positive effect 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 impact on tangible or intangible cultural heritage.

Environmental and social impacts that may arise during the construction and operation phases of the Uygar WPP Project have been identified and a management plan and monitoring plan have been prepared for these impacts. Therefore, the commitment about the cultural heritage preservation should be considered during the project construction phase (Uygar WPP Final EIA Report, 2023). 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, and the nearest relevant official authority or Museum Directorate will be notified. Therefore, the commitment about the cultural heritage preservation will be considered during the project construction phase.[236]

According to the National EIA Report of the Uygar WPP which was prepared in 2023, it is stated that there is no cultural heritage asset (both registered and unregistered cultural heritage assets) within the Project area. However, as a result of the desktop and field studies carried out within the scope of this ESIA study, it has been determined that Asartepe Fortress, which is a registered cultural heritage asset, is located within the boundaries of the Project license area (The registration has been done by Balıkesir Regional Council for the Conservation of Cultural Property with official decision dated 31 March 2017 and numbered 6791). The registered archaeological site is approximately 35 m away from the planned Project site road. Therefore, it is necessary to consider the specific mitigation measures identified in Table 16.18 regarding the registered archaeological site.

16.7 Summary of Outcomes

16.7.1 Tangible Cultural Heritage

There are five cultural heritage assets (4 unregistered, 1 registered) within the Project construction boundaries. 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, the existing archaeological assets will be taken into account and the necessary measures specified in Table 16.18 and Section 16.6 will be taken in order to minimize the possible negative impacts 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 (see 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	Ancient City of Allianoi[237]	Prof. Dr. Ahmet Yaraş	Trakya University	7	İzmir	Bergama	Paşaköy
2	Apollonia[238]	Assoc. Prof. Murat Tozan	Ege University	7	Manisa	Soma	Akçaavlu
3	Ancient City of Pergamon[239]	Prof. Dr. Felix PİRSON	German Archaeological Institute	22	İzmir	Bergama	Ulucami

In this context, it is possible to encounter new cultural assets during the construction activities to be carried out at the Project area 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

[236] Uygar WPP Final EIA Report. 2023.

[237] Retrieved from https://arkeoloji.trakya.edu.tr/pages/allianoi.

[238] Retrieved from https://dergipark.org.tr/tr/download/article-file/401773.

[239] Retrieved from https://www.dainst.blog/transpergmikro/.

Procedure in case of encountering any tangible cultural heritage assets during the construction work.

16.7.2 Intangible Cultural Heritage

Potential sources of impact is not expected to have any effects on intangible cultural heritage elements identified in the Project area.

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 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 İzmir (Bergama), Manisa (Soma) and Balıkesir (İvrindi) provinces). 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 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 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, thermal power plants, quarries 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*[240] 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*

[240] 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 primary objectives of Scoping Phase I are threefold:

Identify and agree on VECs in Consultation with Stakeholders: This collaborative approach ensures that the chosen VECs align with both scientific assessments and the values held by local communities and other stakeholders. Early engagement fosters transparency and inclusivity.

Determine the Time Frame for the Analysis: Establishing the temporal scope is essential for capturing the dynamic nature of cumulative impacts. The time frame should encompass both the historical context and a forward-looking perspective to anticipate foreseeable developments.

Establish the Geographic Scope of the Analysis: Defining the geographic boundaries is critical for delimiting the area influenced by the cumulative impacts. This includes considering both the direct project area and potential indirect impacts extending beyond traditional project boundaries.

The scoping process involves an iterative approach, recognizing that boundaries may evolve as more information becomes available. Best practices include open, participatory, transparent, and meaningful consultations to ensure a well-informed scoping decision. Within this scope, it shall be noted that stakeholder engagement activities carried out within the scope of this ESIA studies had also considered cumulative impacts as well. With this regard, it can be said that the

stakeholders identified in *Chapter 18: Stakeholder Engagement, Information Disclosure and Consultation* also covers the parties whose involvement is key for CIA. To summarize:

- Ministry of Energy and Natural Resources and its relevant bodies and provincial directorates,
- Ministry of Environment, Urbanization and Climate Change and its relevant bodies and provincial directorates,
- Ministry of Culture and Tourism and its relevant bodies and provincial directorates,
- Ministry of Defence and its relevant bodies and provincial directorates
- 2nd and 25th Regional Directorate of DSI
- Izmir-2, Balikesir Regional Board Directorate of Cultural Assets Protection and İzmir Regional Board Directorate of Cultural Assets Protection
- İzmir Metropolitan Municipality and its relevant general directorates
- Manisa Metropolitan Municipality and its relevant general directorates
- Balikesir Metropolitan Municipality and its relevant general directorates
- Bergama Chamber of Agriculture, Chamber of Commerce, and Chamber of Merchants and Craftsmen
- Ivrindi Chamber of Agriculture, Chamber of Commerce, and Chamber of Merchants and Craftsmen
- Soma Chamber of Agriculture, Chamber of Commerce, and Chamber of Merchants and Craftsmen
- NGOs having valuable insight regarding environmental and social impacts in the Project Area.

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
Landscape & Visual	Quality of landscape and visual	Nearby settlements
Biodiversity	Natural Habitats	G4.B Mixed mediterranean pine - thermophilous oak woodland G4.D Mixed Black pine ([Pinus nigra]) - evergreen oak woodland G1.7 Termophilus deciduous woodland E4.4 Alpine and subalpine grasslands 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 Endemic and / or Red List category CR, EN, VU, Fauna Priority Biodiversity Features Carlina oligocephala subsp. pallescens Digitalis trojana Stipa cacuminis

Area of Concern	VEC	Specified VECs
Cultural Heritage	Registered Cultural Heritage Sites	Asartepe Fortress
	Unregistered Cultural Heritage Sites	Akmaz Cemetery Akmaz Religious Visitation Place Döşeme Cemetery
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, infrastructural services
Community Health & Safety	Safety from blade and ice throw and shadow flicker risk	Nearby settlements
	Aviation	Balikesir-Edremit Kocaseyit Airport
	Fire safety	Fire Watch Safety Tower and Fire Prevention Ponds Community who could be affected by wildfires
	Traffic Safety	Passengers using Bergama-Ivrindi 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.

Geographic boundaries should consider the area directly affected by the project (DAI), the important resources within the DAI, and potential impacts beyond the DAI. Temporal boundaries align with the complete life cycle of the proposed development, considering the most conservative time frame between expected impacts. With this regard, an area covering a 15-km-buffer has been selected as Cumulative Impact AoI (Figure 17.1).

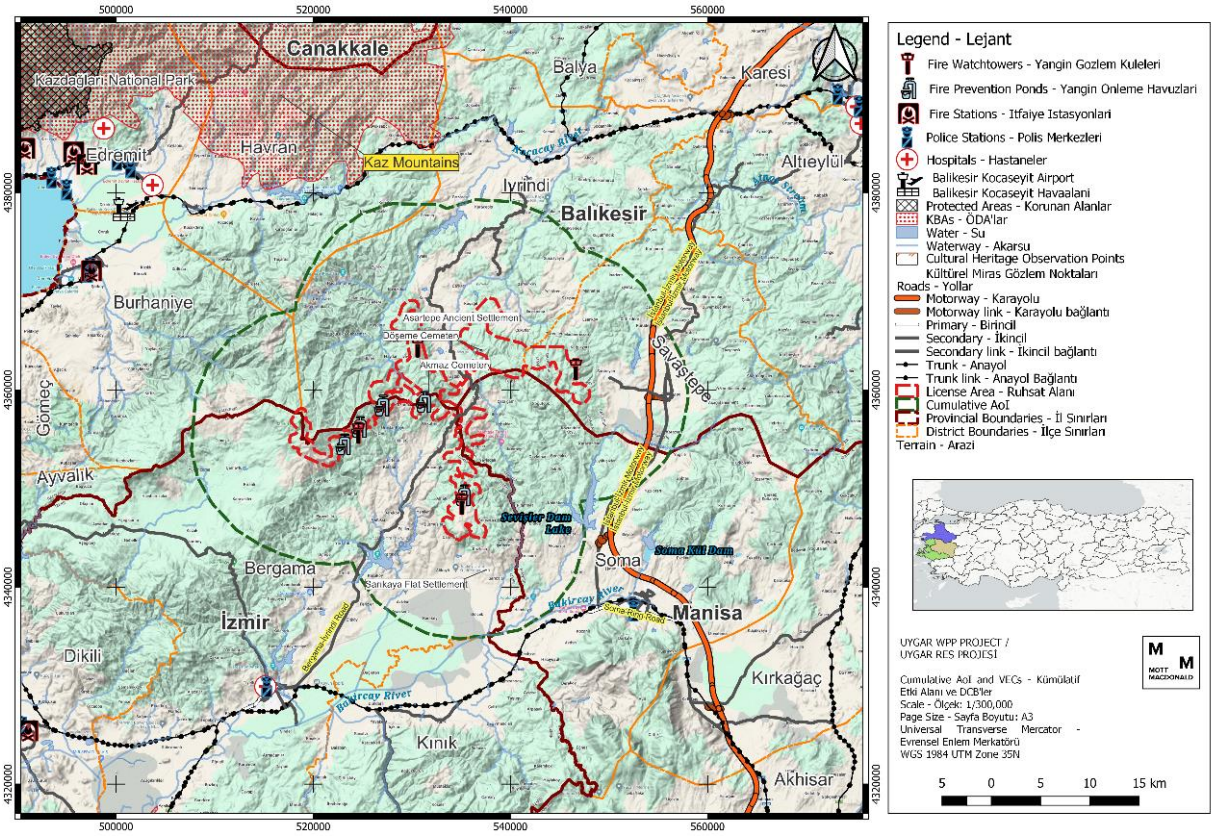


Figure 17.1: Cumulative Impact AoI and Identified VECs

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, and natural environmental and social drivers on VECs (e.g., climate change).. The primary objectives of Scoping Phase II are as follows:

Identify Other Past, Existing, or Planned Activities: A comprehensive inventory of activities within the defined boundaries helps in assessing the cumulative impacts on VECs. This includes both human-induced developments and natural environmental and social drivers..

Assess the Potential Presence of Natural and Social External Influences: Beyond human activities, understanding natural environmental and social drivers, such as climate change and population growth, is essential. These external factors can interact with VECs and influence their condition.

Reasonably predictable projects, emphasizing reference to local, regional, or national development plans were identified within the scope of the CIA Process. It was determined that there are three mining license areas adjacent or located nearby the WPP License Area. Accordingly, the identified current and future drivers are defined as below (Table 17.2):

Additionally, it shall be noted that Table 17.2 includes the the environmental drivers are concentrated in Soma District of Manisa Province. No significant activity is planned or in place in close proximity of the Project Area. 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
Cataltepe WPP	Wind Power Plant	11.5 MW	~16 km	Alize Electirici Prod, Co	Existing
ESTAS WPP	Wind Power Plant	6.2 MW	~16 km	ESTAS	Planned
Geres WPP	Wind Power Plant	30 MW	~30 km	Dost Energy	Existing
Karakurt WPP	Wind Power Plant	21 MW	~45 km	Deniz Energy	Existing Three additional turbined will be installed
Kirkagac WPP	Wind Power Plant	45 MW	~30 km	Kirkagac Energy	Existing
Marmaraadasi WPP	Wind Power Plant	8 MW	~4 km	Madra Renewable Energy	Existing
MKS WPP-1 WPP	Wind Power Plant	7 MW	~12 km	MKS Marmaraga Integrated Chem. Ind Co.	Planned
Soma WPP	Wind Power Plant	288 MW	~16 km	Polat Energy	Existing
Soma-1 WPP	Wind Power Plant	120 MW	~12 km	Bilgin Energy	Existing
Tumad Mine	Gold Mining	~ 315 ha	~3 km	Tumad Mining	Existing
Aegean Lignite Enterprise	Coal Mining	~4100 ha	~27 km	Aegean Lignite Enterprise	Existing
Erdenler Stone Quarry	Stone Quarry	~12 ha	~17 km	Erdenler Mining	Existing
Deniş Coal	Coal Mining	~1200 ha	~18 km	Kolin Mining	Existing
Soma TPP	Thermal Power Plant	990 MW	~18 km	Soma TPP Co	Existing
Kolin TPP	Thermal Power Plant	450 MW	~24 km	Kolin Energy	Existing
Soma TPP – Aliaafa	Energy Transmission Line	380 kV	~10 km	TEIAS	Existing
ICDAS – Soma B ETL	Energy Transmission Line	380 kV	~4.5	TEIAS	Existing
Bergama – Soma TPP ETL	Energy Transmission Line	154 kV	~8 km	TEIAS	Existing
Edremit Bergama	Energy Transmission Line	154 kV	~8 km	TEIAS	Existing

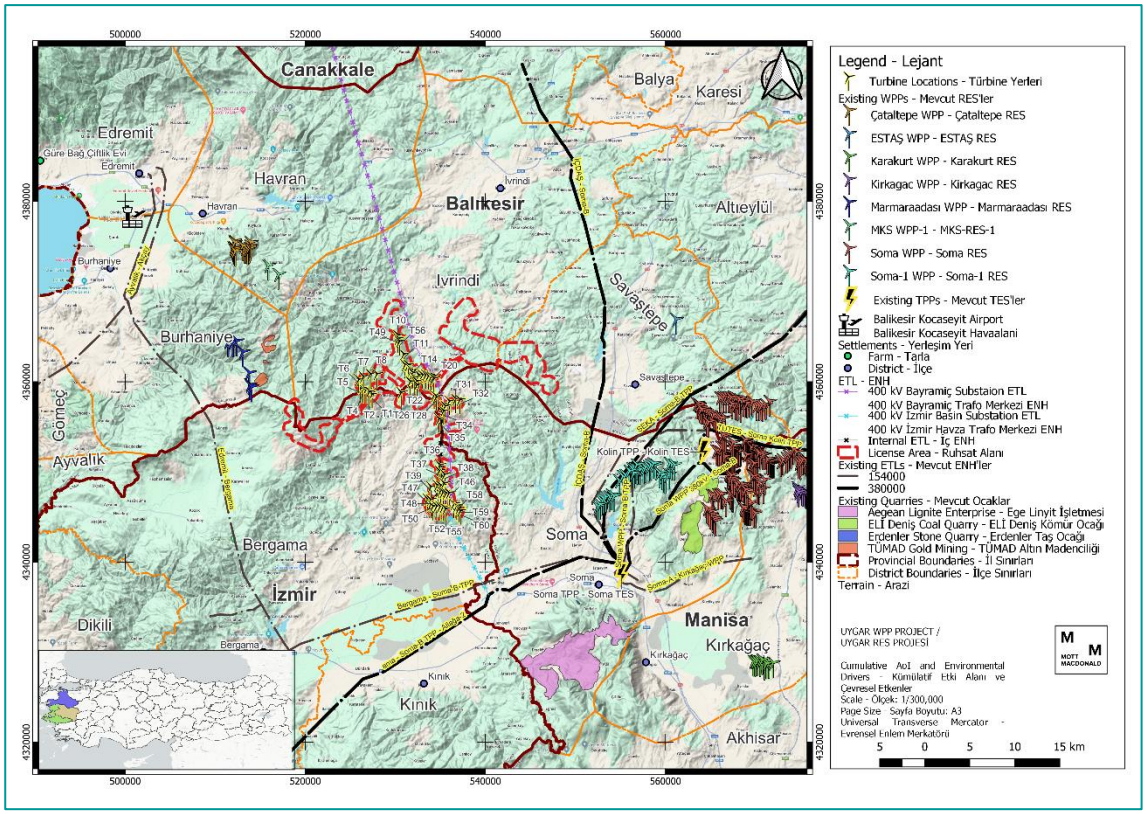


Figure 17.2: Locations of Existing and Planned Activities and Environmental Drivers

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. The key objectives of Step 3 are:

Define the Existing Condition of VECs: Obtain a clear understanding of the current state of identified VECs. This includes assessing their health, structure, and overall well-being.

Understand Potential Reaction to Stress, Resilience, and Recovery Time: Evaluate how VECs may respond to drivers, their capacity to recover, and the time required for recovery. This insight is vital for predicting cumulative impacts accurately.

Assess Trends: Analyse historical trends to identify any changes in the condition of VECs over time. This historical perspective provides context for anticipating future cumulative impacts.

17.2.3.1 Forestry

WPP License Area is located on Boz Mountains where there is a presence of important forest areas. Additionally, Project area has mountainous and rocky features. Currently the main environmental driver for the loss of the forest lands is the existing quarries as they have a possibility to expand aggressively. In addition, it shall be noted that, the close proximity of the Project Area, Soma/Manisa in particular has various industrial developments as well.

17.2.3.2 Ambient air quality & noise levels

Detailed examination on ambient air quality and noise levels were provided *in Chapter 7: Air Quality* and *Chapter 9: Noise and Vibration* respectively. As it was described before, majority of

the environmental drivers including the TPPs are concentrated in Soma/Manisa. Thus, it can be said that main environmental drivers on air quality is traffic, coal burning and mines according to Manisa Environmental Status Report, 2022[241]. Soma Air Quality Monitoring Station is the closest air quality monitoring station to the WPP License Area. As it can be seen from Figure 17.3, air quality of the WPP License Area decreases in winter season when amount of coal burnt in the houses increases. No significant ambient air quality problem has been identified in any of the VECs identified.

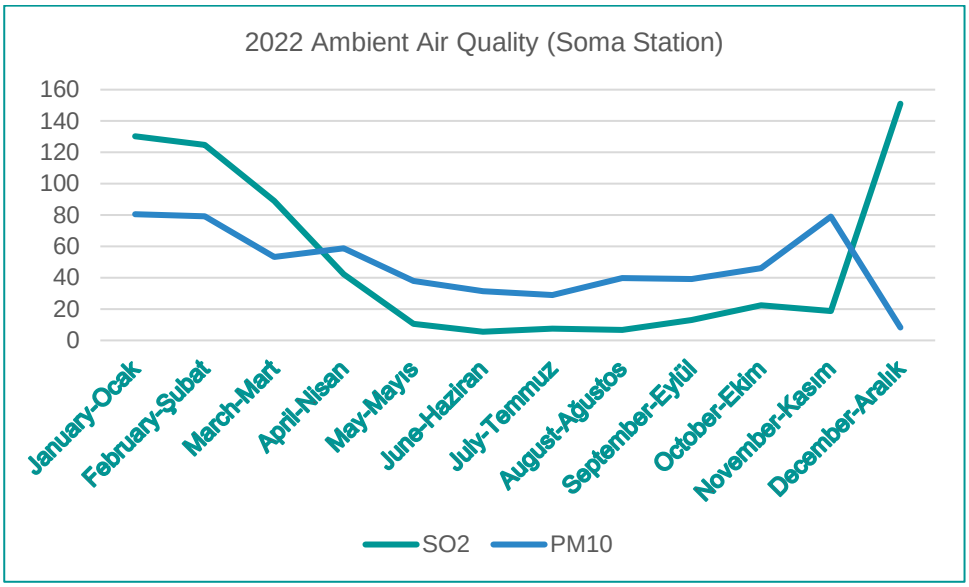


Figure 17.3: 2022 Ambient Air Quality Data (Soma) Station

Furthermore, no significant level of noise has been encountered during the baseline studies as described in *Chapter 9: Noise and Vibration.* No significant noise level has been identified in any of the VECs identified.

17.2.3.3 Quality of Landscape & Visual

Examination on ambient air landscape and visual was provided *in Chapter 10: Landscape and Visual* in detail. Accordingly, no significant environmental driver on landscape and visual was identified. In addition, no grievance regarding the landscape and visual has been raised from the public so far.

17.2.3.4 Biodiversity related VECs

Examination of biodiversity was provided in *Chapter 12: Biodiversity* in detail. As a result of field and desktop studies, five natural and 3 modified habitat types were determined. No significant environmental driver on these habitats was identified. The impact significance of the project on some bird and bat species, which are mentioned in detail in *Chapter 12: Biodiversity*, has been determined as major. The possibility of increasing WPP investments in the region may cause the negative impacts that are collision and barotrauma mortality on birds and bats to be observed at a higher level.

17.2.3.5 Cultural Heritage - Unregistered Cultural Heritage Sites

Examination of cultural heritage was provided in *Chapter 16: Cultural Heritage* in detail. There are one registered and three unregistered cultural heritage sites within the WPP License Area, where there are no turbines located. The registered area is a registered (Balıkesir Regional

[241] Manisa Environmental Status Report, 2022

Council for the Conservation of Cultural Property with official decision dated 31 March 2017 and numbered 6791) fortress.

Furthermore, no traces of an environmental driver on VECs regarding the cultural heritage were identified.

17.2.3.6 Socio-Economic Environment related VECs

The social impact assessment of the Project was provided in *Chapter 13: Social Environment* in detail. The Project is estimated to have some potential adverse impacts related to land use, economic displacement and livelihood sources.

Also, the opinions of the Project affected community members were reflected in *Chapter 18: Stakeholder Engagement, Information Disclosure and Consultation.* Accordingly, consulted residents of Çamoba, Haydar and İkizce neighbourhoods had some concerns about the Project's potential adverse impacts, which were mainly related to loss of livelihood (due to land expropriation and limited public access to the Project area where the pasture lands are located), interruptions in the access to natural spring water, road traffic safety issues, noise, dust, and compensation. They were also curious about the widening possibility of the switchyard since it may require further land acquisition and expropriation activities.

It was also observed in Durmuşlar neighbourhood that some of the landowners reacted to the decision of the urgent expropriation and stated that they will object to the decision. They added that the remaining land will be useless after the expropriation processes are completed due to partial expropriation.

District Director of Agriculture and Forestry in Bergama underlined the certain conflicts and negative reactions against the Project that may occur among neighbourhoods due to sharing the pasture lands after expropriation works are completed. She added that there might be some provocative groups in the Project affected neighbourhoods opposing the Project.

District Director of Agriculture and Forestry in İvrindi mentioned that the road improvements would be necessary during the construction phase since the current access roads to the Project area are not in good conditions. He also mentioned the possibility of temporary traffic jam.

17.2.3.7 Community Health & Safety related VECs

Examination on community health and safety was provided *in Chapter 15: Community Health & Safety* in detail.. There are no settlements in the close proximity where the planned wind turbines of the environmental drivers mentioned.

In addition, as there are no major industrial / commercial activities being carried out or there is no major construction being carried out nearby the VECs identified 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. Step 4 has three main objectives:

Identify Potential Impacts and Risks: Systematically recognize potential environmental and social impacts and risks associated with the cumulative impacts on VECs.

Assess Expected Impacts: Evaluate the anticipated changes in the condition of VECs, emphasizing viability and sustainability as key indicators.

Identify Interaction of Impacts: Understand the potential additive, countervailing, masking, or synergistic impacts arising from the interaction of various impacts and risks.

Within the scope of the CIA carried out for Uygar WPP Project, a variety of methods were used to assess the foreseen impacts on VECs. These methods encompass spatial analysis using geographical information systems (GIS).

17.2.4.1 Land Loss

The existing quarries, integral to the regional landscape, pose a potential challenge as there is a distinct possibility of expansion in the near future. This expansion could bring about increased land disturbance, extraction activities, and alterations to the local topography. The dynamic nature of quarry operations necessitates a comprehensive evaluation of potential cumulative impacts, considering factors such as habitat disruption, soil erosion, and changes in the visual aesthetic of the surrounding environment. As part of the ESIA, a proactive approach is taken to assess and mitigate these potential impacts, ensuring that the expansion of quarries aligns with sustainable land management practices.

In addition to the impending expansion of quarries, the close proximity of the Project Area, particularly Soma/Manisa, introduces a unique challenge due to the concentration of various industrial developments in the region. The cumulative impacts stemming from these industrial activities may manifest in the form of increased land loss. Industrial developments often involve infrastructure expansion, construction, and alterations to land use patterns, which collectively contribute to cumulative impacts on the surrounding environment. The ESIA, recognizing the potential risks associated with industrial activities, incorporates thorough assessments to understand and manage the cumulative effects on land use, aiming to strike a balance between development and environmental preservation.

17.2.4.2 Air emissions & Noise

In the evaluation of cumulative impacts for the Environmental and Social Impact Assessment (ESIA) Report, particular attention is directed towards the potential risks associated with the proposed thermal power plant. One significant concern lies in the potential air emissions that could result from its operations, posing a potential threat to the surrounding environment. The analysis of this risk involves a comprehensive examination of the emissions profile, considering pollutants such as particulate matter, sulphur dioxide, and nitrogen oxides.

While acknowledging the potential risk posed by the thermal power plant's air emissions, it is essential to highlight the spatial separation between these facilities and the Uygar Wind Power Plant (WPP). The strategic placement of these energy infrastructures ensures a considerable distance between them, minimizing the likelihood of adverse interactions. This spatial distinction plays a pivotal role in mitigating cumulative impacts, as the dispersion and dissipation of emissions are expected to occur without significant overlap with the Uygar WPP.

In addition, as the number of the planned wind turbine installation is low (1 for ESTAS, 3 for Karakurt WPP, and 2 for MKS) no significant risk regarding the excavation and construction activities are expected.

Furthermore, In the comprehensive evaluation of cumulative impacts for the ESIA Report, particular attention is directed towards the four quarries situated at a considerable distance from the Uygar Wind Power Plant (WPP). The potential impacts associated with quarry operations include air emissions and, noise. Through rigorous analysis and site-specific assessments, it is established that the spatial separation ensures minimal interaction between the quarries and the Uygar WPP, mitigating the risk of cumulative impacts on the wind power facility.

The strategic location of the quarries, distanced from the Uygar WPP, is a pivotal factor in minimizing cumulative impacts. Recognizing that quarry activities may involve excavation, blasting, and transportation of materials, the assessment focuses on the potential consequences of such operations. Through adherence to stringent environmental regulations, as well as the implementation of best practices in quarry management, we aim to ensure that the Uygar WPP remains unaffected by the activities in these quarries. This approach underscores our commitment to sustainable development, seeking to balance the demands of resource extraction with the preservation of the ecological integrity of the surrounding areas.

17.2.4.3 Landscape & Visual

The cumulative impact assessment on visibility underscores a favorable outlook as both planned and existing wind turbines, along with ETL (Electricity Transmission Line) poles, are strategically situated at a considerable distance from each other. This deliberate spatial planning ensures that the visual coherence of the landscape remains minimally affected, with no significant overlap or interference between these structures. By evaluating factors such as line of sight, terrain features, and project layout, the ESIA concludes that the cumulative impact on visibility is anticipated to be minor, preserving the scenic quality of the surrounding environment.

The meticulous consideration of spatial dynamics plays a crucial role in mitigating potential cumulative impacts on visibility. The geographic separation of wind turbines and ETL poles from each other, combined with thoughtful project planning, contributes to a harmonious coexistence between energy infrastructure and the visual aesthetics of the region. This proactive approach not only aligns with sustainable development principles but also assures stakeholders and the community that the landscape's visual integrity will be safeguarded throughout the lifespan of the proposed and existing projects.

17.2.4.4 Biodiversity

The Project area does not lie on a major migratory pathway of large soaring species, but it is situated close to known minor migratory routes. Therefore, some degree of migrant activity is likely to occur at the Project area, including large soaring species. For species that exhibit avoidance behaviour towards existing WPPs, Uygar WWP increases the collision risk. A similar risk also occurs for bat species. It has been evaluated that operational impacts may have a major collision / barotrauma mortality risk on bat species. In addition, the presence of Uygar WPP will cause loss and fragmentation habitats used as roosting or feeding areas for bats in the region. In order to more agreeable analyse these impacts, the recommended activities in presented Chapter 12.7: Biodiversity Monitoring and Adaptive Management should be carried out.

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[78]. 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.

17.2.4.5 Cultural Heritage

The meticulous examination of existing and planned activities, coupled with an analysis of environmental drivers, reveals a promising scenario where these elements are strategically situated at a considerable distance from both registered and unregistered cultural heritage sites. This deliberate spatial separation serves as a fundamental safeguard against significant cumulative impacts, ensuring that the proposed developments do not compromise the integrity of these culturally significant areas. With a comprehensive understanding of the spatial dynamics and potential interactions, the assessment indicates that no foreseeable adverse effects on the registered or unregistered cultural heritage sites are expected, reinforcing a commitment to preserving and respecting the cultural legacy of the region.

17.2.4.6 Socio-Economic Environment

Madra Renewable Energy Marmaraadası WPP and Tumad Mining may have completed the expropriation/urgent expropriation processes in the areas belonging to the residents during its construction period. However, land acquisition activities of the Project may affect the same residents within the neighbourhoods. Nonetheless, no grievances were received from the local community members during the site visits conducted in October and December 2023.

In terms of quality of life, no cumulative impacts are anticipated with regards to two other investments (Madra Renewable Energy Marmaraadası WPP and Tumad Mining).

Local community members who used the area for agricultural or animal husbandry activities before the construction of Madra Renewable Energy Marmaraadası WPP and Tumad Mining may have experienced economic restrictions. With the Project, these restrictions on livelihood may increase, so this may result in cumulative impacts on economy. However, no grievances related to planned or existing facilities in terms of economic activities of the Project affected neighbourhoods were noted during the site visits in October and December 2023.

17.2.4.7 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. No impact on aviation is expected as there are no major aviation areas nearby. No additional impact on traffic is expected either. Moreover, as the distance between the WPP Turbines and helipad areas are too far, no cumulative impact is foreseen.

No interaction among the determined environmental drivers on the community health and safety related impact is expected except for the fire safety related impacts. The cumulative impacts of a possible mining activity planning shall be reconsidered.

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. The key objectives of Step 5 are as follows:

Define Appropriate "Thresholds" and Indicators: Establish relevant thresholds and indicators to gauge the impact and risk magnitude concerning the VECs.

Determine Impact and Risk Magnitude: Evaluate the magnitude of impacts and associated risks considering the cumulative impacts of various developments.

Identify Trade-offs: Identify and analyse any potential trade-offs between the proposed action and the potential impacts on VECs.

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	Uygar WPP	Installed WPPs	Not installed yet WPPs	ETLs	Mining License Areas	TPPs
Land Loss	Forestry	Forest Areas	Moderate	NA	Low	NA	Moderate	Negligible
Air emissions, noise	Air quality and noise levels in settlements nearby the Project Area	Uygar, Bahadır, Bahçeli, Cevizli, Bahçearası, Örenköy, and Akpınar Villages	Moderate	NA	Low	NA	Moderate	Moderate
Landscape & Visual	Quality of landscape and visual	Nearby Settlements	Low	Negligible	Low	Negligible	Low	Low
Biodversity	Natural Habitats	G4.B Mixed mediterranean pine thermophilous oak woodland G4.D Mixed Black pine ([Pinus nigra])-evergreen oak woodland G1.7 Termophilus deciduous woodland E4.4 Alpine and subalpine grasslands H3.6 Weathered rock and outcrop habitats	Major	Moderate	Moderate	Moderate	Moderate	Moderate
	Flora and Fauna Species with High Conservation Priority	Endemic and / or Red List category CR, EN, VU, Flora Endemic and / or Red List category CR, EN, VU, Fauna	Moderate for Flora Major for birds and bats	Moderate for Flora Moderate to Major for birds and bats	Moderate for Flora Moderate to Major for birds and bats	Low for Flora Moderate to Major for birds	Low	Low

Area of Concern	VEC	Specified VECs	Uygar WPP	Installed WPPs	Not installed yet WPPs	ETLs	Mining License Areas	TPPs
Cultural Heritage	Unregistered Cultural Heritage Sites	Asartepe Fortress Akmaz Cemetery Akmaz Religious Visitation Place Döşeme Cemetery	Moderate	Negligible	Negligible	Negligible	Negligible	Negligible
Socio-Economic Environment	Land and Assets	People who will lose their lands and assets located on the lands	Major	Low	NA	NA	Low	NA
	Economy	Livestock Activities Industrial activities and employment	Moderate	Low	NA	NA	Low	NA
	Quality of Life	Access to healthcare, education, commercial facilities, natural water resources	Low	Negligible	NA	NA	Negligible	NA
Community Health & Safety	Safety from blade and ice throw and shadow flicker risk and flooding	Nearby Settlements	Negligible	Negligible	Low	NA	NA	NA
	Aviation	Balikesir-Edremit Kocaseyit Airport	Negligible	Negligible	Low	Negligible	NA	NA
	Fire safety	Fire Watch Safety Towers and Fire Prevention Ponds Community who could be affected by wildfires	Low	Negligible	Low	NA	NA	NA
	Traffic Safety	Passengers using Bergama-Ivrindi Road	Moderate	Negligible	Low	NA	NA	NA

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 low moderate as the scale of the Project is large and there are mining areas which have a possibility to expand.
- Similarly, the cumulative impact on air emissions, noise will also be low to moderate as the identified VECs area located far from the drivers and currently no significant concern is in question.
- Cumulative impacts on the fauna and the nearby settlements will be low to moderate considering the activities within the scope of the Project and new projects.
- Landscape & visual will not be affected cumulatively by the environmental drivers as the interaction was assessed to be negligible.
- Although it is expected that collision and barotrauma mortality impact 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 changing from negligible to moderate considering different distances between Project components and different VECs.
- Majority of 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. The primary objectives of Step 6 are outlined as follows:

Use the Mitigation Hierarchy: Apply the mitigation hierarchy to address cumulative impacts on selected VECs, emphasizing avoidance, minimization, and mitigation.

Design Effective Management Strategies: Develop robust management strategies to tackle significant cumulative impacts, considering the context of the developments that contribute to these impacts.

Engage Relevant Parties: Facilitate collaboration or coordination with other stakeholders needed for effective impact management, ensuring a collective approach to address cumulative impacts.

Propose Mitigation and Monitoring Programs: Put forth detailed mitigation and monitoring programs tailored to the specific needs of the cumulative impacts identified.

Manage Uncertainties with Informed Adaptive Management: Implement adaptive management strategies to address uncertainties and enhance the efficacy of the proposed mitigation measures.

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:

- 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.
- A pro-active approach and an effective collaboration will be maintained with the investment companies to implement a good traffic safety management and other potential impacts on nearby communities.
- Project’s grievance mechanism will be disclosed to the residents in the social AoI, who will be consulted regularly as per the SEP.
- Enerjisa Uretim will responsible for being included within the collobaration regarding the cumulative impact management process. . Enerjisa Uretim will ensure that all stakeholders identified during stakeholder management studies are informed about the progress of project operations. An effective communication will be established with the permit holders to gather their insights and ensure coordinated efforts during the Project's implementation. When necessary, EnerjiSA will engage and participate for the collaboration for the mechanism to manage the cumulative impacts. In addition the actual status of the nearby mining licenses and its future plannings will be monitored by EnejiSA, and in case of any known future plan, the CIA will be reviewed and revised.

18 Stakeholder Engagement, 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, Project affected persons (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 local community members 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 local community members 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 document. 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 EIA document. However, this regulation is effective as of July 2022 and the public participation meetings of the Project subject to the EIA process were held on 13 April 2022 in Manisa and Balıkesir, and on 14 April 2022 in İzmir. Therefore, it is exempt from the requirement to prepare a SEP within the scope of the EIA process.

Once the EIA document 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 EIA document 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 EIA document 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 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.
  - Performance Standard 2 – Labour 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 AoI. 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 SEP 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 policies and management plans[242]:

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.

[242] https://www.enerjisauretim.com.tr/

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 18.1 through Table 18.4 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 (EPDK)	EPDK is one of the key stakeholders of the Project in relation to the Project scope and components in general.	**High**
	Turkish Electricity Transmission Company (TEIAS)	TEIAS 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		

GOVERNMENTAL BODIES

Level	Organization	Relation to the Project	Level of Interest
	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
	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	2nd Regional Directorate of DSI (State Hydraulic Works)	This organization may have specific views about water courses running close to the Project area.	Low
	25th Regional Directorate of DSI (State Hydraulic Works)		
	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
	2nd Regional Directorate of Ministry of Agriculture and Forestry		
	2nd Regional Directorate of General Directorate of Highways	The organization may provide opinion regarding road crossing within the Project area.	High
	14th Regional Directorate of General Directorate of Highways		
	Izmir Regional Council for the Conservation of Cultural Property 2	These organizations are important stakeholders to identify and clarify the archaeological potential of the Project area.	High
	Balıkesir Regional Council for the Conservation of Cultural Property		
Provincial	The Governorship of Izmir	The governorships representing the national government are the highest authorities in the provinces.	High
	The Governorship of Balıkesir		
	The Governorship of Manisa		
	İzmir Investment and Coordination Committee Directorate	These organizations coordinate all kinds of investment and construction works to be carried out by ministries and other central government organizations in the provinces.	High
	Balıkesir Provincial Directorate of Planning and Coordination		
	Manisa Investment and Coordination Committee Directorate		
	İzmir Metropolitan Municipality	The metropolitan municipality and its relevant departments will have responsibilities in relation to the Project.	High
	İzmir Metropolitan Municipality, Directorate of Environmental Protection and Control		
	İzmir Metropolitan Municipality, Directorate of Zoning and City Planning		
	İzmir Metropolitan Municipality, Directorate of Transportation		
	Balıkesir Metropolitan Municipality	The metropolitan municipality and its relevant departments will have responsibilities in relation to the Project.	High
	Balıkesir Metropolitan Municipality, Directorate of Environmental Protection and Control		
	Balıkesir Metropolitan Municipality, Directorate of Zoning and City Planning		

GOVERNMENTAL BODIES

Level	Organization	Relation to the Project	Level of Interest
	Balıkesir Metropolitan Municipality, Directorate of Transportation		
	Manisa Metropolitan Municipality	The metropolitan municipality and its relevant departments will have responsibilities in relation to the Project.	**High**
	Manisa Metropolitan Municipality, Directorate of Environmental Protection and Control		
	Manisa Metropolitan Municipality, Directorate of Zoning and City Planning		
	Manisa Metropolitan Municipality, Directorate of Transportation		
	Izmir Governorship Provincial Directorate of Social Security Institution	These organizations may provide specific views on labour and working conditions, and health and safety of facility personnel.	**Low**
	Balıkesir Governorship Provincial Directorate of Social Security Institution		
	Manisa Governorship Provincial Directorate of Social Security Institution		
	Izmir Governorship Provincial Directorate of Environment, Urbanization and Climate Change (PDoEUCC)	PDoEUCCs of the provinces have regulatory functions related to the Project such as environmental impact assessment permits and environmental permitting.	**High**
	Balıkesir Governorship Provincial Directorate of Environment, Urbanization and Climate Change (PDoEUCC)		
	Manisa Governorship Provincial Directorate of Environment, Urbanization and Climate Change (PDoEUCC)		
	Izmir Provincial Directorate of Environment and Urbanization	These organizations have regulatory functions in relation to the Project such as environmental impact assessment permits and environmental permitting.	**High**
	Balıkesir Provincial Directorate of Environment and Urbanization		
	Manisa Provincial Directorate of Environment and Urbanization		
	Izmir Regional Council for the Conservation of Cultural Property 2	These organizations are important stakeholders to identify and clarify the archaeological potential of the Project area.	**High**
	Balıkesir Regional Council for the Conservation of Cultural Property		
	İzmir Bergama Museum Directorate		
	Manisa Archaeology Museum Directorate		
	Balıkesir Kuvayi Milliye Museum Directorate		
	Izmir Provincial Directorate of Agriculture and Forestry	These organizations may provide provincial-specific and/or site-specific views on the Project.	**High**
	Balıkesir Provincial Directorate of Agriculture and Forestry		
	Manisa Provincial Directorate of Agriculture and Forestry		
	Izmir Provincial Command of Gendarmerie	These organizations may provide provincial-specific and/or site-specific views on the Project.	**Medium**
	Balıkesir Provincial Command of Gendarmerie		
	Manisa Provincial Command of Gendarmerie		
	Izmir Water and Sewer Administration (IZSU)	These organizations may provide an opinion related to water/wastewater infrastructure of the Project area.	**Medium**
	Balıkesir General Directorate of Water and Sewerage Administration (BASKI)		
	Manisa Water and Sewer Administration (MASKI)		
	The Local Governorship of Bergama, The Municipality of Bergama	The Project area is located in Bergama, Invrindi and Soma districts 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		
	Bergama District Directorate of Health		**Medium**
	Bergama District Gendarmerie Command		**Medium**

GOVERNMENTAL BODIES

Level	Organization	Relation to the Project	Level of Interest
	The Local Governorship of Ivrindi, The Municipality of Ivrindi		High
	Directorate of Zoning and Urbanisation		
	Directorate of Civil Works		
	Directorate of Plan and Project		
	Directorate of Cleaning Works		
	Directorate of Municipal Police		
	Ivrindi District Directorate of Health		Medium
	Ivrindi District Gendarmerie Command		Medium
	Ivrindi District Directorate of Agriculture and Forestry		High
	The Local Governorship of Soma, The Municipality of Soma		High
	Directorate of Zoning and Urbanisation		
	Directorate of Civil Works		
	Directorate of Plan and Project		
	Directorate of Cleaning Works		
	Directorate of Municipal Police		
	Soma District Directorate of Health		Medium
	Soma District Gendarmerie Command		Medium
	Soma 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		
	Greenpeace Akdeniz Türkiye		
	Association for Sustainable Economics and Finance Research (SEFiA)		
	Bird Life International Türkiye Partner- Doğa Association		
	The Nature Conservation Centre		
	Resource, Environment and Climate Association (REC)		
	Ecological Research Society (EKAD)		
	Elderly Rights Association		
	Elderly Policy Association		
	Bergama Chamber of Agriculture		
	Bergama Chamber of Commerce		
	Bergama Chamber of Merchants and Craftsmen		
	Bergama Environmental Platform		
	Bergama Protection and Sustenance of Animals Association		
	Bergama Pigeon Breeders Association		
	Bergama Science and Animals Foundation		
	Bergama Tourism Association		
	Bergama Cattle Breeders Association		
	Soma Chamber of Agriculture		
	Soma Chamber of Commerce		
	Soma Chamber of Merchants and Craftsmen		
	Soma Women's Solidarity Association		

NON-GOVERNMENTAL BODIES

Level	Organization	Relation to the Project	Level of Interest
	Soma Culture and Solidarity Association		
	Soma Social Rights Association		
	Soma Charity Association		
	Soma Employees Association		
	İvrindi Association for the Protection and Sustenance of Living and Agricultural Areas		
	İvrindi Chamber of Agriculture		
	İvrindi Chamber of Commerce		
	İvrindi Chamber of Merchants and Craftsmen		
	İvrindi Tradesmen and Craftsmen Credit Guarantee Cooperative		
	Gökçeyazı Agricultural Credit Cooperative		
	Çekov Environmental Protection Magazine		
	Manisa Association for the Protection of Biological Diversity in Nature and Rural Development		
	İzmir Environmental Platform		
	Manisa Environmental Platform		
	Balıkesir Environmental Platform		
	Ege Environmental Platform		
	Balıkesir Nature Protection Association		
	Balıkesir Renewable Energy Resources 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 in 16 Project affected neighbourhoods	Neighbourhoods 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		
	One informal user of one of the Project affected public lands identified within the scope of the RAP studies		
	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		
	Students		
	Unemployed people		
Media	Ege News	It is important to engage with local and regional media organizations for effective public disclosure and consultation.	**Medium**
	Son Mühür Newspaper		
	İzmir Newspaper		
	Aydın Voice Newspaper		
	Aydın Denge Newspaper		
	Aydın Newspaper		
	HaberTire News		
	Aydın Kulis Newspaper		
	Manşet Aydın Newspaper		
	Balıkesir Newspaper		
	Postam Newspaper		
	Balıkesir Merhaba Newspaper		
	İz Newspaper		
	Bergama Agenda News		
	Ege TV		
	Balıkesir TV		
	Aydın TV		
	Channel İzmir TV		

STAKEHOLDER GROUPS

Level	Group	Relation to the Project	Level of Interest
Universities	İzmir Ege University İzmir Dokuz Eylül University İzmir Ekonomi University Manisa Celal Bayar University Balıkesir 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	İvrindi State Hospital Edremit State Hospital Havran State Hospital Soma State Hospital Kınık State Hospital İvrindi Firestation Soma Fire Brigade Bergame Firestation Ege University Bergama Vocational High School Taşdibi Primary School Oruclar Primary School Karalar Primary School Kiranlı Primary School Büyükyenice Primary School Göçbeyli Primary School Karacam Primary School Ularca Primary School Yukarıada Primary School Söğütçük Primary School Cukurlar Primary School Mosques Local Coffeeshops Fire Watchtowers near the Project affected neighbourhoods	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**

Table 18.4: Internal Stakeholder List

INTERNAL STAKEHOLDERS

Level	Organization	Relation to the Project	Level of Interest
Internal Stakeholders	Project staff Contractors and subcontractors and their employees Suppliers and their workers	These groups are one of the key stakeholders in terms of continuation of the Project activities in compliance with the international standards.	**High**

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 AoI 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 (Environmental and Social) Activities

Correspondence / Opinion Letters

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 the Protection of Natural Assets
  - General Directorate of Meteorology, Presidency of Observation Systems Department
- Ministry of Energy and Natural Resources,
  - General Directorate of Energy Affairs
  - General Directorate of Mining and Petroleum Affairs, Department of Special Areas and Mapping
- Ministry of Agriculture and Forestry,
  - General Directorate of Forestry
  - General Directorate of State Hydraulic Works (DSİ), Department of Surveys, Planning, and Allocations
- Ministry of Transport and Infrastructure,
  - Airports Department Directorate, General Directorate of Civil Aviation
  - General Directorate of Highways
- General Directorate of State Airports Administration, Electronic Department Presidency
- General Directorate of Highways 2nd and 14th Regional Directorate
- Energy Market Regulatory Authority
- İzmir Provincial Directorate, Presidency of Culture and Tourism, Investments Department
- İzmir Provincial Directorate of Investment Monitoring and Coordination
- Manisa Provincial Directorate of Investment Monitoring and Coordination
- İzmir Provincial Disaster and Emergency Management Directorate
- Balıkesir Provincial Disaster and Emergency Management Directorate
- Manisa Provincial Disaster and Emergency Management Directorate
- Burhaniye District Municipality, Directorate of Sanitation
- Bergama District Municipality, Directorate of Sanitation

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

- General Directorate of Highways, 2nd Regional Directorate is concerned about the Project's proximity to the 35-05 KKN / 45-76 KKN (Bergama-Soma) Ayr. - Turanlı - 14th Region Border Road. They emphasize that no activities should be conducted within a 60-meter distance from the existing road. Compliance with specified minimum distances is required for near roads of the Project area within the Authority's responsibility area.
- Ministry of Environment, Urbanization, and Climate Change, General Directorate of Environmental Impact Assessment, Permit, and Inspection has concerns related to the Project's revised capacity and its impact on the environment. They emphasize the need for technical and scientific justifications for alternative project areas and address potential environmental impacts. The Project area overlapped with 12 exploration and operation

permit areas, including those related to mining activities. It is noted that the mining activities in these permit areas will not be obstructed.

- Ministry of Transport, Maritime Affairs, and Communications, General Directorate of Highway is concerned about road safety distances for WPPs. They outline specific calculations for minimum safety distances from roads and emphasize the importance of adhering to these distances to ensure safety.
- Ministry of Environment, Urbanization, and Climate Change, General Directorate of the Protection of Natural Assets notes that the Project area falls within a potential natural site area and highlights the need for consultation after completing the natural site registration process.
- 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 Agriculture and Forestry, General Directorate of Forestry outlines several commitments that should be included in the National EIA report, such as ensuring that the Project does not interfere with fire towers and committing to fire safety measures.

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 institutions 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 public participation meetings were carried out in İzmir, Balıkesir and Manisa provinces within the scope of the National EIA Studies. Public participation meetings were conducted on 13 April 2022 in Manisa and Balıkesir, and on 14 April 2022 in İzmir. These meetings aimed to engage with the public, provide information about the Project, and gather their feedback regarding the Project.

The Project Company appointed a social consultancy company named Adam Smith, whose consultants have been in the field and consulting the residents in the nearby neighbourhoods for approximately two years as of October 2023. The social consultants have regularly visited the mukhtars and residents of the neighbourhoods that are in close proximity to the Project area.

The consultants collected information about the history, residential conditions, natural structure, population, migration, health, education, and cultural patterns of the neighbourhoods. During the visits, they also provided information about the Project and its potential impacts on the neighbourhoods, especially land acquisition and expropriation. The main concerns raised by stakeholders during this process were whether the Project would have any negative impacts on the basic livelihoods of the residents (in terms of land acquisition, expropriation, construction process, environmental impacts, etc.). 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 neighbourhoods. However, the outcomes of the consultations with these stakeholders were not registered in a written way and detailed information cannot be retrospectively retrieved from Adam Smith.

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 two site visits on 26 October 2023 and 7-8 December 2023 within the scope of the ESIA study of the Project. Six out of 16 Project-affected neighbourhoods were visited by the Consultant as a part of the site visits conducted in October and December 2023. This limitation in site visits 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 neighbourhoods 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 neighbourhood 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 visits included collecting baseline data about the Project affected neighbourhoods, 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, 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) 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:

- Mukhtar and residents of Çamoba neighbourhood (İzmir)
- Member of the mukhtar office (Aza) and residents of Alhatlı neighbourhood (İzmir)
- Bergama District Directorate of Agriculture and Forestry (İzmir)
- Mukhtar and residents of Durmuşlar neighbourhood (İzmir)
- Mukhtar and residents of Kiraz neighbourhood (Manisa)
- Mukhtar and residents of Haydar neighbourhood (Balıkesir)

- Mukhtar and residents of İkizce neighbourhood (Balıkesir)
- İvrindi District Directorate of Agriculture and Forestry (Balıkesir)

The main findings of these consultations are summarized below:

- Majority of the consulted residents (particularly in Çamoba, Alhatlı and Haydar neighbourhoods) were aware of the Project's land acquisition activities and mentioned that the land acquisition negotiations were handled well by the Project Company. However, the landowners in Durmuşlar and Kiraz neighbourhoods did not have detailed information on the land acquisition processes although they are aware of the Project for a long time. It was observed in Durmuşlar neighbourhood that some of the landowners reacted to the decision of the urgent expropriation and stated that they will object to the decision. They added that the remaining land will be useless after the expropriation processes are completed due to partial expropriation.
- During the site visit, it was not possible to reach out any directly affected PAPs. But this limitation is filled with the studies carried out within the scope of RAP site visits. In addition to this, the stakeholders consulted in general had limited knowledge on the applicability of international standards with relation to land acquisition.
- Consulted residents of Çamoba, Haydar and İkizce neighbourhoods had some concerns about the Project's potential adverse impacts, which were mainly related to loss of livelihood (due to land expropriation and limited public access to the Project area where the pasture lands are located), interruptions in the access to natural spring water, road traffic safety issues, noise, dust, and compensation. They were also curious about the widening possibility of the switchyard since it may require further land acquisition and expropriation activities.
- As reported by the mukhtar of Çamoba neighbourhood, the social consultants and/or the Project Company representatives have been regularly visiting the neighbourhoods, informing the residents, and asking them if they have any requests or concerns. Accordingly, some residents requested support for the improvements on the access roads to the highlands and pasture lands. However, the mukhtar stated that since these requests have not been fulfilled yet, residents started complaining about the Project and losing the belief on the positive impacts of the Project.
- District Director of Agriculture and Forestry in Bergama underlined the certain conflicts and negative reactions against the Project that may occur among neighbourhoods due to sharing the pasture lands after expropriation works are completed. She added that there might be some provocative groups in the Project affected neighbourhoods opposing the Project.
- District Director of Agriculture and Forestry in İvrindi mentioned that the road improvements would be necessary during the construction phase since the current access roads to the Project area are not in good conditions. He also mentioned the possibility of temporary traffic jam.
- The following development areas were suggested and/or expected by the consulted stakeholders:
  - Providing feed support and carrying out pasture improvement works for the households whose livelihoods are based on animal husbandry
  - Providing seed and fertilizer support for the households whose livelihoods are based on agriculture
  - Organizing awareness raising activities and trainings for the olive producers
  - Establishing socioeconomic development projects for women empowerment
  - Supporting the women's enterprise cooperative established in İvrindi district and other cooperatives that are in operation in the Project affected areas
  - Providing support to the ongoing projects that are developed by İvrindi District Directorate of Agriculture and Forestry (i.e., increasing mushroom sales through the establishment of

tents for processing the mushroom and establishing marketing areas for selling, diversification of production lines for tomato paste, pickle, tarhana, and noodle, which are among the traditional foods produced mostly by women)

- Providing support for the beekeepers through trainings, activities, and hive supply
- Providing support for the greenhouse installations
- Creating local employment opportunities for the youth and unemployed in the nearby neighbourhoods
- Establishing projects to diversify the different sources of income other than animal husbandry and agriculture Improving the road quality throughout the access routes between the district centres and the Project affected neighbourhoods
- Strengthening the infrastructural conditions of the Project affected neighbourhoods (i.e., road improvements, measures to prevent flood risks, and easier access to water)
- Enhancing the public transportation services in the Project affected neighbourhoods
- Providing support to construct or improve the school, health facility, mosque, and social facility for weddings and funerals in the nearby neighbourhoods

The above-mentioned issues have been taken into consideration and elaborated in the relevant sub-sections of the *Chapter 13: Social Environment* within the ESIA Report of the Project.

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)[243], 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 neighbourhood that is easily accessible to all stakeholders (especially those living in the Project's AoI) will be selected and, where necessary, transport will be provided to enable individuals who are living in the other neighbourhoods and desires 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

[243] 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.

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, 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 Mott MacDonald. The objective of the SEP is to 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 of 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 Section18.6.5. Accordingly, disclosure, consultation and engagement activities of the Project will also be managed by the CLOs 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 CLOs 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

Stakeholders that are defined in the Section 18.3.2 will be consulted about the Project’s relevant subject matters (i.e., Project's development stages, potential impacts and mitigation measures, communication channels with stakeholders, and grievance mechanism of the Project) through variety of communication methods on a frequent basis. Please see the SEP for details on the future stakeholder engagement approach of the Project together with the proposed implementation timetable and responsibilities for stakeholder engagement throughout the lifetime of the Project.

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 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[244] 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

[244] 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.

- Posters[245] 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:

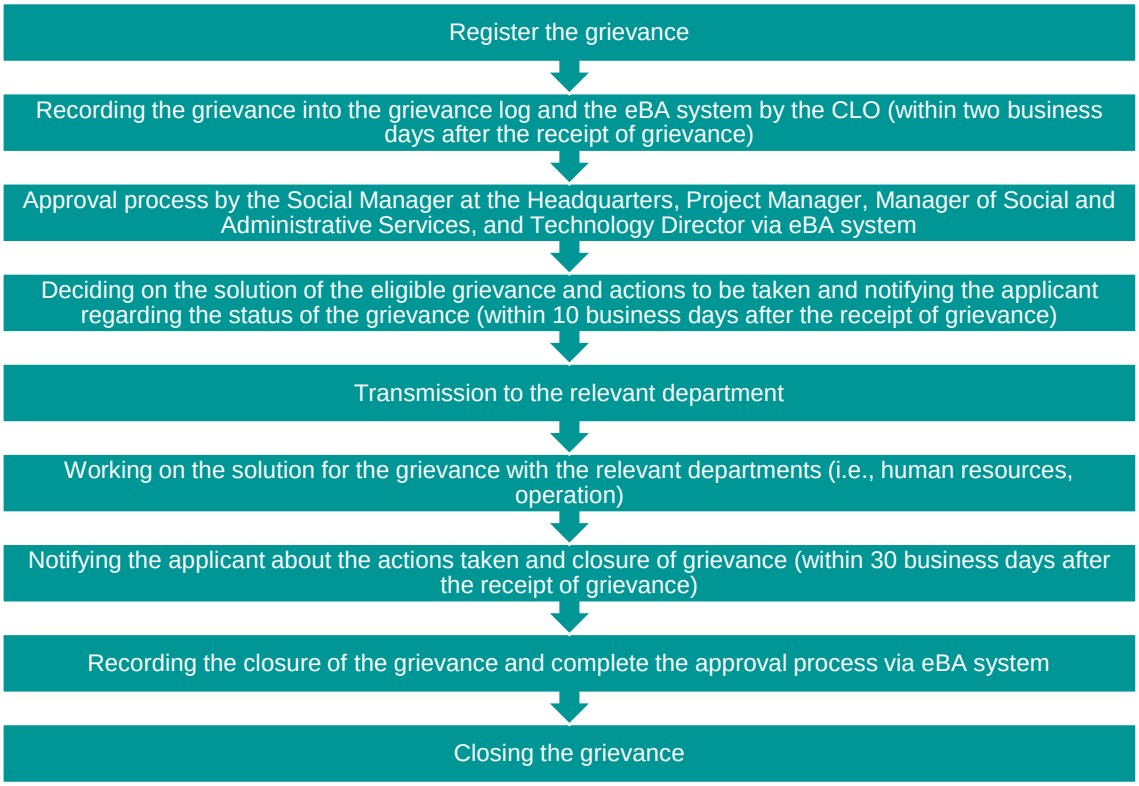


Figure 18.1: Steps of the External Grievance Mechanism Process

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.

[245] Poster is given in Appendix G.

- 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 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[246] 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.

[246] https://www.enerjisauretim.com.tr/hakkimizda/yonetim/politikalarimiz/enerjisa-uretim-is-etigi-kurallari

Employee Grievance Channel	Improvement Areas
	•
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.
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 (Uygar 1: Durmuşlar Mah, Delikıztaşı Mevkii, Bergama/İzmir & Uygar 2: Kiraz Mah, Yanıkağıl Mevkii, Soma/Manisa)
- 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.