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Kestanederesi Wind Power Plant (WPP) Project

Supplementary Biodiversity Surveys Final Report

March 2025

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Supplementary Biodiversity Surveys Final Report

March 2025

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Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	February 2025	Esra Demirhan Anıl Öser Berkay Şahin Cihan Ünal Değirmenci	Gizem Arıkan Gürler	Hande Hatipoğlu	Draft Final Supplementary Baseline Report for 2024
B	April 2025	Esra Demirhan Anıl Öser	Gizem Arıkan Gürler	Hande Hatipoğlu	Final Supplementary Baseline Report for 2024

Document reference: B

Contents

Tables

Figures

Definitions and Abbreviations

Abbreviation	Definition
AoI	Area of Influence
AZE	Alliance for Zero Extinction
BAP	Biodiversity Action Plan
BERN	The Convention on the Conservation of European Wildlife and Natural Habitats
BMP	Biodiversity Management Plan
CHA	Critical Habitat Assessment
CITES	Convention for the International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically Endangered
CRM	Collision Risk Model
DD	Data Deficient
DKMP	General Directorate of Nature Conservation and National Park
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EN	Endangered
ESIA	Environmental and Social Impact Assessment
ETL	Energy Transmission Line
EU	European Union
EUNIS	European Nature Information System
GIS	Geographic Information Systems
GN	Guidance Notes
IBA	Important Bird Area
IFC	International Finance Cooperation
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
LC	Least Concern
MoENR	Ministry of Energy and Natural Resources
NP	National Park
NT	Near Threatened
PBF	Priority Biodiversity Features
PCFM	Post-construction Fatality Monitoring
PR	Performance Requirement
PS	Performance Standard
Ramsar	Convention on Wetlands of International Importance Especially as Waterfowl Habitat
SP	Sampling Point for ground static acoustic bat surveys
T	Turbine
TRDB	Turkish Red Data Book
VES	Visual Encounter Survey

VP	Vantage Point
VU	Vulnerable
WPP	Wind Power Plant

Executive summary

Kestanederesi Wind Power Plant (WPP) Project (“the Project”) with 28 turbines and 117.6 MWm/117.6 MWe total installed power, is planned to be implemented by Enerjisa Üretim. As a result of the Environmental and Social Impact Assessment (ESIA) study conducted by the Consultant, biodiversity data gaps were identified for the Project’s compliance with the applicable national and international standards. Supplementary biodiversity baseline collection was carried out by the Project Company in 2024. The draft final report presents flora, terrestrial fauna, bird and bat survey results and outcomes for the study period.

The field study identified two endemic plant species, both classified as "LC" under TRDB categories. One species, *Cedrus libani*, is classified as "VU" globally by the IUCN, but it is a cultivated form used in regional afforestation. The target species *Sedum album* , *Sedum amplexicaule*, and *Sedum rubens* (species researched due to the apollo butterfly) as outlined in the BMP for construction and operational phases, were observed. However, none of the six target plant species from the Boz Mountains KBA were observed during the study.

For the baseline collection of herpetofauna during the spring, and summer, seasons, fieldwork commenced in the early morning at daylight and continued until dusk to account for nocturnal species. With the exception of *Testudo graeca*, which is classified as Vulnerable (VU) by the IUCN and listed in CITES Annex-II, all other species, including herpetofauna, are classified as Least Concern (LC), indicating no significant extinction risk. There are no endemic herpetofauna species among the identified species.

For the baseline collection of terrestrial mammal species during the spring and summer seasons of 2024, a total of 20 fieldwork days were conducted. In the Project Area of Influence, 6 species are listed in Annex II of the Bern Convention, 7 species in Annex III, and 2 species in Annex II of CITES. According to the IUCN Red List, no species are classified as endangered,

Eleven butterfly species were identified, reflecting late summer and autumn activity. No Apollo butterfly or its host plant, *Sedum album* was found on the southern slopes, but dry *Sedum album* individuals were observed on the northern slopes, which offer suitable habitat. The species are classified as Least Concern (LC) by IUCN and are not listed in BERN or CITES appendices.

For the baseline collection of bird species, NatureScot VP surveys at turbines and ETL and breeding bird surveys via transect and point counts were carried out in spring, summer and autumn. Surveys revealed low migratory rates for 2024 survey period, and medium to high overall collision risk estimations for resident species based on this year’s results. ETL segment with higher collision hazard was not identified.

For the baseline collection of bat species, NatureScot ground static acoustic surveys were carried out in spring, summer and autumn, in addition to transect surveys covering turbine areas. Surveys captured seasonally heightened levels of bat activity (summer) including threatened species *N. lasiopterus.* Additional mitigation and monitoring approaches were recommended.

1 Introduction

1.1 Project Background

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

Kestanederesi Wind Power Plant (WPP) Project (“the Project”) with 28 turbines and 117.6 MWm/117.6 MWe total installed power, is planned to be implemented by Enerjisa Üretim. The Project components consist of 28 turbines, a switchyard, an administrative building, Project roads (i.e., access and site roads), a 300 tonnes/hour capacity mobile crashing and screening facility, as well as an energy transmission lines (ETL) as a Project associate facility. The Project is part of a nine-project wind energy investment package initiated by Enerjisa Üretim which has a 750 MW total installed power from a total of 180 wind turbines located in Aegean and Marmara Regions of western Türkiye; aiming to evaluate and utilize the wind energy potential of the region and contribute to the national strategy and regional economy.

The Enerjisa YEKA Nine Wind Power Plants (WPPs) projects have undergone Environmental and Social Impact Assessment (ESIA) and Critical Habitat Assessment (CHA) studies, conducted by Mott MacDonald (“Consultant”), also including Biodiversity Management Plan (BMP) development. However, due to limitations identified in the baseline data during the ESIA studies, supplementary biodiversity field surveys were deemed necessary. Consequently, Enerjisa Üretim has commissioned Mott MacDonald Türkiye to develop the site-specific baseline collection methodologies and conduct field studies accordingly. Supplementary baseline studies were conducted for each WPP, as details are provided throughout this report, managed by expert teams using relevant methodologies.

1.2 Scope of Study

As a result of the ESIA study conducted by the Consultant, biodiversity data gaps were identified for the Project’s compliance with the applicable national and international standards as presented in Section 2. Supplementary biodiversity collection methodologies for flora and fauna were subsequently developed by the Consultant and field surveys were scheduled in 2024 to address biodiversity data gaps which would (1) enhance the Project biodiversity baseline to provide reliable and robust results, (2) enable revisions of CHA and BMP, (3) provide clarifications with regards to implementation of mitigation hierarchy and (4) conduct operation phase monitoring for the Project. The supplementary biodiversity surveys cover the period between March and November, which represents three seasons, spring, summer, and autumn.

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

2 Applicable Guidelines and Standards

2.1 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 2-1.

Table 2-1 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)	National Plan on on-site Protection of Plant Genetic Diversity (1998)
Terrestrial Hunting Law (11.07.2003/25165 - 28.10.2020)	National Environmental Action Plan (1999)
Law on Animal Protection (01.07.2004/25509 - 13.12.2010)	National Forestry Program (2004)
Regulation on the Protection of Wetlands (04.04.2014/28962 - 23.06.2022)	Climate Change Action Plan (2012)
Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (27.12.2001/24623 - 20.07.2019)	Turkish National Action Plan against Desertification (2015)
Regulation on Protection of Wildlife and Wildlife Development Areas (08.11.2004/25637)	National Rural Development Strategy (2015)
Law on Protection of Cultural and Natural Assets (23.07.1983/18113 - 15.06.2022)	National Biological Diversity Strategy and Action Plan (2019)
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)	

2.2 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)
- 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)

2.3 Project Standards

The Project Company intends to develop the Project in alignment with the applicable international and national standards, and 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 Note (6), EBRD Performance Requirements (PR6) and Guidance Note (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.

3 Methodology

3.1 Flora

3.1.1 Flora Methodology

In order to reveal the flora inventory in the study area, the studies were carried out in three steps. These are 1-Desktop studies (Basic Preparation), 2-Field studies, 3-Survey (interview) studies. The flora studies have been specifically concentrated on the turbines and their 1 km buffer, ETL and access road area, with research and seed collection efforts directed towards the target plant species found within these designated areas.

- Station selection and literature review were conducted utilizing geographic information systems (GIS).
- As part of the GIS studies, stations for point and transect observations were initially established using satellite images as a preliminary step.
- Previous flora studies near the study area were examined within the scope of literature survey
- For the flora assessment, satellite maps were initially analysed as part of the field study preparations. Subsequently, fieldwork was conducted to survey the terrain and habitats within the designated area.
- Information on the distribution of species was obtained from literature sources and this information was used as a base for further analysis. For flora species, the literature sources given in Section 6.1 were reviewed.
- The synonyms of the species were also taken into consideration in the literature review.
- Within the scope of literature survey, nationally protected and internationally recognized areas were investigated, such as Boz Mountains KBA.

Field Studies:

- Field studies were conducted in areas that were not surveyed previously and also surveys were designed to verify whether Bozdağ KBA trigger flora species were present in the Project Area of Influence (AoI). The flora studies have been specifically concentrated on the turbines and their 1 km buffer, ETL and access road area.
- The first phase of fieldwork was carried out primarily to verify the quality of the stations identified in the desktop studies. If deemed necessary in the preliminary field work, adjustments were made to the stations. Natural and semi-natural habitats in the Project area and its immediate surroundings were taken into consideration in determining the stations.
- Surveys were carried out in 2024 during the vegetation period, with the objective of thoroughly assessing and documenting the various plant species present within the study area. The studies utilized the region's 1:25,000 scale topographic map, satellite images, GPS device, camera, a notebook, and various materials for collecting plant samples in the field, including transparent bags, a hoe, pruning shears, a plant press, and seed envelopes.
- The field studies were primarily conducted along 500-meter transect lines, representing different habitats within the Project's footprint and area of influence.
- During the field studies, the third-level EUNIS habitat types of the study area along each transect line were also identified.

The following steps were followed in the identification process of plant species:

- During the identification of plant specimens, various sources were used, First of all Flora of Turkey and the East Aegean Islands, as well as the digital version of the Flora of Turkey (Tübives) and other references given in section 6.1.
- Latin and Turkish names, family information, and taxonomic classification were based on the book “Türkiye Bitkileri Listesi (Damarlı Bitkiler) [List of Plants of Turkey (Vascular Plants)]” published by the Turkish Flora Research Association in 2012.
- Recent publications and newly added taxon records to the Flora of Turkey have also been reviewed, and the study Important Plant Areas of Turkey has been referenced as well.
- References have also been made to The Plant List, Plants of the World Online, and the International Plant Name Index (IPNI), and Bizimbitkiler.org.
- When determining the national IUCN threat categories of the identified species and subspecies, both endemic and non-endemic rare taxa, the primary reference used was the Red Data Book of Turkish Plants. For determining the global IUCN threat categories, the official website of the IUCN Red List was used as the main reference.

3.1.2 Field Schedule

Survey was conducted in May and June for target species.

3.1.3 Survey Locations

For the purpose of evaluating floristic diversity within the scope of the Project, the boundaries of the study area were first defined. The study area was determined by considering all components and aspects of the Project, including land preparation, excavation works, installation and construction, transportation, energy production activities, any solid/liquid waste, dust, air emissions, noise, electromagnetic impacts, and the environmental effects and spread distances of these emissions. (See Table 3-1 and Figure 3-1)

Table 3-1 Flora Survey Location (Point and Transects)

Flora Point			Transect			
Station No	Survey Point	Nearest Project Element	Transect No	Transect Start Location	Transect End Location	Nearest Project Element
1	38°15'37.88"N-28°27'6.86"E	Site Road – T2	1	38°14'17.00"N -28°21'51.81"E	38°14'2.20"N-28°21'56.28"E	Access Road
2	38°15'20.10"N-28°23'11.28"E	Access Road-Site Road- T3	2	38°14'23.54"N-28°21'46.17"E	38°14'19.79"N-28°21'56.50"E	Access Road
3	38°15'11.23"N-28°28'31.51"E	Site Road – T6	3	38°14'40.17"N-28°21'58.55"E	38°14'28.34"N-28°21'45.32"E	Access Road
4	38°15'52.12"N-28°25'18.22"E	Site Road – T8	4	38°15'18.76"N-28°22'50.98"E	38°14'48.80"N-28°22'2.26"E	Access Road - T1
5	38°15'49.09"N-28°25'30.59"E	Site Road – T9	5	38°15'24.63"N-28°23'22.34"E	38°15'22.77"N-28°23'8.61"E	Site Road – T3
6	38°16'22.23"N-28°26'11.21"E	Site Road – T11	6	38°15'52.47"N-28°25'14.89"E	28°25'14.89"E-28°25'32.80"E	Site Road – T8-T9
7	38°16'3.62"N-28°26'23.55"E	Site Road – T12	7	38°16'22.25"N-28°26'11.52"E	38°16'10.47"N-28°26'38.25"E	Site Road – T11- T28- T12-T14
8	38°16'6.10"N-28°27'48.77"E	Site Road – T13	8	38°15'37.27"N-28°26'59.10"E	38°15'34.29"N-28°27'18.94"E	Site Road – T2

9	38°16'8.19"N- 28°26'36.14"E	Site Road – T14	9	38°16'7.00"N- 28°27'49.09"E	38°15'51.47"N- 28°27'55.73"E	Site Road – T13- T17
10	38°15'31.63"N- 28°28'3.18"E	Site Road – T15	10	38°15'31.44"N- 28°28'3.39"E	38°15'50.35"N- 28°28'36.44"E	Site Road – T15- T16- T27
11	38°15'32.43"N- 28°28'20.56"E	Site Road – T16	11	38°15'14.57"N- 28°28'19.48"E	38°15'11.47"N- 28°28'31.88"E	Site Road – T6- T25
12	38°15'56.48"N- 28°27'53.56"E	Site Road – T17	12	38°15'25.63"N- 28°28'53.23"E	38°15'1.51"N- 28°28'55.00"E	T24- T19
13	38°15'1.52"N- 28°28'54.46"E	Site Road – T19	13	38°15'1.36"N- 28°29'1.55"E	38°14'50.41"N- 28°29'7.19"E	Site Road – T20
14	38°14'52.38"N- 28°29'4.32"E	Site Road – T20	14	38°15'53.13"N- 28°26'39.94"E	38°15'43.63"N- 28°26'30.79"E	ETL- Site Road- Switch Yard
15	38°15'26.39"N- 28°28'53.82"E	Site Road – T24	15	38°16'48.71"N- 28°27'15.67"E	38°16'38.52"N- 28°27'6.29"E	ETL
16	38°15'14.05"N- 28°28'18.83"E	Site Road – T25	16	38°17'28.78"N- 28°27'56.21"E	38°17'17.88"N- 28°27'41.76"E	ETL
17	38°15'49.87"N- 28°28'35.82"E	Site Road – T27	17	38°17'46.28"N- 28°29'6.12"E	38°17'38.71"N- 28°28'43.88"E	ETL
18	38°16'10.56"N- 28°26'14.11"E	Site Road – T28	18	38°18'42.10"N- 28°30'28.13"E	38°18'32.04"N- 28°30'15.06"E	ETL

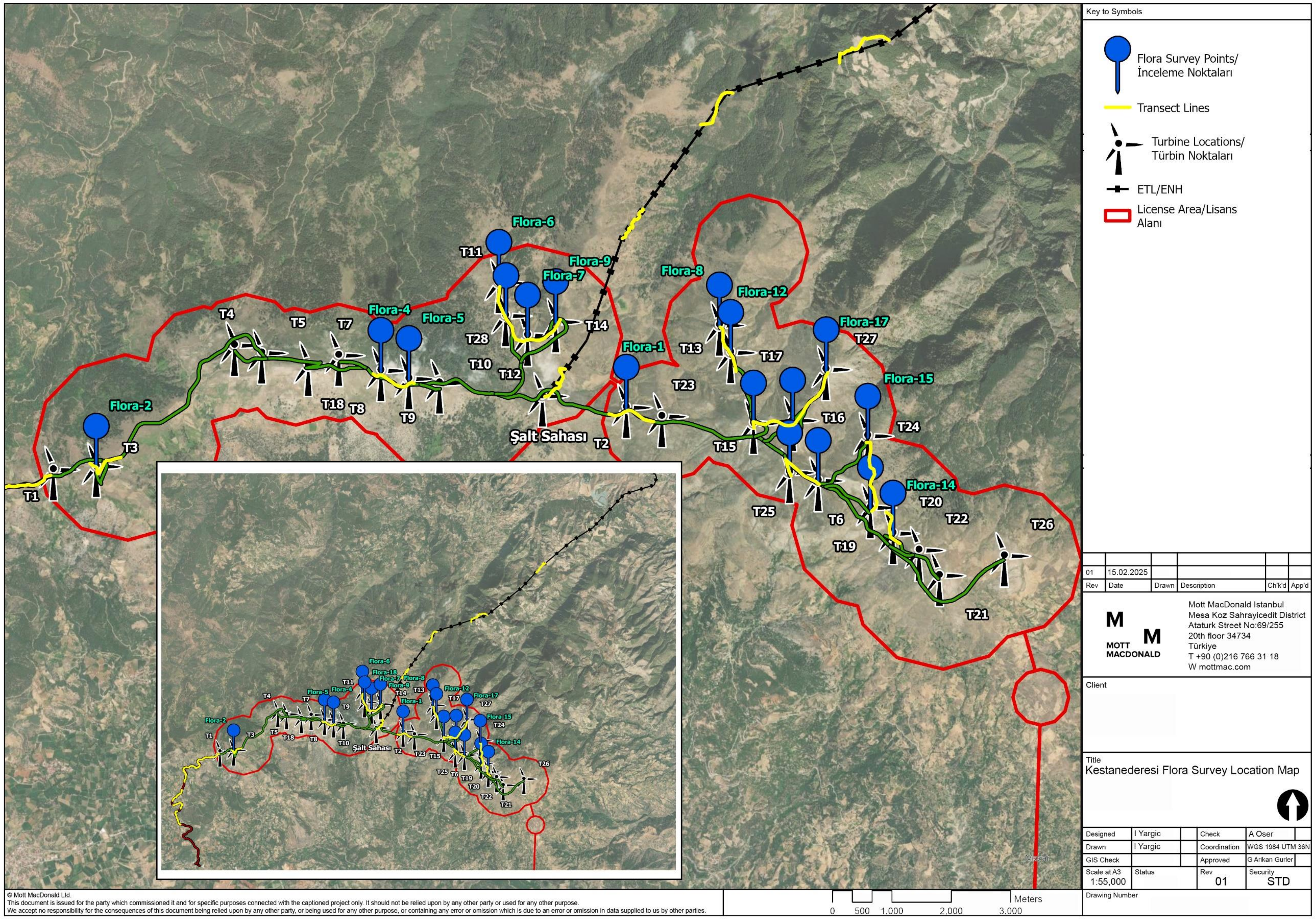


Figure 3-1 Flora Survey Location Map

3.2 Terrestrial Mammal

3.2.1 Terrestrial Mammal Methodology

In order to reveal the mammals inventory in the study area, the studies were carried out in three steps. These are 1-Desktop studies (Basic Preparation), 2-Field studies, 3-Survey (interview) studies. The mammal studies, as a supplementary component, have been specifically concentrated on the ETL and access road area, with research efforts focused on identifying suitable locations for camera traps and transects, while turbine locations may be considered but are not the primary focus of the study

Desktop Studies:

- Station selection and literature review were conducted utilizing GIS.
- As part of the GIS studies, point and transect locations were initially determined using satellite imagery for preliminary preparation.
- Previous mammals studies near the study area were examined within the scope of literature review.
- For mammals, firstly, satellite maps were analysed within the scope of field preparation studies.
- As part of the field preparation for terrestrial mammal, satellite maps were initially analysed. Subsequently, fieldwork was conducted to assess the status of the species and their relationship with the habitat. The precise locations of the stations were determined during the fieldwork.
- Information on the distribution of species was obtained from literature sources and this information was used as a base. The literature sources given in Section 6.2 were reviewed.
- The synonyms of the species were also taken into consideration in the literature review.
- Within the scope of literature reviews, nationally protected and internationally recognized areas were investigated and surveyed.

Field Studies:

- Field studies were conducted in areas that were not surveyed previously. The terrestrial mammal studies, as a supplementary component, have been specifically concentrated on the, ETL and access road area. while turbine locations may be considered but are not the primary focus of the study.
- The first phase of field studies for terrestrial mammals aimed to assess the suitability of camera trap and transect locations identified in the desktop studies. Stations were relocated, if necessary, with consideration given to natural and semi-natural habitats in and around the Project area.
- Mammal field studies was conducted in two main parts. Direct observation (camera trap) and Indirect observation (Footprints, faeces, and body hair).
- In the field studies habitats suitable for mammals were identified and observations were made for a total of 20 days according to the size of the habitat.
- Paths that could be the passage routes of medium and large mammals etc. were checked for camera trap installation. Camera traps were installed at points where animal signs (tracks, feces etc.) were seen.
- Indirect observation was made on the existing roads and footpaths within the Area of Influence.
- Camera traps remained in the field for 15 consecutive days at each survey point in April 2024 and 5 consecutive days in May 2024.

3.2.2 Field Schedule

A total of 20 days of survey was conducted in 2024 during the active season (April and May) for mammals to thoroughly assess and document the mammal species present within the study area. The field survey was strategically planned to align with the period of increased mammal activity, ensuring that observation of the mammal species, including both common and rare species, could be accurately recorded. This timing facilitated the identification of potential habitats and the collection of relevant data regarding species distribution and behaviour.

3.2.3 Survey Locations

For the purpose of evaluating mammals diversity within the scope of the Project, the boundaries of the study area were first defined. The study area was determined by considering all components and aspects of the Project, including land preparation, excavation works, installation and construction, transportation, energy production activities, any solid/liquid waste, dust, air emissions, noise, electromagnetic impacts, and the environmental effects and spread distances of any emissions. (See Table 3-2 and Figure 3-2)

Table 3-2 Terrestrial Mammals Survey Locations (Camera Trap and Transect)

Camera Trap			Transect			
Station No	Camera Trap Point	Nearest Project Element	Transect No	Transect Start Location	Transect End Location	Nearest Project Element
1	38°15'21.98"N-28°23'0.30"E	Access Road -Site Road- T1	1	38°14'22.69"N-28°21'58.97"E	38°14'0.64"N-28°22'6.50"E	Access Road
2	38°15'52.76"N-28°26'5.79"E	Site Road, T10 – T12	2	38°15'31.13"N-28°23'22.29"E	38°15'19.23"N-28°22'55.17"E	Site Road-T1 – T3
3	38°15'33.92"N-28°28'14.59"E	Site Road– T16 – T15	3	38°15'57.88"N-28°26'2.62"E	38°15'44.69"N-28°26'19.44"E	Site Road-Switch Yard
			4	38°15'38.60"N-28°28'26.40"E	38°15'43.09"N-28°27'53.54"E	Site Road-T15 – T16
			5	38°15'57.67"N-28°24'58.62"E	38°16'3.62"N-28°24'30.21"E	Site Road – T17- T18
			6	38°16'50.82"N-28°27'6.97"E	38°16'34.72"N-28°27'10.40"E	ETL
			7	38°17'17.83"N-28°27'40.01"E	38°17'31.54"N-28°28'8.60"E	ETL
			8	38°17'53.36"N-28°29'18.94"E	38°17'30.89"N-28°28'40.27"E	ETL

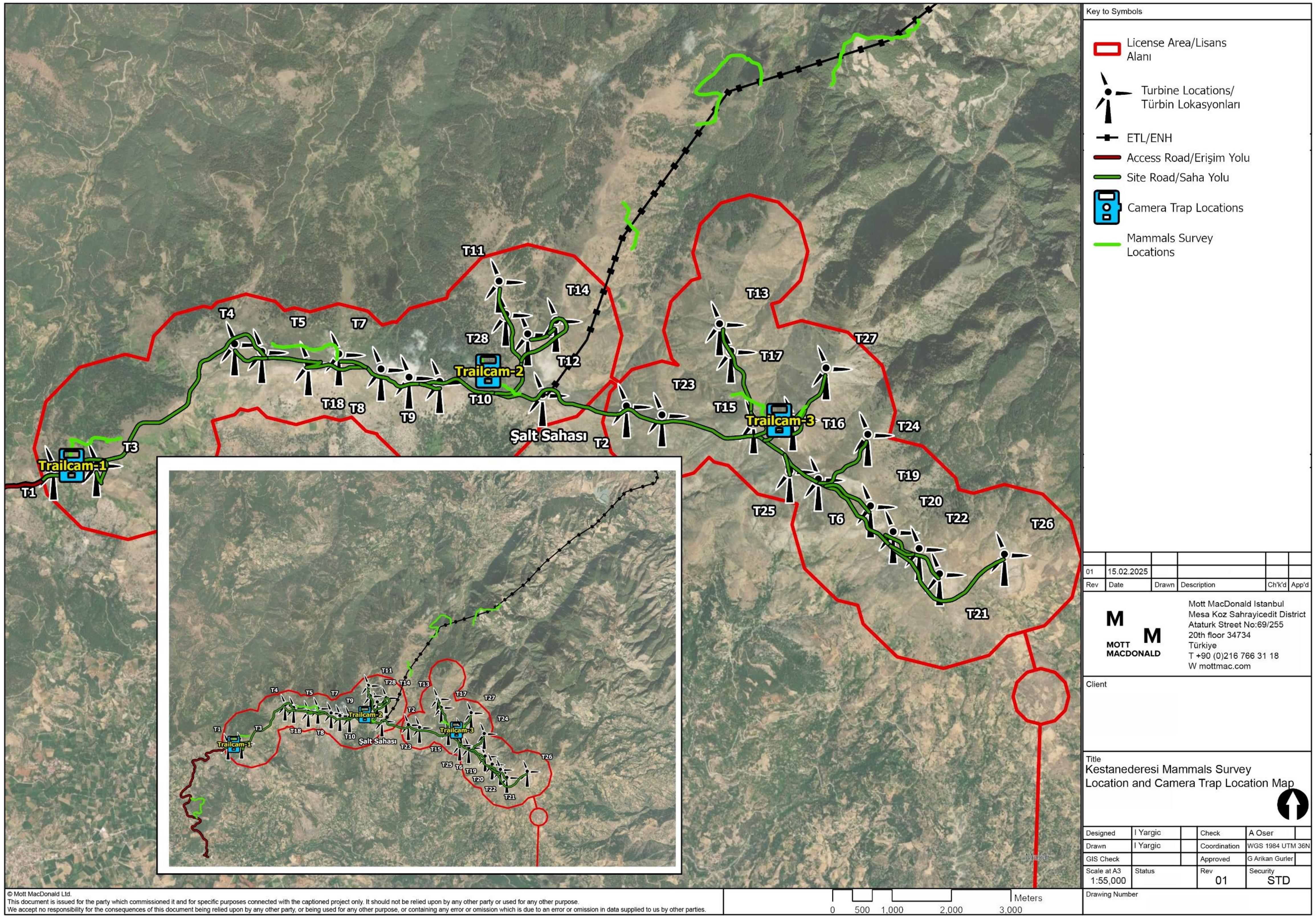


Figure 3-2 Terrestrial Mammal Camera Trap and Transect Survey Locations

3.3 Herpetofauna

3.3.1 Herpetofauna Methodology

In order to reveal the herpetofauna inventory in the study area, the studies were carried out in three steps. These are 1-Desktop studies (Basic Preparation), 2-Field studies, 3-Survey (interview) studies. The herpetofauna studies, as a supplementary component, have been specifically concentrated on the turbines, ETL and access road area, with research efforts focused on identifying suitable locations for sampling points and transects.

Desktop Studies:

- Station selection and literature review were conducted utilizing GIS.
- As part of the GIS studies, point and transect locations were initially determined using satellite imagery for preliminary preparation.
- Previous herpetofauna studies near the study area were examined within the scope of literature review.
- As part of the field preparation for herpetofauna, satellite maps were initially analysed. Subsequently, fieldwork was conducted to assess the status of the species and their relationship with the habitat. The precise locations of the stations were determined during the fieldwork.
- Information on the distribution of species was obtained from literature reviews and this information was used as a base. The literature sources given in section 6.3 were reviewed.
- The synonyms of the species were also taken into consideration in the literature review.
- Within the scope of literature reviews, nationally protected and internationally recognized areas were investigated and surveyed.

Field Studies:

- Field studies were conducted in areas that were not surveyed previously. The herpetofauna studies, as a supplementary component, have been specifically concentrated on the, ETL and access road area. while turbine locations may be considered but are not the primary focus of the study.
- The first phase of field studies for herpetofauna aimed to assess the suitability of point and transect locations identified in the desktop studies. Stations were relocated, if necessary, with consideration given to natural and semi-natural habitats in and around the Project area.
- In the following studies, habitats suitable for amphibians and reptiles were identified and observations were made for a total of 4 days according to the size of the habitat. Fieldwork started in the morning at daylight and continued until dusk for nocturnal species.
- Observations were conducted at total 5 stations and 7 transects for varying periods of time depending on the size of the habitat.
- In order to identify amphibians and reptiles, water sources, areas close to water sources, under stones and rocks, rock crevices and cracks, tree hollows, etc. were checked in the field work carried out in and around the study area.
- During the observations, ‘Visual Encounter Survey (VES)’ and Call Survey were used to determine the presence of amphibians and reptile species.

3.3.2 Survey Locations

For the purpose of evaluating herpetofauna diversity within the scope of the Project, the boundaries of the study area were first defined. The study area was determined by considering all components and aspects of the Project, including land preparation, excavation works, installation and construction, transportation, energy production activities, any solid/liquid waste, dust, air emissions, noise, electromagnetic impacts, and the environmental effects and spread distances of any emissions. (See Table 3-3 and Figure 3-3)

Table 3-3 Herpetofauna Survey Locations

Sampling			Transect			
Station No	Sampling Point	Nearest Project Element	Transect No	Transect Start Location	Transect End Location	Nearest Project Element
1	38°15'29.27"N-28°23'6.95"E	T1 - T3	1	38°13'37.95"N-28°22'9.94"E	38°13'30.44"N-28°22'20.12"E	Access Road
2	38°15'51.45"N-28°25'24.67"E	T8 - T9	2	38°15'37.09"N-28°23'13.50"E	38°15'23.98"N-28°22'59.41"E	T1 – T3 - Site Road
3	38°15'13.23"N-28°28'44.87"E	T6 – T24	3	38°15'52.94"N-28°25'20.34"E	38°15'48.58"N-28°25'38.50"E	T8 – T9 – T10
4	38°15'34.91"N-28°28'10.60"E	T15 – T16	4	38°15'21.93"N-28°28'27.77"E	38°14'57.12"N-28°29'0.50"E	Site Road- T6 – T19 – T20
5	38°16'6.87"N-28°27'46.82"E	T13	5	38°15'45.60"N-28°28'8.10"E	38°15'36.18"N-28°28'24.39"E	Site Road – T16
			6	38°17'9.19"N-28°27'34.83"E	38°16'51.61"N-28°27'26.53"E	ETL
			7	38°19'20.79"N-28°31'40.86"E	38°19'14.94"N-28°31'24.32"E	ETL

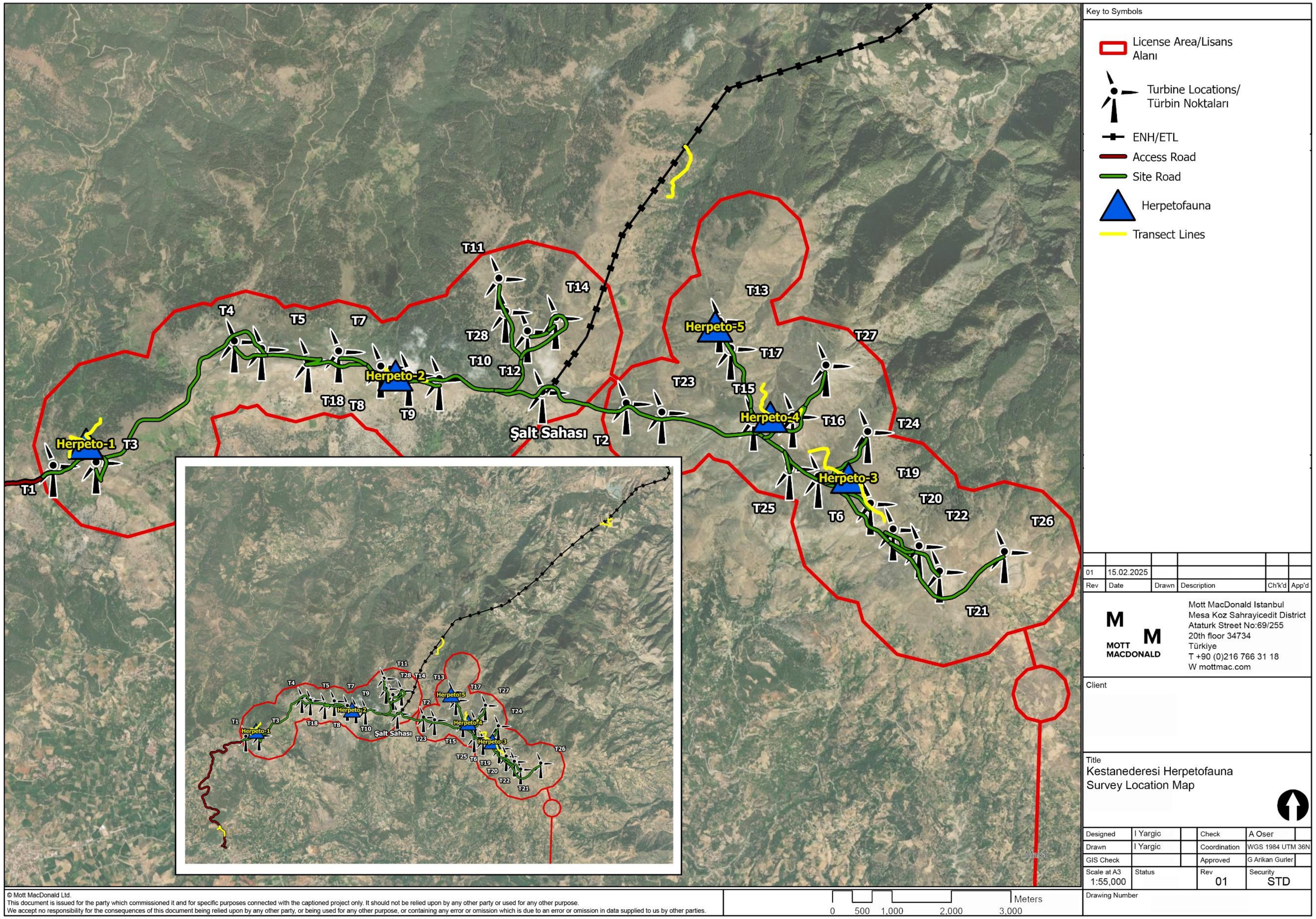


Figure 3-3 Transect and Point Survey Locations of Herpetofauna

3.4 Bird

As previously presented in the standalone methodology reports[2], studies on birds were carried out on 3 main topics: Turbine Vantage Point (VP) survey, ETL VP survey, and Breeding Bird Survey.

No major changes to bird methodology were made. On the other hand, a short summary of minor changes to established methodologies based on field ground truthing are summarised below, and discussed in further detail under Section 3.4.1, 3.4.2 and 3.4.4;

- Due to challenging terrain, all VPs were revised after ground truthing between 500m to 2 km for improved coverage (see Section 3.4.1).
- Similarly due to difficult terrain, all ETL VPs were revised following ground truthing between 1.5 – 2.5 km. With the change, the VP coverage of the ETL within 2 km buffer is above 75% which is sufficient coverage. (see Section 3.4.2)
- VPs were renamed (numeration) for field surveyor convenience (see Section 3.4.1, and Section 3.4.2)
- Spring season for the Project region was considered as extending to mid-June as confirmed by the local ornithology experts. (see Section 3.4.4)

3.4.1 Vantage Point Methodology

Bird survey is based on a vantage point survey, hereafter VP, on high ground methodology both for migratory and breeding/resident species as defined by NatureScot (formerly known as SNH) guidelines, which are widely used for ecological impact assessment studies on wind farms.

VP involves conducting observations from a fixed location, from where the whole Project area can be seen and all the birds flying through the wind farm airspace can be detected. A minimum of 36 hours of observations are required for each season.

The appropriate time of observations is determined as when target species are active which is between 09:00 - 17:00, though changing daylight conditions between seasons are also considered when scheduling observations. The observer scans the area within the main viewing angle every 5 minutes, using the maximum angle if a bird contact moves outside of the main angle. When a bird is detected, the species is identified, total number of birds is noted, minimum and maximum flight height during the course is estimated, first and last time of the sighting is noted. A standard field recording sheet was used (see Appendix 6.5).

The observer pays particular attention to the flight height of the birds. The height levels of a wind turbine can be marked as: (a) below rotor height (<42 m), (b) at rotor height (42-180 m), (c) above rotor height (>180 m). When the birds possibly fly near the turbines, the flight line cross the location of the turbine. On maps specifically designed for each VP, the flight path of each bird is drawn.

Vantage Point Field Schedule

During spring of 2024, a total of 166 hours and 11 minutes of surveys were conducted across four vantage points (VP1, VP2, VP3, and VP4) as presented Table 3-4. Week number of the year are denoted with Monday as first day. The surveys started in mid-March and continued until the end of May. On average, approximately 41 hours and 33 minutes of surveys were conducted per vantage point.

[2] Kestanederesi WPP Biodiversity Monitoring Methodology. Mott MacDonald. Issue date 28 March 2024.

Table 3-4 VP survey effort and dates in spring.

Week	First Day	VP1	VP2	VP3	VP4	Total (h)
W12	18/03	5:30	-	3:58	4:11	13:39
W13	25/03	13:22	11:36	10:02	11:45	46:45
W17	22/04	6:04	12:47	14:03	14:40	47:34
W18	29/04	6:06	-	-	-	6:06
W21	20/05	12:06	6:25	14:32	14:37	47:40
W22	27/05	-	4:27	-	-	4:27
Total	-	43:08	35:15	42:35	45:13	166:11

During the summer of 2024, between 28 hr 43 min and 45 hr 40 min of surveys were conducted across four vantage points (VP1, VP2, VP3 and VP4). The summer surveys started in mid-June and continued until the end of July. On average, approximately 35 hours and 19 minutes of surveys were conducted per vantage point (Table 3-5).

Table 3-5 VP survey effort and dates in summer.

Week	First Day	VP1	VP2	VP3	VP4	Total (h)
W26	24/06	13:20	31:30	21:10	22:02	88:02
W27	01/07	11:57	-	-	-	11:57
W30	22/07	11:43	14:10	7:33	7:54	41:20
Total	-	37:00	45:40	28:43	29:56	141:19

During the autumn of 2024, between 52 hr 31 min and 70 hr of surveys were conducted across four vantage points (VP1, VP2, VP3 and VP4) (Table 3-6). Autumn surveys started in mid-August and continued until mid-November. On average, approximately 60 hours and 19 minutes of surveys were conducted per vantage point.

Table 3-6 VP survey effort and dates in autumn.

Week	First Day	VP1	VP2	VP3	VP4	Total (h)
W34	19/08	13:01	14:30	22:47	22:25	72:43
W36	02/09	7:02	7:18	7:37	7:51	29:48
W37	09/09	4:43	7:29	7:44	7:50	27:46
W40	30/09	12:59	14:41	15:12	15:50	58:42
W42	14/10	14:46	7:42	7:48	16:04	46:20
W43	21/10	-	5:58	-	-	5:58
Total	-	52:31	57:38	61:08	70:00	241:17

VP Locations

4 VPs are used for the best visual coverage of the turbine areas. Locations of the VPs are shown on Figure 3-4 and coordinates of the VPs are provided in Table 3-7.

Table 3-7 Locations of the VPs (WGS 84 UTM 35N)

VP	Easting	Northing
VP1	622934	4236414
VP2	625899	4235981
VP3	628309	4235750
VP4	630341	4233963

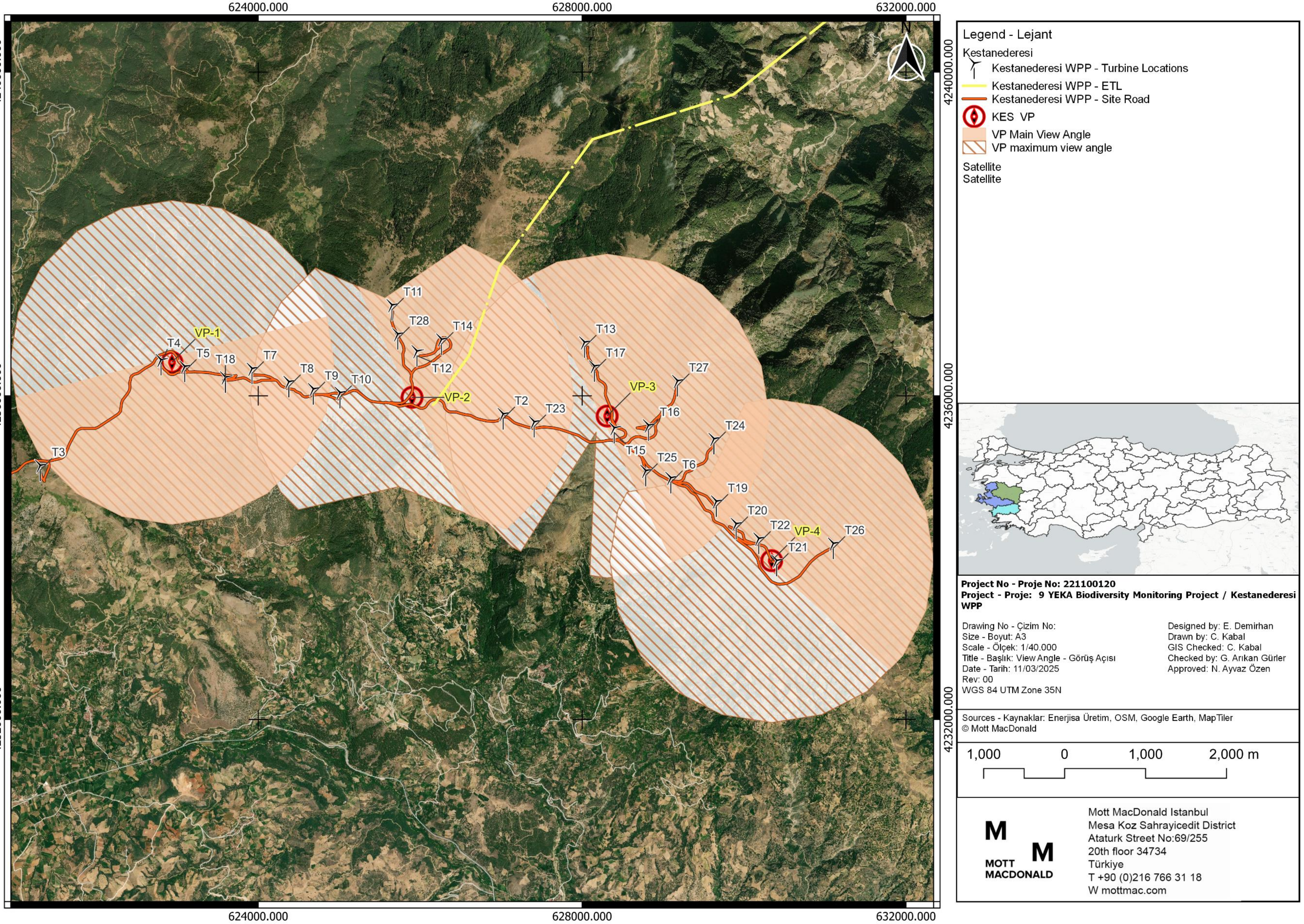


Figure 3-4 Locations of the VPs.

3.4.2 ETL Observations

The impact of the wind farm is not complete without considering the related and connected infrastructure. The transmission lines are known to cause death to birds by physical injuries and electrocution. The isolation of the pylons and the installation of the bird diverters are important.

Energy transmission line (ETL) monitoring provides valuable insights into the bird species present at the ETL route and potential environmental considerations related to the observed habitats. In order to assess the potential impact of ETL on the areas it will traverse post-construction, 2 vantage points (VP ETLs) were thoughtfully selected, and observations were conducted at these points. An observer was present at the selected VP ETL and scanned the area each 5 minutes at the maximum possible view angle. When a bird is detected, the species is identified, and the flight height of the bird is recorded as above or below the ETL.

To analyse bird passage rates, the number of bird passages per hour was calculated for each vantage point (TLs) along the ETL. The average passage rate was then determined for three seasons. ETL segments were classified into low, medium, or high-risk categories based on passage rates of target species:

- Low risk: Up to 0.35 bird passages/hour (average value: 0.25 bird passages/hour)
- Medium risk: Between 0.35 and 0.70 bird passages/hour (average value: 0.50 bird passages/hour)
- High risk: Above 0.70 bird passages/hour

These threshold values were established by comparing data from the 9 WPP projects. Current guidelines do not provide explicit thresholds for risk levels; therefore, these classifications were determined based on an arbitrary but consistent decision-making process informed by the comparative dataset.

ETL Observation Field Schedule

A total of 127 hours and 56 minutes of surveys were conducted during the spring of 2024, starting on 25 March 2024 and finishing on 27 May 2024. The surveys were carried out at three transmission line points (VP ETL1, ETL2, and ETL3). On average, approximately 42.65 hours of surveys were conducted per VP ETL as shown in Table 3-8.

Table 3-8 ETL survey effort and dates in spring

Week	First Day	VP ETL1	VP ETL2	VP ETL3	Total
W13	25/03	29:14	-	11:34	40:48
W17	22/04	07:42	07:39	12:47	28:08
W18	29/04	09:27	09:28	-	18:55
W21	20/05	08:57	09:04	06:25	24:26
W22	27/05	08:02	07:37	-	15:39
Total	-	63:22	33:48	30:46	127:56

A total of 118 hours and 56 minutes of surveys were conducted during the summer of 2024, between June 15 and August 18. The surveys were carried out at two transmission line points (VPs ETL1, ETL2 and ETL3). On average, approximately 39 hr 38 min of survey was conducted per vantage point (VP ETL) as shown in Table 3-9.

Table 3-9 ETL survey effort and dates in summer

Week	First Day	VP ETL1	VP ETL2	VP ETL3	Total
W26	24/06	-	17:52	31:30	49:22

Week	First Day	VP ETL1	VP ETL2	VP ETL3	Total
W27	01/07	15:25	15:42	-	31:07
W30	22/07	7:45	16:32	14:10	38:27
Total	-	23:10	50:06	45:40	118:56

A total of 182 hours and 39 minutes of surveys were conducted during the autumn of 2024, between August 19 and November 15. The surveys were carried out at two transmission line points (VPs ETL1, ETL2 and ETL3). On average, approximately 60 hr 53 min of survey was conducted per vantage point (VP ETL) as shown in Table 3-10.

Table 3-10 ETL survey effort and dates in autumn

Week	First Day	VP ETL1	VP ETL2	VP ETL3	Total
W34	19/08	35:15	7:56	14:30	57:41
W36	02/09	8:57	8:38	7:18	24:53
W37	09/09	6:45	6:25	7:29	20:39
W40	30/09	15:57	16:05	14:41	46:43
W42	14/10	-	-	7:42	7:42
W43	21/10	11:00	8:03	5:58	25:01
Total	-	77:54	47:07	57:38	182:39

ETL Observation Locations

3 VPs are used for the best visual coverage of the turbine areas. Locations of the ETL VPs are shown on Figure 3-5. Coordinates of the ETL VPs are provided in Table 3-11.

Table 3-11 Locations of the VPs (WGS 84 UTM 35N)

VP	Easting	Northing
VP ETL1	633517	4242840
VP ETL2	630838	4239978
VP ETL3	625899	4235981

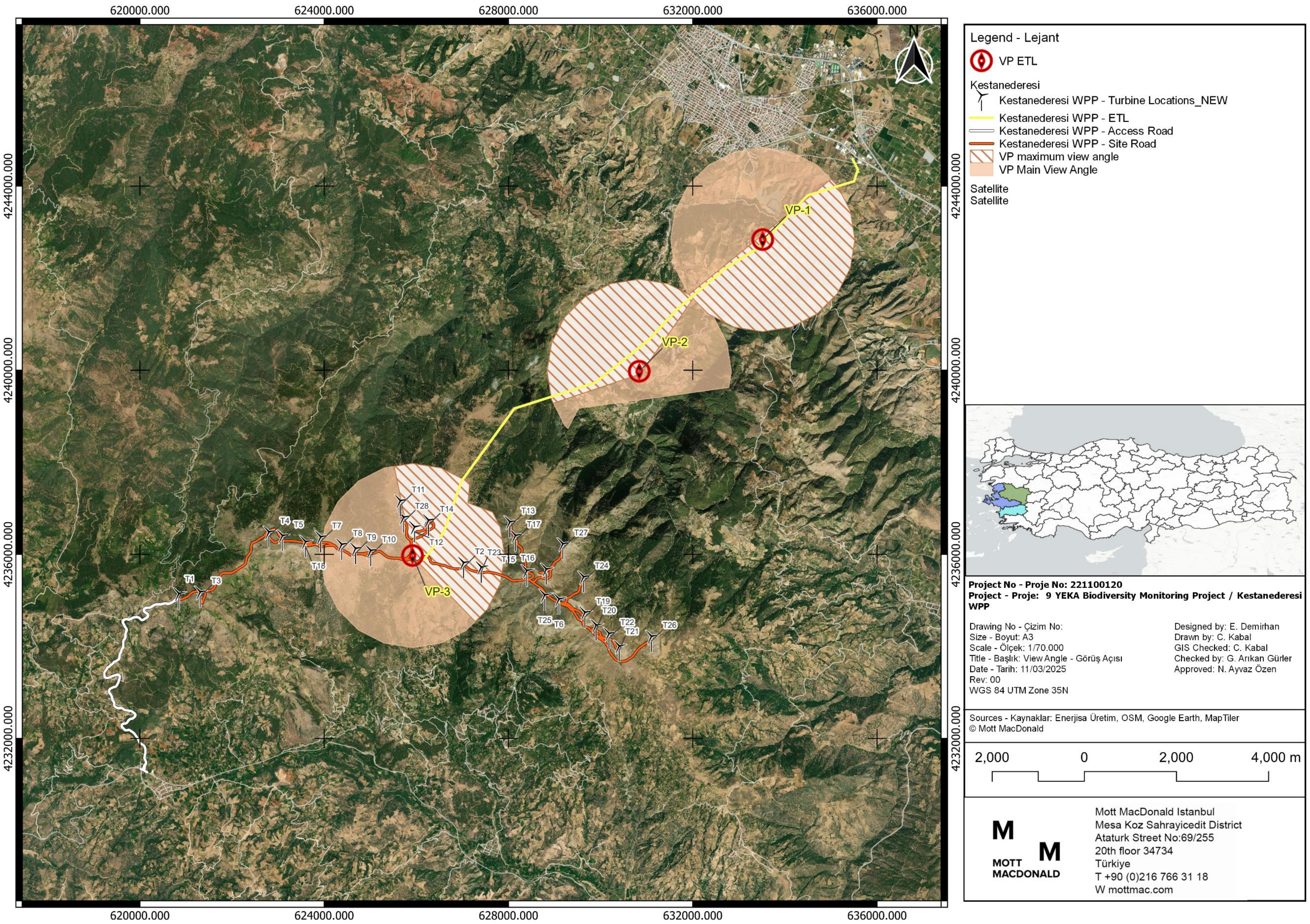


Figure 3-5 Locations of the ETL VPs

3.4.3 Collision Risk Methodology

NatureScot Guidance note describes a methodology for assessing the full impact of wind farms on ornithological interests which includes a two-stage process for the assessment of collision risk (NatureScot 2000). Stage (1) involves the calculation of the number of birds that fly through the rotors, which itself consists of two separate approaches, modified in order to calculate (a) resident bird numbers and (b) migratory bird numbers. Stage (2) involves the calculation of the probability of a bird being hit by a rotor when flying through. Avoidance rates in both approaches are accounted for according to NatureScot (2018), which for raptors is specified as 98% (see Appendix 6.5).

For the purposes of this analysis, a resident bird is defined as individuals of either resident species or migrant species that spend more time at the Project site than simply passing by. In other words, any bird that spent more time for feeding, resting, hunting was regarded as resident. A migrant bird was defined as birds that only pass through the area once in a certain direction, typically in order to migrate.

Approach 1: Regular Flights through a Wind Farm

The first approach was designed for cases in which a bird population makes regular flights through the wind farm, possibly in a reasonably defined direction. This is usually applied for species that exhibit regular flights between the feeding and sleeping (roosting) areas, such as wintering geese, gulls and cranes.

In this analysis, approach 1 was modified to be applicable to migrant birds. This approach was utilized to estimate the mortality of birds that only fly through and not sleep (roost), feed or exhibit other behaviour that causes the bird to spend time in the area.

Calculation of the collision risk for the birds during regular flights according to NatureScot is:

1. Identify a 'risk window' i.e. a window of width equal to the width of the wind farm across the general flight direction of the birds, and of height equal to the maximum height of the highest turbine. The cross-sectional area W = width x height.
2. Estimate the number of birds flying through this risk window per annum, i.e. flock size x frequency of flight. Make allowance in the flock size for occasions on which birds which may fly higher than this risk window and for the fact that the risk window may only straddle a proportion of the overall flight corridor used by the birds.
3. Calculate the area A presented by the wind farm rotors. Assume the rotors are aligned in the plane of the risk window as, to a first approximation, any reduction in cross-sectional area because the rotors are at an oblique angle is offset by the increased risk to birds which have to make a longer transit through the rotors. Where rotors overlap when viewed in cross-section, allow for the full cross-sectional area of separate rotors as the risk to birds is doubled if passing through two successive rotors: A = N x πR2 where N is the number of rotors and R is the rotor radius
4. Express the total rotor area as a proportion A / W of the risk window.
5. Number of birds passing through rotors = number of birds through risk window x proportion occupied by rotors = n x (A / W)

Approach 2: Birds using the Wind Farm Airspace

The second approach was designed for birds such as raptors which occupy a recognised territory, and there is a certain level of understanding of the likely distribution of flights within that territory.

In this analysis, Approach 2 was adapted to estimate the mortality of resident birds, i.e. birds that spend a certain amount of time hunting, territory defence, displaying and nesting in the area.

Calculation of the collision risk for the birds using the airspace of the wind farm following NatureScot (2000) is:

1. Identify a 'flight risk volume' Vw which is the area of the wind farm multiplied by the height of the turbines.
2. Calculate the combined volume swept out by the wind farm rotors Vr = N x πR2 x (d + l) where N is the number of wind turbines, d is the depth of the rotor back to front, and l is the length of the bird.
3. Estimate the bird occupancy n within the flight risk volume. This is the number of birds present multiplied by the time spent flying in the flight risk volume, within the period (usually one year) for which the collision estimate is being made.

For good results the data available should be based on actual observations within the area of the wind farm alone (provided the observation is done without disturbance), and the best results will be based on observational data about flight heights, such as will enable informed estimate of the proportion of flights at a level which may collide with the wind farm rotors. However, in the absence of such data, an estimate can be made knowing only the number of birds, and proportion of time flying, within the bird's territory, and using some knowledge of flight behaviour to gauge the proportion of flights at a height to be at risk.

4. The bird occupancy of the volume swept by the rotors is then

n x (Vr / Vw) bird-secs.

5. Calculate the time taken for a bird to make a transit through the rotor and completely clear the rotors:

t = (d + l) / v where v m/sec is the speed of the bird through the rotor

6. To calculate the number of bird transits through the rotors, divide the total occupancy of the volume swept by the rotors in bird-secs by the transit time t:

Number of birds passing through rotors = n x (Vr / Vw) / t

3.4.4 Breeding Bird Methodology

In the region, the breeding season for most bird species is between March and July, according to the Turkish Breeding Bird Atlas (which was incorporated into European Breeding Bird Atlas[3]). Breeding bird surveys were conducted for early and late breeding seasons at the Wind Farm. These surveys utilized both line transect (VPs) and points counts (VP ETLs) methods. For the line transect method, transects were selected adjacent to vantage points. Observers walked along these transect lines, recording each potential breeding bird observed, along with the species and the highest level of breeding code for each bird species as given in Table 3-12. For the point count method, observers recorded each potential breeding bird observed at VP and VP ETL points during bird monitoring surveys, along with the species and the highest level of breeding code for each bird species.

Table 3-12 Breeding bird survey atlas codes.

Breeding categories and Atlas codes
A Possible breeding

[3] https://ebba2.info/

1 Species observed in breeding season in possible nesting habitat
2 Singing male(s) present (or breeding calls heard) in breeding season
B Probable breeding
3 Pair observed in suitable nesting habitat in breeding season
4 Permanent territory presumed through registration of territorial behaviour (song, etc.) on at least two different days a week or more apart at same place
5 Courtship and display
6 Visiting probable nest site
7 Agitated behaviour or anxiety calls from adults
8 Breed patch on adult examined in the hand
9 Nest building or excavating of nest hole
C Confirmed breeding
10 Distraction display or injury feigning
11 Used nest or eggshells found (occupied or laid within period of survey)
12 Recently fledged young (nidicolous species) or downy young (nidifugous species)
13 Adults entering or leaving nest site in circumstances indicating occupied nest (including high nests or nest holes, the contents of which cannot be seen) or adult seen incubating
14 Adult carrying a faecal sac or food for young
15 Nests containing eggs
16 Nests with young seen or heard

Breeding Bird Field Schedule and Locations

During the breeding bird surveys, a total of 17 transect walks were conducted in April and July 2024 (Table 3-13). The walks lasted an average of 61 minutes and covered 1 km. Most walks were conducted at around 09:30 in the morning.

In addition, bird sighting data collated from all VPs and VP ETLs between March and July were used for additional data points on breeding birds.

Table 3-13 Breeding bird survey dates and nearest VPs.

Transect Location	Date	Month	Time	Duration (min)	Distance (km)
KES-ETL1	25.03.2024	Mar	12:34:00	26	0
KES-ETL2	25.03.2024	Mar	12:34:00	26	0
KES-ETL1	25.03.2024	Mar	14:55:00	120	3
KES-ETL2	25.03.2024	Mar	14:55:00	120	3
KES-VP4	27.04.2024	Apr	09:19:00	62	1
KES-VP3	27.04.2024	Apr	09:30:00	52	2
KES-VP3	27.04.2024	Apr	09:45:00	50	1
KES-ETL1	28.04.2024	Apr	08:49:00	60	1
KES-ETL2	28.04.2024	Apr	09:08:00	60	1
KES-VP1	29.04.2024	Apr	09:55:00	60	0
KES-VP3	25.06.2024	Jun	09:35:00	62	0
KES-VP3	25.06.2024	Jun	09:55:00	65	2
KES-VP4	7.23.2024	Jul	09:38:00	62	1
KES-VP3	7.23.2024	Jul	09:48:00	60	1
KES-VP3	7.23.2024	Jul	09:50:00	61	1
KES-VP1	7.25.2024	Jul	09:45:00	62	1

3.5 Bat

No major changes to the established bat methodology were made. 8 devices were moved between 100-200 m to situate the device better based on ground conditions.

Some technical issues were noted during specific surveys. Some detectors were observed to fail or stop recording on certain nights. During the spring season, detector SP 12 failed after the third night of operation. In the summer, five detectors experienced failures after the fifth night. In contrast, the autumn season saw flawless performance, with all detectors working perfectly without any failures throughout the monitoring period. Despite these issues, five full days of recordings from these detectors provided sufficient data for a meaningful analysis. Detector recording success for spring can be seen in Table 4-38, summer in Table 4-44 and autumn in Table 4-50 (no failures). Failures resulted in no recordings and show up as blank in table cells for the device.

3.5.1 Ground Static and Mobile Acoustic Survey Methodology

Ground static bat surveys followed NatureScot guidelines which prescribe the following:

- At sites where the proposed turbine locations are known, static detectors should be placed to provide a representative sample of bat activity at or close to these points.
- Detectors should be placed at all known turbine locations at wind farms containing less than ten proposed turbines.
- Where developments have more than ten turbines, detectors should be placed within the developable area at ten potential turbine locations plus a third of additional potential turbine sites up to a maximum of 40 detectors for the largest developments.
- At key-holed woodland/plantation sites (and other proposals involving extensive habitat alteration), pre-application survey data may not represent the situation post-construction, as the habitat available for bats will change following construction. Automated survey locations should therefore also include open areas including existing nearby rides/clearings in the forestry, to provide an indication of how bats may adapt to and use the new habitat created through turbine construction.
- Ideally, surveys should aim for 10 consecutive nights, but in practice weather conditions may preclude this particularly early or late in the year and in more northerly latitudes.

Static and transect acoustic surveys were conducted in order to assess bat activity in the project site. For static surveys, 6 full spectrum bat detectors (Wildlife Acoustic Song Meter Mini Bat 2 AA) used at each selected sampling point for ten nights. For transect surveys, surveyors travelled slowly along a designated route within the project site, using a full-spectrum bat detector (Wildlife Acoustics Song Meter Mini Bat 2 AA) to record bat activity. Additionally, geo-tracking was conducted using a mobile phone application (Figure 3-6). Transect surveys were carried out after sundown on the same nights as the static surveys. The detectors were triggered by bat calls. The detectors were located at around 1 m above the ground.

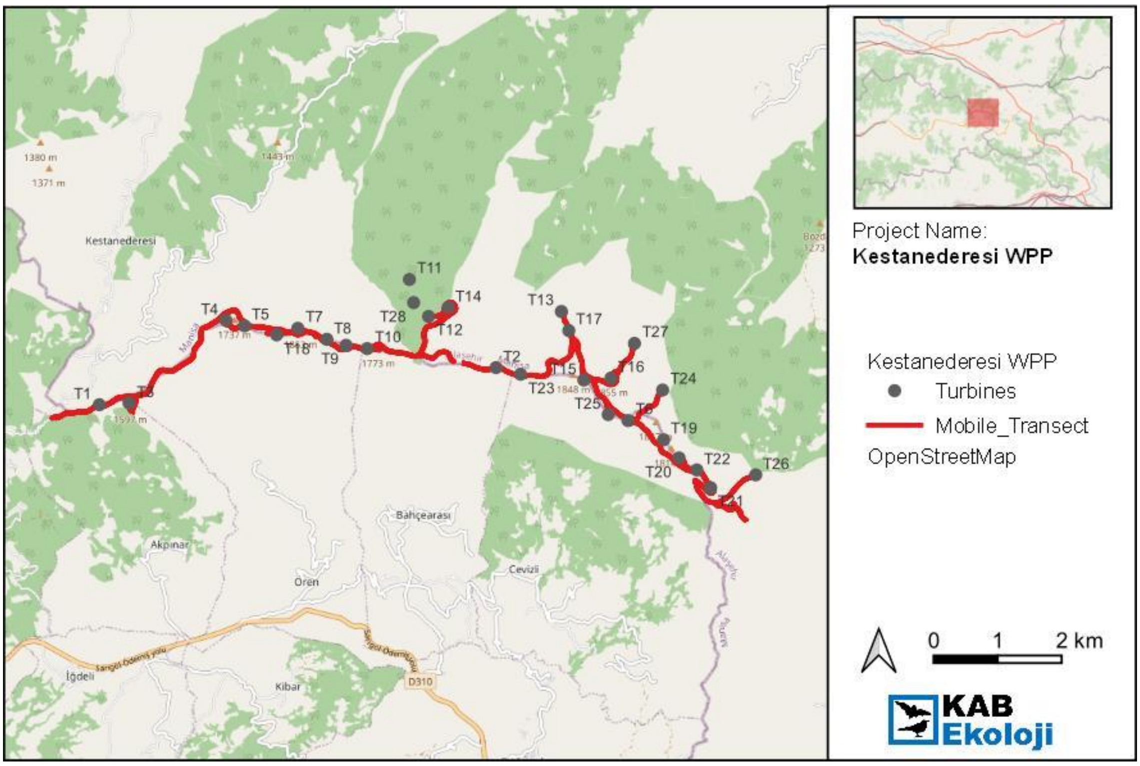


Figure 3-6 Transect survey route at the project.

3.5.2 Acoustic Analysis Methodology

Bat recordings obtained from bat detectors were analysed using BatExplorer and Kaleidoscope Pro (produced by Wildlife Acoustics) and species identifications were done by following established scientific literature and industry best practice (Appendix 6.6). Echolocation signal characteristics including signal shape, peak frequency of maximum energy, signal slope, pulse duration, start frequency, end frequency, pulse bandwidth, inter-pulse interval and power spectra are compared to published signal characteristics for local bat species. As the call parameters of some species overlap, in such cases definitive species identification is difficult and their identifications were reported as “possible.” Feeding buzzes and social calls were also noted.

Since Auto-ID yields mixed results in sound identification, i.e. performs very well for some species, or shows biases for some over others, or sometimes identifies species which are not even distributed in a particular region, manual analysis was performed in a sampling type approach in order to account for Auto-ID corrections. For each consecutive ten nights of recording, two nights with the highest number of recordings were identified via filters. These nights were then prioritized for detailed manual analysis. Additionally, it was also ensured that the nights selected represented all the bat species identified through Auto-ID. If the two nights with the highest bat activity did not capture all species for some SPs, additional nights were added into the manual analysis set for a more complete representation.

Myotis genus identifications remain some of the most challenging species to differentiate in Turkiye, and experts are often not comfortable providing species level identifications. A through Myotis analysis is very time intensive, with a small percentage of recordings allowing for further species analysis, and even in that case, most efforts can usually narrow it down to 2-3 species clusters, again not resulting in confident species IDs. If Myotis species IDs are of specific concern, targeted methodologies and approaches would be necessary. Usually for Myotis, a mixture of sound and morphology is preferred for species identification, which in some cases may not even be sufficient, and genetic evidence may be necessary. Bat experts often indicate Myotis at genus level and this has become common practice since Myotis species are not defined in literature or carcass studies as especially collision prone at WPPs.

3.5.3 Field Schedule

A set of static and transect acoustic bat surveys were conducted (Table 3-14). Weather conditions during surveys are given in Table 3-15.

Table 3-14 Acoustic bat surveys for 2024 spring, summer, and autumn season.

Survey Season	Start Date	Finish Date	Number of Nights
Spring Static Surveys	24 April	3 May	10 nights
Spring Transect Survey 1	25 April	25 April	1 night
Spring Transect Survey 2	2 May	2 May	1 night
Summer Static Surveys	16 July	26 July	10 nights
Summer Transect Survey 1	22 July	22 July	1 night
Summer Transect Survey 2	23 July	23 July	1 night
Summer Transect Survey 3	24 July	24 July	1 night
Summer Transect Survey 4	25 July	25 July	1 night
Autumn Static Surveys	11 September	21 September	10 nights
Autumn Transect Survey 1	13 September	13 September	1 night
Autumn Transect Survey 2	14 September	14 September	1 night
Autumn Transect Survey 3	15 September	15 September	1 night
Autumn Transect Survey 4	16 September	16 September	1 night

Table 3-15 Weather conditions during the surveys.

Date	Temperature (°C)	Wind Speed (m/s)	Cloud cover %	Precipitation (mm)
2024-04-24	20	5	80	0.1
2024-04-25	17	3	80	0
2024-04-26	13	3	10	0
2024-04-27	11	2	0	0
2024-04-28	12	1	0	0
2024-04-29	14	2	40	0
2024-04-30	12	2	10	0
2024-05-01	14	2	0	0
2024-05-02	11	1	20	0
2024-05-03	12	2	0	0
2024-07-16	24	3	0	0
2024-07-17	24	2	0	0.1
2024-07-18	26	1	10	0
2024-07-19	28	2	20	0
2024-07-20	26	2	0	0
2024-07-21	26	2	0	0
2024-07-22	24	2	0	0
2024-07-23	27	3	70	0
2024-07-24	26	3	30	0

Date	Temperature (°C)	Wind Speed (m/s)	Cloud cover %	Precipitation (mm)
2024-07-25	26	2	40	0
2024-07-26	22	2	20	0
2024-07-27	21	3	0	0
2024-09-11	19	3	20	0
2024-09-12	18	3	20	0
2024-09-13	18	2	0	0
2024-09-14	19	4	0	0
2024-09-15	19	3	20	0
2024-09-16	14	3	10	0
2024-09-17	15	3	0	0
2024-09-18	16	2	0	0
2024-09-19	16	2	80	0
2024-09-20	19	2	50	0
2024-09-21	19	1	100	0
2024-09-22	15	2	60	0.8

3.5.4 Survey Locations

Ground static bat detector locations (Sampling Point, SP) are provided in Table 3-16 and shown on Figure 3-7.

Table 3-16 Ground static bat detector locations (WGS84 UTM35N)

SP	Easting	Northing	Nearest Turbine
SP1	620838	4235072	T1
SP2	622925	4236393	T4
SP3	623827	4236246	T7
SP4	624283	4236171	T8
SP5	626268	4236627	T14
SP6	625743	4236653	T28
SP7	625630	4237065	T11
SP8	625318	4235919	T10
SP9	631036	4234013	T26
SP10	630217	4234246	T22
SP11	629769	4235501	T24
SP12	629626	4234755	T19
SP13	628875	4234972	T25
SP14	628098	4236590	T13
SP15	627415	4235615	T23
SP16	628639	4235635	T16

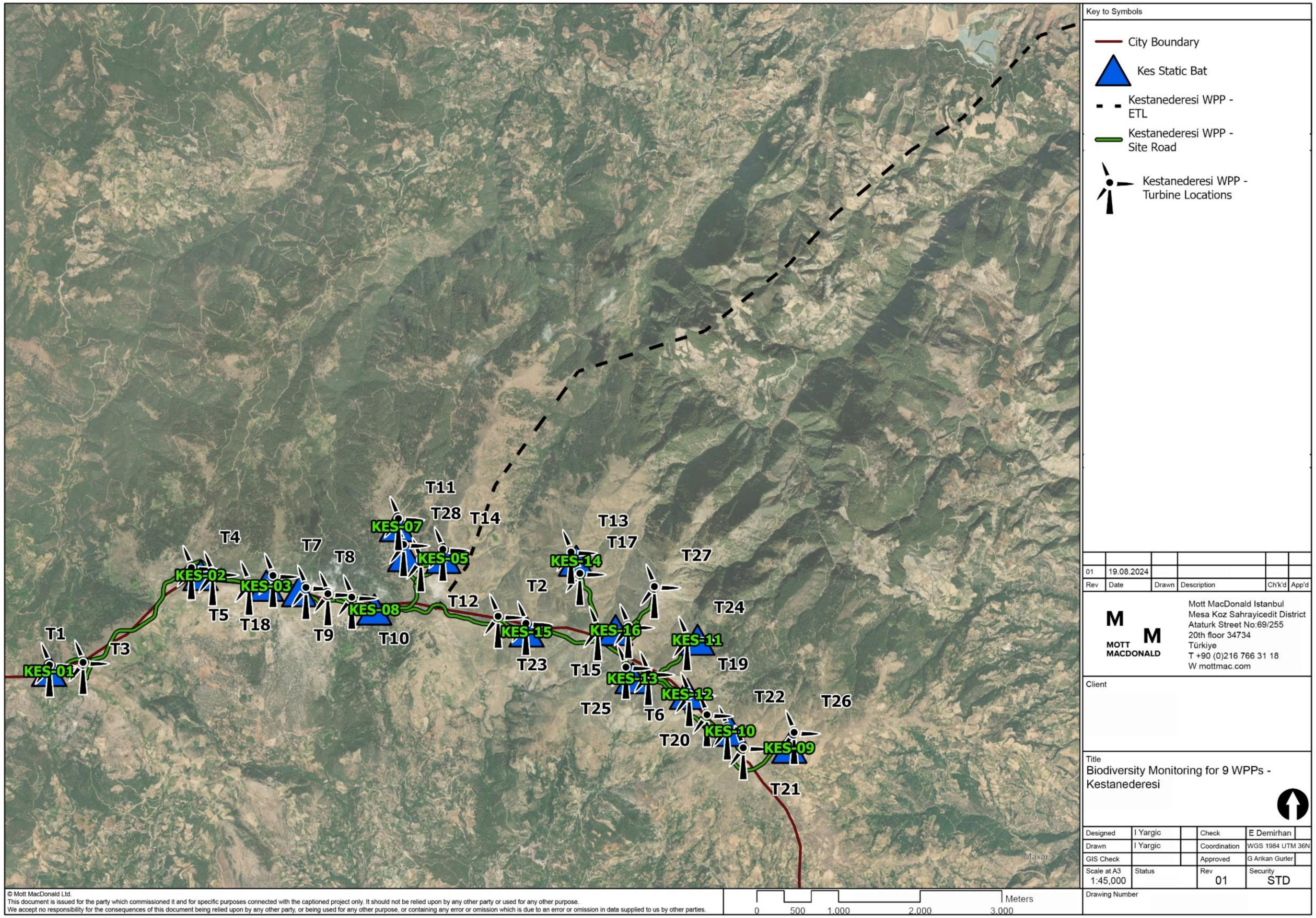


Figure 3-7 Ground static bat detector locations

3.6 Butterfly

3.6.1 Butterfly Methodology

In order to reveal the butterfly inventory in the study area, the studies were carried out in two steps. which included the assessment of the Apollo butterfly (*Parnassius apollo*) and the determination of butterfly diversity. These are 1-Desktop studies (Basic Preparation), 2-Field studies. The butterfly studies, as a supplementary component, have been specifically concentrated on the turbines, ETL and access road area, with research efforts focused on identifying suitable locations for transects.

Desktop Studies:

- Station selection and literature review were conducted utilizing GIS.
- As part of the GIS studies, point and transect locations were initially determined using satellite imagery for preliminary preparation.
- Previous butterfly studies near the study area were examined within the scope of literature review.
- As part of the field preparation for Apollo butterfly satellite maps were initially analysed. Subsequently, fieldwork was conducted to assess the status of the species and their relationship with the habitat. The precise locations of the stations were determined during the fieldwork.
- Information on the distribution of species was obtained from literature reviews and this information was used as a base. The literature sources given in section 6.4 were reviewed.
- The butterfly species of Izmir were compiled in a study conducted by Atahan and colleagues in 2009. In this study, 122 different butterfly species were documented within the borders of Izmir province (Atahan et al., 2009)[4]. This study includes not only the observations made by Atahan and his colleagues but also records collected in previous years. The scientific names of the butterfly species used in the study are based on the list published by Karaçetin and Welch (2011)[5], which was updated according to the current taxonomy published by Wiemers et al. in 2018[6].In addition to Atahan et al., 2009. studies on the identification of butterfly species in the region, the "Red Book of Butterflies of Turkey" by Karaçetin, E. and Welch, H.J. (2011)[7] was also reviewed.

Field Studies:

- The first phase of field studies for butterfly aimed to assess the suitability of transect locations identified in the desktop studies. Stations were relocated, if necessary, with consideration given to natural and semi-natural habitats in and around the Project area.
- Counts were conducted along fixed transects of approximately 1 km, each consisting of smaller sections with a homogeneous habitat type at turbine locations, ETL and access roads.
- The most widely used method in butterfly community diversity studies and long-term monitoring, globally recognized, is the "Butterfly Transect Counts" method. This

[4] Atahan, A., Bozacı, V., Çelikkaya, D., Gül, O., Haçer, M., ve Şimşek, K. (2009). Illustrated List of the Butterflies of İzmir Province (Turkey). Priamus, Nr. 45, 1-134.

[5] Karaçetin, E., ve Welch, H.J. (2011). *Türkiye'deki Kelebeklerin Kırmızı Kitabı*. Ankara: Doğa Koruma Merkezi

[6] Wiemers, M., Balletto, E., Dincă, V., Fric, Z.F., Lamas, G., Lukhtanov, V., Munguira, M.L., van Swaay, C.A.M., Vila, R., Vliegenthart, A., Wahlberg, N., ve Verovnik, R. (2018). An updated checklist of the European Butterflies (Lepidoptera, Papilionoidea). ZooKeys, 811, 9-45. https://doi.org/10.3897/zookeys.811.28712

[7] Karaçetin, E., ve Welch, H.J. (2011). Türkiye'deki Kelebeklerin Kırmızı Kitabı. Ankara: Doğa Koruma Merkezi. Erişim: [www.dkm.org.tr]

approach was first defined by Pollard (1977)[8] and later refined and standardized by Pollard and Yates (1993)[9]. In the Pollard walk (transect counts) method, an experienced observer walks slowly at a steady pace while recording the adult butterfly species and their numbers observed within a 5-meter-wide area, 2.5 meters on either side.

- Eggs, larvae, or pupae were also identified during the fieldwork.
- Butterfly counts were conducted in sunny conditions to ensure accuracy, as butterfly activity is significantly reduced during strong and/or cold winds, which were avoided. Furthermore, early morning counts were preferred during the peak of summer to minimize the impact of high temperatures on butterfly activity.
- Counts were deemed invalid if the wind speed exceeded force 4 or if cloud cover exceeded 50%.

3.6.2 Field Schedule

As part of the field studies, a nine-day field survey was conducted in July and August 2024.. During the field studies, the locations previously recorded for Apollo (*Parnassius apollo*) within the Bozdağ KBA were first inspected, followed by a survey of the project area.

[8] Pollard, E. (1977). A method for assessing changes in the abundance of butterflies. Biological Conservation, 12, 115-134.

[9] Pollard, E., and Yates, T.J. (1993). Monitoring Butterflies for Ecology and Conservation. Chapman & Hall, 274 page.

4 Results

4.1 Flora

4.1.1 Boz Mountains Key Biodiversity Area

All turbine areas, as well as the majority of the ETL and Project roads (i.e., access roads and site roads) are located within Boz Mountains KBA, code EGE024, which consists of mixed woodland (mainly *Quercus* and *Pinus* sp), maquis, alpine, subalpine and boreal grassland, and running and standing freshwater features.[10]

During the field studies conducted within the study area, none of the six target plant taxa identified in the Boz Mountains KBA were observed.

Table 4-1 KBA Flora Species

Family	Species	Obsevation Status
POACEAE	*Pseudophleum gibbum* (Boiss.) Dogan	Not Observed
ASPARAGACEAE	*Ornithogalum nivale* Boiss.	Not Observed
POACEAE	*Bromus macrocladus* Boiss.	Not Observed
ASPARAGACEAE	*Ornithogalum improbum* Speta	Not Observed
AMARYLLIDACEAE	*Sternbergia schubertii* Schenk	Not Observed
COLCHICACEAE	*Colchicum micaceum* K.Perss.	Not Observed

4.1.2 Habitat Types

The classification of habitat types within terrestrial and freshwater ecosystems was carried out using the European Nature Information System (EUNIS) 2012 Habitat Classification.

The recorded habitats are listed in Table 4-2, along with their wide distribution areas within the study area and Figure 4-1 shows the location of related habitat types in AoI. The amount of habitat loss due to project activities is listed below between Table 4-3 and Table 4-7.

Table 4-2 Habitat Types of the Project AoI

Broad habitat type	EUNIS Habitat Type	Extend within Project AoI (ha)	Percentage (%)
Woodland	G3.5 Pinus nigra woodland	2.454.77	16.37 %
	G4.B Mixed Mediterranean pine - thermophilous oak woodland	1.386.98	9.25 %
Step	E4.4 Alpine and subalpine grasslands	3.944.56	26.31 %
Inland unvegetated or sparsely vegetated habitats	H2.6 Western Mediterranean and thermophilous scree	204.40	1.36 %
	H3.2 Boreal arctic base rich inland cliff (calcareous rocky slopes with chasmophytic vegetation)	17.71	0.12 %
Agricultural Fields	I1.1 Intensive unmixed crops	6.558.54	43.75%

[10] https://www.keybiodiversityareas.org/site/factsheet/28343

	I1.2 Mixed crops of market gardens and horticulture	229.25	1.53 %
Built-up Areas	J1 Building, Cities, towns, and villages	194.98	1.31 %

Table 4-3 Habitat Loss on Access Roads

EUNIS	Area (ha)	Percentage
E4.4 Calcareous alpine and subalpine grassland	1.62	0.041%
G3.5 Pinus nigra woodland	0.00	0.000%
H2.6 Calcareous and ultra-basic screes of warm exposures	0.00	0.000%
H3.2 Basic and ultra-basic inland cliffs	0.00	0.000%
I1.1 Intensive unmixed crops	5.84	0.089%
Total	**7.46**	

Table 4-4 Habitat Loss on Site Roads

EUNIS	Area (ha)	Percentage
E4.4 Calcareous alpine and subalpine grassland	23.06	0.5846%
G3.5 Pinus nigra woodland	0.14	0.0056%
H2.6 Calcareous and ultra-basic screes of warm exposures	2.81	1.3760%
H3.2 Basic and ultra-basic inland cliffs	0.26	1.4702%
I1.1 Intensive unmixed crops	1.03	0.0158%
Total	**27.31**	

Table 4-5 Habitat Loss on Turbine Footprint

EUNIS	Area (ha)	Percentage
E4.4 Calcareous alpine and subalpine grassland	33.31	0.8443%
G3.5 Pinus nigra woodland	0.00	0.0000%
H2.6 Calcareous and ultra-basic screes of warm exposures	7.12	3.4809%
H3.2 Basic and ultra-basic inland cliffs	1.60	9.0340%
I1.1 Intensive unmixed crops	0.39	0.0060%
Total	**42.41**	

Table 4-6 Habitat Loss on Switchyard Area

EUNIS	Area	Percentage
E4.4 Calcareous alpine and subalpine grassland	1.44624714	0.0367%
G3.5 Pinus nigra woodland	0	0.0000%
H2.6 Calcareous and ultra-basic screes of warm exposures	0	0.0000%
H3.2 Basic and ultra-basic inland cliffs	0	0.0000%
I1.1 Intensive unmixed crops	0	0.0000%
Total	**1.44624714**	

Table 4-7 Habitat Loss on ETL

EUNIS	Arae (ha)	%
E4.4 Calcareous alpine and subalpine grassland	75.39447423	27.86%
G3.5 Pinus nigra woodland	37.11321336	13.71%
G4.B Mixed mediterranean pine - thermophilous oak woodland	52.16989023	19.28%
H2.6 Calcareous and ultra-basic screes of warm exposures	14.55142458	5.38%
I1.1 Intensive unmixed crops	88.81986548	32.82%
J2.3 Rural industrial and commercial sites still in active use	2.572122533	0.95%
Total	**270.6209904**	

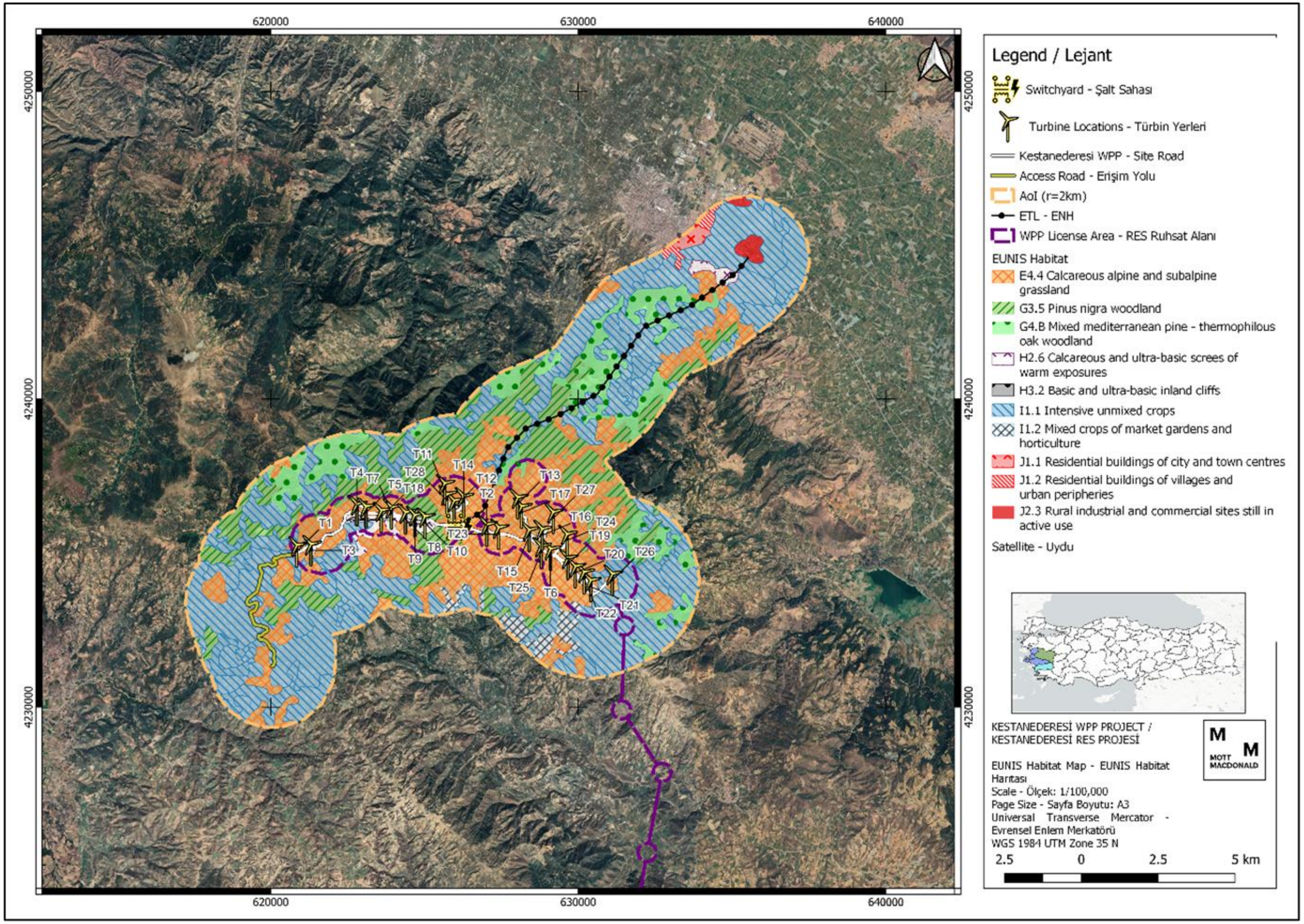


Figure 4-1 EUNIS Habitat Classification of Kestanederesi WPP Area of Influence

4.1.3 Floristic Analyses

As a result of the field studies, 163 plant taxa at the species and subspecies level from 51 families were identified in the Project area. The list of the plant taxa identified in the Project area and its surroundings is provided in Table 4-8.

Table 4-8 Plant Taxa and Threatened Categories Identified in the Project Area of Influence

No	Family	Species	Turkish Name	Phytogeographic Region	Endemism	IUCN	TRDB	BERN	CITES	Literature / Observation
1	Acanthaceae	*Acanthus hirsutus*	Kıllı Ayıpençesi	Widespread	-	NE	NE	-	-	O
2	Anacardiaceae	*Pistacia lentiscus*	Sakız Ağacı	Widespread	-	LC	NE	-	-	O
3	Apiaceae	*Eryngium creticum*	Göz Dikeni	Widespread	-	NE	NE	-	-	O
4	Apocynaceae	*Nerium oleander*	Zakkum	Widespread	-	LC	NE	-	-	O
5	Asparagaceae	*Muscari comosum*	Morbaş	Mediterranean	-	NE	NE	-	-	O
6	Asparagaceae	*Muscari neglectum*	Arapüzümü	Widespread	-	NE	NE	-	-	O
7	Asparagaceae	*Ornithogalum montanum*	Dağ Akyıldızı	Mediterranean	-	NE	NE	-	-	O
8	Asparagaceae	*Ornithogalum nutans*	Tükrükotu	Mediterranean	-	NE	NE	-	-	O
9	Asparagaceae	*Ornithogalum umbellatum*	Sunbala	Widespread	-	NE	NE	-	-	O
10	Asparagaceae	*Scilla bifolia*	Orman Sümbülü	Mediterranean	-	NE	NE	-	-	O
11	Aspleniaceae	*Asplenium trichomanes*	Saçakotu	Widespread	-	NE	NE	-	-	O
12	Asteraceae	*Carduus nutans*	Eşekdikeni	Widespread	-	NE	NE	-	-	O
13	Asteraceae	*Carlina vulgaris*	Deli Domuzdikeni	Widespread	-	NE	NE	-	-	O
14	Asteraceae	*Centaurea virgata*	Acı Süpürge	Irano-Turanian	-	NE	NE	-	-	O
15	Asteraceae	*Centaurea solstitialis* subsp. *solstitialis*	Çakırdikeni	Widespread	-	NE	NE	-	-	O
16	Asteraceae	*Chondrilla juncea*	Karakavuk	Widespread	-	NE	NE	-	-	O
17	Asteraceae	*Cichorium intybus*	Hindiba	Widespread	-	NE	NE	-	-	O
18	Asteraceae	*Cnicus benedictus*	Topdiken	Widespread	-	NE	NE	-	-	O
19	Asteraceae	*Conyza canadensis*	Selviotu	Widespread	-	NE	NE	-	-	O
20	Asteraceae	*Cota tinctoria*	Boyacı Papatyası	Widespread	-	NE	NE	-	-	O
21	Asteraceae	*Crepis sancta*	Yaban Kıskısı	Widespread	-	NE	NE	-	-	O
22	Asteraceae	*Doronicum orientale*	Kaplanotu	Widespread	-	NE	NE	-	-	O
23	Asteraceae	*Picnomon acarna*	Kılçıkdiken	Widespread	-	NE	NE	-	-	O
24	Asteraceae	*Senecio vernalis*	Kanaryaotu	Widespread	-	NE	NE	-	-	O
25	Asteraceae	*Scolymus hispanicus*	Şevketi Bostan	Mediterranean	-	NE	NE	-	-	O
26	Asteraceae	*Tripleurospermum parviflorum*	Beybunik	Widespread	-	NE	NE	-	-	O
27	Boraginaceae	*Myosotis alpestris*	Boncukotu	Widespread	-	NE	NE	-	-	O
28	Boraginaceae	*Heliotropium hirsutissimum*	Aygün Çiçeği	Mediterranean	-	NE	NE	-	-	O
29	Boraginaceae	*Onosma taurica*	Emzikotu	Widespread	-	NE	NE	-	-	O
30	Brassicaceae	*Alyssum murale*	Seki Kuduzotu	Widespread	-	NE	NE	-	-	O
31	Brassicaceae	*Arabis alpina* subsp. *alpina*	Kazteresi	Widespread	-	NE	NE	-	-	O
32	Brassicaceae	*Aubrieta canescens*	Obrizya	Widespread	-	NE	NE	-	-	O
33	Brassicaceae	*Aurinia rupestris*	Kayaincisi	Widespread	-	NE	NE	-	-	O
34	Brassicaceae	*Draba bruniifolia*	Kaya Dolaması	Widespread	-	NE	NE	-	-	O
35	Brassicaceae	*Draba verna*	Çırçırotu	Widespread	-	NE	NE	-	-	O
36	Brassicaceae	*Fibigia macrocarpa*	Koca Sikkeotu	Widespread	-	NE	NE	-	-	O
37	Brassicaceae	*Hirschfeldia incana*	Nadas Turpu	Widespread	-	NE	NE	-	-	O

No	Family	Species	Turkish Name	Phytogeographic Region	Endemism	IUCN	TRDB	BERN	CITES	Literature / Observation
38	Brassicaceae	*Microthlaspi perfoliatum*	Giyle	Widespread	-	NE	NE	-	-	O
39	Campanulaceae	*Campanula glomerata*	Yumak Çanı	Widespread	-	NE	NE	-	-	O
40	Capparaceae	*Capparis spinosa*	Kebere	Widespread	-	NE	NE	-	-	O
41	Caryophyllaceae	*Cerastium dichotomum*	Çatal Boynuzotu	Widespread	-	NE	NE	-	-	O
42	Caryophyllaceae	*Cerastium purpurascens*	Alaca Boynuzotu	Widespread	-	NE	NE	-	-	O
43	Caryophyllaceae	*Dianthus strictus* var. *strictus*	Dimisok	Widespread	-	NE	NE	-	-	O
44	Caryophyllaceae	*Holosteum umbellatum*	Şeytan Küpesi	Widespread	-	NE	NE	-	-	O
45	Caryophyllaceae	*Moenchia mantica*	Dördüz Otu	Widespread	-	NE	NE	-	-	O
46	Caryophyllaceae	*Silene aegyptiaca*	Ballıca	Widespread	-	NE	NE	-	-	O
47	Caryophyllaceae	*Silene conoidea*	Şıvananotu	Widespread	-	NE	NE	-	-	O
48	Caryophyllaceae	*Silene italica*	Yuğuşyüreği	Mediterranean	-	NE	NE	-	-	O
49	Amaranthaceae	*Chenopodium album* subsp. *album* var. *album*	Aksirken	Widespread	-	NE	NE	-	-	O
50	Cistaceae	*Cistus creticus*	Laden	Widespread	-	NE	NE	-	-	O
51	Convolvulaceae	*Convolvulus arvensis*	Tarla Sarmaşığı	Widespread	-	NE	NE	-	-	O
52	Crassulaceae	*Sedum album*	Çobankavurgası	Widespread	-	NE	NE	-	-	O
53	Crassulaceae	*Sedum amplexicaule*	Kulakotu	Widespread	-	NE	NE	-	-	O
54	Crassulaceae	*Sedum rubens*	Kayaüzümü	Mediterranean	-	NE	NE	-	-	O
55	Cupressaceae	*Cupressus sempervirens*	Servi	Mediterranean	-	LC	NE	-	-	O
56	Cupressaceae	*Juniperus communis*	Ardıç	Widespread	-	LC	NE	-	-	O
57	Cupressaceae	*Juniperus foetidissima*	Kokar Ardıç	Widespread	-	LC	NE	-	-	O
58	Cupressaceae	*Juniperus oxycedrus*	Katran Ardıcı	Widespread	-	LC	NE	-	-	O
59	Dennstaedtiaceae	*Pteridium aquilinum*	Eğrelti	Widespread	-	NE	NE	-	-	O
60	Euphorbiaceae	*Euphorbia falcata*	Eğri Sütleğen	Widespread	-	NE	NE	-	-	O
61	Fabaceae	*Adenocarpus complicatus*	Sıyırgı	Mediterranean	-	NE	NE	-	-	O
62	Fabaceae	*Anthyllis vulneraria*	Çobangülü	Widespread	-	NE	NE	-	-	O
63	Fabaceae	*Astragalus angustiflorus* subsp. *angustiflorus*	İnce Geven	Irano-Turanian	-	NE	NE	-	-	O
64	Fabaceae	*Astragalus condensatus*	Sıkgeven	Irano-Turanian	X	NE	LC	-	-	O
65	Fabaceae	*Astragalus depressus* var. *depressus*	Arsız Geven	Widespread	-	NE	NE	-	-	O
66	Fabaceae	*Astragalus elongatus* subsp. *elongatus*	Yazıyoncası	Irano-Turanian	-	NE	NE	-	-	O
67	Fabaceae	*Astragalus microcephalus*	Anadolu Kitresi	Irano-Turanian	-	NE	NE	-	-	O
68	Fabaceae	*Colutea cilicica*	Patlangaç	Widespread	-	NE	NE	-	-	O
69	Fabaceae	*Coronilla coronata*	Burçak	Mediterranean	-	NE	NE	-	-	O
70	Fabaceae	*Lathyrus digitatus*	Tavşankanı	Mediterranean	-	NE	NE	-	-	O
71	Fabaceae	*Lotus corniculatus* var. *corniculatus*	Gazalboynuzu	Widespread	-	NE	NE	-	-	O
72	Fabaceae	*Medicago lupulina*	Bitçikotu	Widespread	-	NE	NE	-	-	O
73	Fabaceae	*Medicago sativa*	Karayonca	Widespread	-	LC	NE	-	-	O
74	Fabaceae	*Ononis spinosa* subsp. *antiquorum*	Acram	Mediterranean	-	NE	NE	-	-	O
75	Fabaceae	*Bituminaria bituminosa*	Asfaltotu	Mediterranean	-	NE	NE	-	-	O

No	Family	Species	Turkish Name	Phytogeographic Region	Endemism	IUCN	TRDB	BERN	CITES	Literature / Observation
76	Fabaceae	*Trifolium pratense* var. *pratense*	Çayır Üçgülü	Widespread	-	NE	NE	-	-	O
77	Fabaceae	*Trifolium repens* var. *repens*	Ak Üçgül	Widespread	-	NE	NE	-	-	O
78	Fabaceae	*Trifolium resupinatum* var. *resupinatum*	Anadolu Üçgülü	Widespread	-	NE	NE	-	-	O
79	Fabaceae	*Vicia cracca*	Kuş Fiği	Euro- Siberian	-	NE	NE	-	-	O
80	Fagaceae	*Castanea sativa*	Kestane	Euro- Siberian	-	LC	NE	-	-	O
81	Fagaceae	*Quercus cerris*	Saçlımeşe	Mediterranean	-	LC	NE	-	-	O
82	Fagaceae	*Quercus coccifera*	Kermes Meşesi	Mediterranean	-	LC	NE	-	-	O
83	Fagaceae	*Quercus pubescens*	Tüylü Meşe	Widespread	-	LC	NE	-	-	O
84	Geraniaceae	*Erodium chium*	Ege İğneliği	Mediterranean	-	NE	NE	-	-	O
85	Geraniaceae	*Geranium tuberosum*	Çakmuz	Irano-Turanian	-	NE	NE	-	-	O
86	Juglandaceae	*Juglans regia*	Ceviz	Widespread	-	LC	NE	-	-	O
87	Juncaceae	*Juncus effusus*	Has Kofa	Widespread	-	LC	NE	-	-	O
88	Lamiaceae	*Ajuga chamaepitys*	Acıgıcı	Widespread	-	NE	NE	-	-	O
89	Lamiaceae	*Nepeta nuda*	Morküncü	Euro- Siberian	-	NE	NE	-	-	O
90	Lamiaceae	*Lamium amplexicaule*	Baltutan	Widespread	-	NE	NE	-	-	O
91	Lamiaceae	*Lamium orientale*	Güzelce	Irano-Turanian	-	NE	NE	-	-	O
92	Lamiaceae	*Lavandula stoechas* subsp. *stoechas*	Karabaş	Mediterranean	-	NE	NE	-	-	O
93	Lamiaceae	*Marrubium globosum* subsp. *globosum*	Bozcaboğum	Irano-Turanian	X	NE	LC	**-**	**-**	**O**
94	Lamiaceae	*Marrubium vulgare*	Karaderme	Mediterranean	-	NE	NE	-	-	O
95	Lamiaceae	*Micromeria myrtifolia*	Boğumluçay	Widespread	-	NE	NE	-	-	O
96	Lamiaceae	*Origanum onites*	Bilyalı Kekik	Widespread	-	NE	NE	-	-	O
97	Lamiaceae	*Phlomis grandiflora*	Bahargülü	Mediterranean	-	NE	NE	-	-	O
98	Lamiaceae	*Salvia aethiopis*	Habeş Adaçayı	Widespread	-	NE	NE	-	-	O
99	Lamiaceae	*Salvia tomentosa*	Şalba	Mediterranean	-	NE	NE	-	-	O
100	Lamiaceae	*Teucrium chamaedrys*	Kısamahmut	Widespread	-	NE	NE	-	-	O
101	Lamiaceae	*Teucrium polium*	Acıyavşan	Widespread	-	NE	NE	-	-	O
102	Lamiaceae	*Thymus zygioides*	Bodur Kekiği	Mediterranean	-	NE	NE	-	-	O
103	Lamiaceae	*Stachys cretica*	Deliçay	Widespread	-	NE	NE	-	-	O
104	Lamiaceae	*Thymbra spicata*	Zahter	Mediterranean	-	NE	NE	-	-	O
105	Smilacaceae	*Smilax aspera*	Gıcırdikeni	Widespread	-	NE	NE	-	-	O
106	Liliaceae	*Fritillaria bithynica*	Deli Lâle	Mediterranean	-	NE	NE	-	-	O
107	Asparagaceae	*Ruscus aculeatus*	Tavşanmemesi	Widespread	-	NE	NE	-	-	O
108	Liliaceae	*Tulipa armena*	Dağ Lâlesi	Irano-Turanian	-	NE	NE	-	-	O
109	Malvaceae	*Alcea biennis*	Fatmaanagülü	Widespread	-	NE	NE	-	-	O
110	Moraceae	*Ficus carica* subsp. *carica*	İncir	Mediterranean	-	NE	NE	-	-	O
111	Moraceae	*Morus alba*	Ak Dut	Widespread	-	NE	NE	-	-	O
112	Oleaceae	*Phillyrea latifolia*	Akçakesme	Mediterranean	-	LC	NE	-	-	O
113	Papaveraceae	*Papaver rhoeas*	Gelincik	Widespread	-	NE	NE	-	-	O

No	Family	Species	Turkish Name	Phytogeographic Region	Endemism	IUCN	TRDB	BERN	CITES	Literature / Observation
114	Pinaceae	*Cedrus libani*	Katranağacı	Mediterranean	-	VU	NE	-	-	O
115	Pinaceae	*Pinus nigra*	Karaçam	Widespread	-	LC	NE	-	-	O
116	Plantaginaceae	*Plantago lanceolata*	Damarlıca	Widespread	-	NE	NE	-	-	O
117	Platanaceae	*Platanus orientalis*	Çınar	Widespread	-	DD	NE	-	-	O
118	Plumbaginaceae	*Acantholimon acerosum*	Pişikkeveni	Irano-Turanian	-	NE	NE	-	-	O
119	Poaceae	*Aegilops caudata*	Karaot	Mediterranean	-	LC	NE	-	-	O
120	Poaceae	*Avena sativa*	Yulaf	Widespread	-	NE	NE	-	-	O
121	Poaceae	*Brachypodium sylvaticum*	Koru Kılcanı	Euro- Siberian	-	NE	NE	-	-	O
122	Poaceae	*Bromus squarrosus*	Kirpikli Damiye	Widespread	-	NE	NE	-	-	O
123	Poaceae	*Bromus sterilis*	Sağır İlcan	Widespread	-	NE	NE	-	-	O
124	Poaceae	*Bromus tectorum*	Kır Bromu	Widespread	-	NE	NE	-	-	O
125	Poaceae	*Cynodon dactylon* var. *dactylon*	Köpekdişi	Widespread	-	NE	NE	-	-	O
126	Poaceae	*Dactylis glomerata*	Domuzayrığı	Euro- Siberian	-	NE	NE	-	-	O
127	Poaceae	*Eragrostis minor*	Bodur Yulaf	Widespread	-	NE	NE	-	-	O
128	Poaceae	*Festuca valesiaca*	Meşe Yumağı	Widespread	-	NE	NE	-	-	O
129	Poaceae	*Hordeum bulbosum*	Boncuk Arpa	Widespread	-	LC	NE	-	-	O
130	Poaceae	*Phleum phleoides*	Bayır İtkuyruğu	Euro- Siberian	-	NE	NE	-	-	O
131	Poaceae	*Phragmites australis*	Kamış	Euro- Siberian	-	LC	NE	-	-	O
132	Poaceae	*Poa annua*	Salkımotu	Widespread	-	LC	NE	-	-	O
133	Poaceae	*Poa angustifolia*	Dar Salkımotu	Widespread	-	LC	NE	-	-	O
134	Poaceae	*Poa bulbosa*	Yumrulu Salkım	Widespread	-	NE	NE	-	-	O
135	Poaceae	*Secale cereale*	Çavdar	Widespread	-	NE	NE	-	-	O
136	Poaceae	*Triticum aestivum*	Ekmeklik Buğday	Widespread	-	NE	NE	-	-	O
137	Polygonaceae	*Rumex acetosella*	Kuzukulağı	Widespread	-	NE	NE	-	-	O
138	Ranunculaceae	*Ranunculus arvensis*	Mustafaçiçeği	Widespread	-	NE	NE	-	-	O
139	Ranunculaceae	*Ranunculus ficaria*	Arpacıksalebi	Widespread	-	NE	NE	-	-	O
140	Rhamnaceae	*Paliurus spina-christi*	Karaçalı	Widespread	-	NE	NE	-	-	O
141	Rosaceae	*Amygdalus communis*	Badem	Widespread	-	NE	NE	-	-	O
142	Rosaceae	*Crataegus monogyna*	Yemişen	Widespread	-	LC	NE	-	-	O
143	Rosaceae	*Sanguisorba minor*	Çayırdüğmesi	Widespread	-	NE	NE	-	-	O
144	Rosaceae	*Rosa canina*	Kuşburnu	Widespread	-	NE	NE	-	-	O
145	Rosaceae	*Rosa pulverulenta*	Bodur Gül	Widespread	-	NE	NE	-	-	O
146	Rosaceae	*Rubus sanctus*	Böğürtlen	Widespread	-	NE	NE	-	-	O
147	Rosaceae	*Potentilla recta*	Su Parmakotu	Widespread	-	NE	NE	-	-	O
148	Rosaceae	*Prunus domestica*	Erik	Widespread	-	NE	NE	-	-	O
149	Rosaceae	*Pyrus elaeagnifolia* subsp. *elaeagnifolia*	Ahlat	Widespread	-	NE	NE	-	-	O
150	Rubiaceae	*Cruciata taurica*	Kırım Güzeli	Irano-Turanian	-	NE	NE	-	-	O
151	Rubiaceae	*Galium verum*	Boyalık	Euro- Siberian	-	NE	NE	-	-	O

No	Family	Species	Turkish Name	Phytogeographic Region	Endemism	IUCN	TRDB	BERN	CITES	Literature / Observation
152	Santalaceae	*Osyris alba*	Morcak	Mediterranean	-	NE	NE	-	-	O
153	Santalaceae	*Viscum album*	Ökseotu	Widespread	-	NE	NE	-	-	O
154	Orobanchaceae	*Parentucellia latifolia* subsp. *latifolia*	Üçdilotu	Mediterranean	-	NE	NE	-	-	O
155	Solanaecae	*Solanum americanum*	İtüzümü	Widespread	-	NE	NE	-	-	O
156	Styracaceae	*Styrax officinalis*	Ayıfındığı	Widespread	-	LC	NE	-	-	O
157	Tamaricaceae	*Tamarix parviflora*	Deli Ilgın	Mediterranean	-	LC	NE	-	-	O
158	Thymelaeaceae	*Daphne gnidioides*	Sıyırcık	Mediterranean	-	NE	NE	-	-	O
159	Urticaceae	*Urtica dioica*	Isırgan	Widespread or unknown	-	LC	NE	-	-	O
160	Verbenaceae	*Verbena officinalis*	Mineçiçeği	Widespread or unknown	-	NE	NE	-	-	O
161	Violaceae	*Viola kitaibeliana*	Yabani Menekşe	Widespread or unknown	-	NE	NE	-	-	O
162	Violaceae	*Viola parvula*	Tüylü Menekşe	Widespread or unknown	-	NE	NE	-	-	O
163	Zygophyllaceae	*Tribulus terrestris*	Çobançökerten	Widespread or unknown	-	NE	NE	-	-	O

4.1.4 Status of Plants in Terms of Threatened Category and Endemism

The species observed in the survey area have been evaluated according to the IUCN global and the Turkish Red Data Book (TRDB) categories.

According to the TRDB threatened categories, two of the identified plant taxa are classified as "LC (Least Concern)," while the remaining 161 are categorized as "NE (Not Evaluated). The Red Book of Turkish Plants categories, evaluates only rare plant species, both endemic and non-endemic. Therefore, taxa other than endemic or rare plants have not been assessed.(Table 4-9)

According to the global IUCN threatened categories, one of the identified plant taxa Cedar (*Cedrus libani*) is classified as "VU (Vulnerable)," 24 are classified as "LC (Least Concern)," one is classified as "DD (Data Deficient)," and the remaining 137 are classified as "NE (Not Evaluated)."

The Cedar (*Cedrus libani*) is a naturalized species in Türkiye. However, it is not naturally found in the habitats of the project area of influence, but it is used in afforestation efforts within the project area of influence.

The 163 identified taxa are not listed in the appendices of the Bern Convention or the CITES.

The endemic flora species are widespread endemics, meaning they have a broad distribution and are not considered local endemics.

Table 4-9 The endemic species in the Project area of Influence

Species	IUCN	TRDB	BERN	CITES
Astragalus condensatus	NE	LC	-	-
Marrubium globosum subsp. *globosum*	NE	LC	-	-

4.2 Terrestrial Mammal

4.2.1 Boz Mountains Key Biodiversity Area

The KBAs report for the Boz Mountains, along with the online databases and resources reviewed, does not provide specific information regarding the presence of mammal species relevant to the KBA in the region.

4.2.2 Mammals Surveys

The similar data as provided in the ESIA regarding terrestrial mammals has been obtained. A total of 30 mammal species from 15 families were identified within the Project Area of Influence through a combination of field studies, literature reviews, and survey interviews. Among these species, 10 were directly observed during fieldwork, and 20 were identified through a thorough review of existing literature (See Table 4-10).

There is no endemic mammal species among the identified species.

Among the mammal species identified in the Project Area of Influence, 8 species are listed in Annex II of the Bern Convention, 8 species in Annex III, and 3 species in Annex II of CITES. According to the IUCN Red List, no species in the area is classified as endangered, with 1 species categorized as Vulnerable (VU), 2 species categorized as Near threatened (NT), 1 species categorized as Data Deficient (DD). The remaining species are classified as Least Concern (LC), indicating they are not currently at significant risk of extinction.

Marbled polecat (*Vormela peregusna*) is Vulnerable (VU). Its habitat preference (open land, arid, steppe areas) does not majorly overlap with the habitat characteristics of the Project area but it could be a rare occurrence here. Marbled polecat has been recorded as literature data.

Yılkı horses (*Equus caballus*) have been observed around the Project area. In Türkiye, Yılkı horses refer to domestic horse populations that have been released into the wild by humans or have adapted to surviving in natural habitats due to various circumstances.

Yılkı horses are typically observed in herds, particularly in forested and mountainous regions. Within the ecosystem, their herbivorous feeding habits can influence vegetation, and they may serve as prey for predators. However, due to their lack of exposure to natural selection processes, they pose risks to health and genetic diversity. While Yılkı horses do not have a specific conservation status in Turkey, various management plans are being developed to address their impact on ecological balance and their interactions with humans. It would not be accurate to classify Yılkı horses observed in the project area as wild animals.

Table 4-10 Terrestrial Mammal Taxa and Threatened Categories Identified in the Project Area of Influence

Family	Species Name	English Name	Endemism	IUCN	BERN	CITES	Monitoring Criteria	Observation / Literature
Erinaceidae	*Erinaceus concolor*	Southern White-breasted Hedgehog	-	LC		-	-	L / O
Soricidae	*Neomys anomalus*	Southern Water Shrew	-	LC	Ann -II			L
Soricidae	*Suncus etruscus*	Etruscan Shrew	-	LC	Ann -II			L
Talpidae	*Talpa levantis*	Levantine Mole	-	LC	Ann -III	-	-	L
Leporidae	*Lepus europaeus*	European Hare	-	LC	Ann -III	-	-	L / O
Sciuridae	*Sciurus anomalus*	Caucasian Squirrel	-	LC	Ann -III	-	-	L / O
Sciuridae	*Spermophilus xanthoprymnus*	Anatolian Souslik-Ground Squirrel	-	NT	-	-	-	L
Cricetidae	*Arvicola amphibius*	Water Vole	-	LC	-	-	-	L
Muridae	*Microtus guentheri*	Guenther’s Vole	-	LC	-	-	-	L / O
Muridae	*Microtus subterraneus*	European Pine Vole	-	LC	-	-	-	L
Muridae	*Mesocricetus brandti*	Turkish Hamster	-	NT	-	-	-	L
Muridae	*Apodemus mystacinus*	Broad-toothed Field Mouse	-	LC	-	-	-	L
Muridae	*Apodemus sylvaticus*	Wood Mouse	-	LC	-	-	-	L / O
Muridae	*Rattus rattus*	Black Rat	-	LC	-	-	-	L / O
Muridae	*Rattus norvegicus*	Brown Rat	-	LC	-	-	-	L
Spalacidae	*Nannospalax leucodon*	Lesser Mole Rat	-	DD	-	-	-	L
Gliridae	*Dryomys nitedula*	Forest Dormouse	-	LC	Ann -II	-	-	L
Canidae	*Canis lupus*	Grey Wolf	-	LC	Ann -II	Ann -II	-	L
Canidae	*Canis aureus*	Golden Jackal	-	LC	-	-	-	L
Canidae	*Vulpes vulpes*	Red Fox	-	LC	-	-	-	L / O
Ursidae	*Ursus arctos*	Brown Bear	-	LC	Ann -III	Ann -II	-	L
Mustelidae	*Mustela nivalis*	Least Weasel	-	LC	Ann -III	-	-	L / O
Mustelidae	*Vormela peregusna*	Marbled Polecat	-	VU	Ann -III	-	-	L

Mustelidae	*Martes martes*	Pine Marten	-	LC	Ann -II	-	-	L
Mustelidae	*Martes foina*	Beech Marten	-	LC	Ann -III	-	-	L / O
Mustelidae	*Meles meles*	European Badger	-	LC	Ann -III	-	-	L
Felidae	*Felis silvestris*	Wildcat	-	LC	Ann -II	-	-	L
Felidae	*Lynx lynx*	Eurasian Lynx	-	LC	Ann -II	Ann -II	-	L
Suidae	*Sus scrofa*	Boar	-	LC		-	-	L / O
Cervidae	*Capreolus capreolus*	Roe Deer	-	LC	Ann -II	-	-	L
Equidae	*Equus caballus*	Feral Horse	-	NE	-	-	-	L / O

4.3 Herpetofauna

4.3.1 Boz Mountains Key Biodiversity Area

The KBAs report for the Boz Mountain, along with the online databases and resources reviewed, does not provide specific information regarding the presence of mammal species relevant to the KBA in the region.

4.3.2 Amphibia

The similar data as provided in the ESIA regarding amphibia has been obtained. A total of 10 amphibia species from 5 families were identified within the Project Area of Influence through a combination of field studies, literature reviews, and survey interviews. Among these species, 3 were directly observed during fieldwork, and 7 were identified through a thorough review of existing literature. (See Table 4-11).

There is no endemic amphibia species among the identified species.

Among the amphibia species identified in the Project Area of Influence, 4 species are listed in Annex II of the Bern Convention, 5 species in Annex III. According to the IUCN Red List, no species in the area are classified as endangered. All species are classified as Least Concern (LC), indicating they are not currently at significant risk of extinction. According to the CITES Convention, none of the nine species are listed in the annexes.

During the field survey, no permanent water sources, such as ponds, were observed within the project area. However, water channels formed by excessive irrigation around agricultural fields, where the identified species were observed.

4.3.3 Reptilia

The similar data as provided in the ESIA regarding Reptilia has been obtained. A total of 24 Reptilia species from 8 families were identified within the Project Area of Influence through a combination of field studies, literature reviews, and survey interviews. Among these species, 6 were directly observed during fieldwork, and 18 were identified through a thorough review of existing literature. (See Table 4-12)

There is no endemic reptile species among the identified species.

Among the Reptilia species identified in the Project Area of Influence, 11 species are listed in Annex II of the Bern Convention, 13 species in Annex III. According to the IUCN Red List, no species in the area are classified as endangered.

Except for one species, the remaining species are classified as Least Concern (LC) by the IUCN, indicating they are not currently at significant risk of extinction. One species, *Testudo graeca*, is classified as 'VU (Vulnerable)' under the IUCN criteria and CITES Annex-II. Additionally, according to the CITES Convention, only 1 of the 24 species is listed in its annexes.

Table 4-11 Amphibia Taxa and Threatened Categories Identified in the Project Area of Influence

Family	Species Name	English Name	Endemism	IUCN	BERN	CITES	Monitoring Criteria	Observation / Literature
Salamandridae	*Triturus karelinii*	Southern crested newt	-	LC	Ann -II	-	-	L
Pelobatidae	*Pelobates syriacus*	Eastern spadefoot	-	LC	Ann -II	-	-	L
Bufonidae	*Bufo bufo*	Common Toad	-	LC	Ann-III	-	-	L / O
Bufonidae	*Bufotes viridis*	European green toad	-	LC	Ann -II	-	-	L / O
Hylidae	*Hyla orientalis*	Eastern tree frog	-	LC	Ann -III	-	-	L
Ranidae	*Pelophylax ridibundus*	Marsh frog	-	LC	Ann -III	-	-	L / O
Ranidae	*Rana macrocnemis*	Long-legged wood frog	-	LC	Ann -III	-	-	L
Ranidae	*Pelophylax bedriagae*	Levant water frog	-	LC	Ann -III	-	-	L
Ranidae	*Rana tavasensis*	Tavas Mountain Frog	-	LC	Ann -III	-	-	L

Table 4-12 Reptilia Taxa and Threatened Categories Identified in the Project Area of Influence

Family	Species Name	English Name	Endemism	IUCN	BERN	CITES	Monitoring Criteria	Observation / Literature
Testudinidae	*Testudo graeca*	Spur-Thighed Tortoise	-	VU	Ann -II	Ann -II	X	O / L
Gekkonidae	*Hemidactylus turcicus*	Mediterranean House Gecko	-	LC	Ann -III	-	-	L
Agamidae	*Stellagama stellio*	Starred Agama	-	LC	Ann -II	-	-	O / L
Anguidae	*Pseudopus apodus*	Sheltopusik	-	LC	Ann -II	-	-	L
Scincidae	*Ablepharus kitaibelii*	European Copper Skink	-	LC	Ann -II	-	-	L
Scincidae	*Heremites auratus*	Levant Skink	-	LC	Ann -III	-	-	L
Lacertidae	*Podarcis muralis*	Common Wall Lizard	-	LC	Ann -II	-	-	L
Lacertidae	*Anatololacerta anatolica*	Anatolian Rock Lizard	-	LC	Ann -III	-	-	O / L
Lacertidae	*Anatololacerta oertzeni*	Rock Lizard	-	LC	Ann -III	-	-	L
Lacertidae	*Parvilacerta parva*	Dwarf Lizard	-	LC	Ann -III	-	-	L
Lacertidae	*Lacerta diplochondrodes*	Rhodos Green Lizard	-	LC	Ann -III	-	-	L
Lacertidae	*Ophisops elegans*	Snake-Eyed Lizard	-	LC	Ann -II	-	-	O / L
Lacertidae	*Blanus strauchi*	Turkish Worm Lizard	-	LC	Ann -II	-	-	L
Boidae	*Eryx jaculus*	Javelin Sand Boa	-	LC	Ann -III	-	-	L
Colubridae	*Dolichophis caspius*	Caspian Whipsnake	-	LC	Ann -III	-	-	L
Colubridae	*Coluber jugularis*	Large Whip Snake	-	LC	Ann -II	-	-	L
Colubridae	*Platyceps najadum*	Dahl's Whip Snake	-	LC	Ann -II	-	-	L
Colubridae	*Hemorrhois nummifer*	Coin-Marked Snake	-	LC	Ann -III	-	-	L
Colubridae	*Platyceps collaris*	Red Whip Snake	-	LC	Ann -III	-	-	L
Colubridae	*Eirenis modestus*	Ring-Headed Dwarf Snake	-	LC	Ann -III	-	-	O / L
Colubridae	*Elaphe sauromates*	Eastern Four-Lined Ratsnake	-	LC	Ann -III	-	-	L
Colubridae	*Zamenis situla*	European Ratsnake	-	LC	Ann -II	-	-	L
Colubridae	*Malpolon insignitus*	Eastern Montpellier Snake	-	LC	Ann -III	-	-	L
Viperidae	*Montivipera xanthina*	Ottoman Viper	-	LC	Ann -II	-	-	L

4.4 Bird

4.4.1 Vantage Point Observations

VP methodology records bird “contacts” and the results therefore are expected to feature repeat “contacts” of the same individuals especially for resident species.

Spring

During spring VP surveys, a total of 198 bird contacts were detected at the site (Table 4-13). The three most common species observed were the Long-legged Buzzard (*Buteo rufinus*) with 60 individuals, the Eurasian Kestrel (*Falco tinnunculus*) with 44 contacts, and the Common Buzzard (*Buteo buteo*) also with 44 contacts. Residents were more common than migrants, with 189 residents and 9 migrants recorded. Among the species observed, no globally threatened breeding species were recorded.

Table 4-13 Total number of soaring migratory and resident bird species observed in spring 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Total
Long-legged Buzzard	Buteo rufinus	LC	-	60	60
Eurasian Kestrel	Falco tinnunculus	LC	-	44	44
Common Buzzard	Buteo buteo	LC	-	44	44
Short-toed Snake-Eagle	Circaetus gallicus	LC	4	18	22
Eleonora's Falcon	Falco eleonorae	LC	-	10	10
Eurasian Marsh-Harrier	Circus aeruginosus	LC	5	-	5
unidentified Raptor	Accipitridae xx	-	-	5	5
Peregrine Falcon	Falco peregrinus	LC	-	5	5
unidentified Falcon	Falco spec.	-	-	2	2
Northern Goshawk	Accipiter gentilis	LC	-	1	1
Total	-	-	9	189	198

During the spring of 2024, an extensive survey averaging approximately 41 hours and 33 minutes were conducted per vantage point. Over this period, 9 birds were identified as migrants. The migration rate was determined as 0.22 birds/hour for the spring migratory season.

Among the birds observed, 152 (about 77% of all observed birds) were reported to fly at risk zone (both fly at rotor height and below and 500 m buffer of the project site) (Table 4-14). Majority of birds that entered the risk zone were resident. The species that most frequently entered the risk zone was Long-legged Buzzard (*Buteo rufinus*). However, these numbers do not represent unique birds and contain multiple reports of the same bird for residents.

Table 4-14 Resident and migrant bird occurrences at risk zone in spring 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Total
Long-legged Buzzard	Buteo rufinus	LC	-	47	47
Common Buzzard	*Buteo buteo*	LC	-	41	41
Eurasian Kestrel	*Falco tinnunculus*	LC	-	39	39
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	-	13	13
Peregrine Falcon	*Falco peregrinus*	LC	-	4	4
Eleonora's Falcon	*Falco eleonorae*	LC	-	2	2
Eurasian Marsh-Harrier	*Circus aeruginosus*	LC	2	-	2
unidentified Falcon	*Falco spec.*	-	-	2	2

Common Name	Scientific Name	IUCN	Migrant	Resident	Total
unidentified Raptor	*Accipitridae xx*	-	-	1	1
Northern Goshawk	*Accipiter gentilis*	LC	-	1	1
Total	-	-	2	150	152

Figure 4-2 Long-legged Buzzard observed at the project site (photo: Mehmet Yavuz)

Summer

During summer VP surveys, a total of 393 bird contacts were detected at the site (Table 4-15). The most frequently encountered species was the Common Buzzard (*Buteo buteo*), with 160 contacts observed, all of which were residents. Other notable observations included the Lesser Kestrel (*Falco naumanni*) with 106 resident contacts. Additionally, Eleonora's Falcon (*Falco eleonorae*) was frequently observed in small groups, typically consisting of 3–4 individuals. No threatened and migrant species were observed during summer VP surveys.

Table 4-15 Total number of soaring migratory and resident bird species observed in summer 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Total
Common Buzzard	*Buteo buteo*	LC	-	160	160
Lesser Kestrel	*Falco naumanni*	LC	-	106	106
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	-	46	46
Eleonora's Falcon	*Falco eleonorae*	LC	-	34	34
Long-legged Buzzard	*Buteo rufinus*	LC	-	30	30
Peregrine Falcon	*Falco peregrinus*	LC	-	8	8
European Honey-buzzard	*Pernis apivorus*	LC	-	3	3
Eurasian Sparrowhawk	*Accipiter nisus*	LC	-	3	3
unidentified Raptor	*Accipitridae xx*	-	-	3	3
Total	-	LC	0	393	393

During the summer of 2024, a survey averaging approximately 35 hours and 19 minutes was conducted per vantage point. Over this period, no migrant bird was identified. The migration rate was determined to be 0 birds per hour for the summer season.

Among the birds observed, 340 (about 87% of all observed birds) were reported to fly at risk zone (both fly at rotor height and below and 500 m buffer of the project site) (Table 4-16). The species that most frequently entered the risk zone was Common Buzzard (*Buteo buteo*). However, these numbers do not represent unique birds and contain multiple reports of the same bird for residents.

Table 4-16 Resident and migrant bird occurrences at risk zone in summer 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Total
Common Buzzard	Buteo buteo	LC	-	128	128
Lesser Kestrel	Falco naumanni	LC	-	106	106
Eleonora's Falcon	Falco eleonorae	LC	-	33	33
Short-toed Snake-Eagle	Circaetus gallicus	LC	-	31	31
Long-legged Buzzard	Buteo rufinus	LC	-	29	29
Peregrine Falcon	Falco peregrinus	LC	-	6	6
unidentified Raptor	Accipitridae xx	-	-	3	3
European Honey-buzzard	Pernis apivorus	LC	-	2	2
Eurasian Sparrowhawk	Accipiter nisus	LC	-	2	2
Total	-	-	0	340	340

Autumn

During autumn VP surveys, a total of 374 birds were detected at the site (Table 4-17). The most frequently encountered species was the Eurasian Kestrel (*Falco tinnunculus*), with 136 contacts observed. Other notable observations included the Common Buzzard (*Buteo buteo*) and Short-toed Snake-Eagle (*Circaetus gallicus*) with 88 and 59 contacts, respectively. No threatened species were observed during autumn VP surveys.

Table 4-17 Total number of soaring migratory and resident bird species observed in autumn 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Total
Eurasian Kestrel	Falco tinnunculus	LC	1	135	136
Common Buzzard	Buteo buteo	LC	3	85	88
Short-toed Snake-Eagle	Circaetus gallicus	LC	-	59	59
European Honey-buzzard	Pernis apivorus	LC	27	3	30
Peregrine Falcon	Falco peregrinus	LC	-	12	12
Eurasian Sparrowhawk	Accipiter nisus	LC	5	9	14
Long-legged Buzzard	Buteo rufinus	LC	-	7	7
Eleonora's Falcon	Falco eleonorae	LC	-	6	6
Eurasian Marsh-Harrier	Circus aeruginosus	LC	5	1	6
unidentified Raptor	Accipitridae xx	-	2	4	6
Booted Eagle	Hieraaetus pennatus	LC	-	3	3
unidentified Falcon	Falco spec.	-	-	3	3
Northern Goshawk	Accipiter gentilis	LC	-	2	2
Montagu's Harrier	Circus pygargus	LC	2	-	2

Common Name	Scientific Name	IUCN	Migrant	Resident	Total
Total	-	-	45	329	374

During the autumn of 2024, a survey averaging approximately 60 hours and 19 minutes was conducted per vantage point. Over this period, 45 bird was identified as a migrant. The migration rate was determined to be 0,75 birds per hour for the autumn season. European Honey-buzzard was a notable migrant for 2024 autumn surveys. The species activity began on the third week of August with the last migrant recorded on the first week of October. The species was mostly recorded as individual migrants, with a couple instances of 2-4 birds seen together, however 12 individuals were recorded at the same time on 24 August.

Among the birds observed, 302 (about 81% of all observed birds) were reported to fly at risk zone (both fly at rotor height and below and 500 m buffer of the project site) (Table 4-18). The species that most frequently entered the risk zone was Eurasian Kestrel (*Falco tinnunculus*). However, these numbers do not represent unique birds and contain multiple reports of the same bird for residents.

Table 4-18 Resident and migrant bird occurrences at risk zone in autumn 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Total
Eurasian Kestrel	Falco tinnunculus	LC	-	119	119
Common Buzzard	Buteo buteo	LC	-	69	69
Short-toed Snake-Eagle	Circaetus gallicus	LC	-	47	47
European Honey-buzzard	Pernis apivorus	LC	21	2	23
Peregrine Falcon	Falco peregrinus	LC	-	10	10
Eurasian Sparrowhawk	Accipiter nisus	LC	5	7	12
Eleonora's Falcon	Falco eleonorae	LC	-	5	5
Long-legged Buzzard	Buteo rufinus	LC	-	4	4
Booted Eagle	Hieraaetus pennatus	LC	-	2	2
Eurasian Marsh-Harrier	Circus aeruginosus	LC	2	1	3
unidentified Falcon	Falco spec.	-	-	2	2
unidentified Raptor	Accipitridae xx	-	-	2	2
Northern Goshawk	Accipiter gentilis	LC	-	2	2
Montagu's Harrier	Circus pygargus	LC	2	-	2
Total	-	-	30	272	302

4.4.2 ETL Observations

Spring

During the spring 2024 surveys at VP ETL points, a total of 99 birds were detected across various species (Table 4-19). Out of these, 32 birds, which account for approximately 34% of the total, were observed flying at the height of the transmission lines, placing them at potential risk of collision. The most common species observed was the Common Buzzard (*Buteo buteo*), with 31 individuals detected and 19 of them flying at risk height. Other notable species include the Short-toed Snake-Eagle (*Circaetus gallicus*) with 22 individuals observed, 5 of which were at risk height, and the Long-legged Buzzard (*Buteo rufinus*) with 17 individuals, 3 of which were at risk height. Besides, Ruddy Shelduck (*Tadorna ferruginea*) was observed with 3 individuals, 1 of which were at risk height at TL1 point.

With the available data, bird passages are distributed fairly uniform along the route of the transmission line.

Table 4-19 Total number of bird species observed at VP ETL points at risk height in spring 2024.

Common Name	Scientific Name	Status	IUCN	VP ETL1	VP ETL2	VP ETL3	Total
Common Buzzard	*Buteo buteo*	Resident	LC	7	10	2	19
Short-toed Snake-Eagle	*Circaetus gallicus*	Resident	LC	5	-	-	5
Long-legged Buzzard	*Buteo rufinus*	Resident	LC	3	-	-	3
Eurasian Kestrel	*Falco tinnunculus*	Resident	LC	2	-	-	2
Northern Goshawk	*Accipiter gentilis*	Resident	LC	-	1	1	2
Ruddy Shelduck	*Tadorna ferruginea*	Resident	LC	1	-	-	1
Total				18	11	3	32

Summer

During the summer 2024 surveys at VP ETL points, a total of 109 birds were detected across various species. Out of these, 42 birds, which account for approximately 38% of the total, were observed flying at the height of the transmission lines, placing them at potential risk of collision (Table 4-20). The most common species observed was the Common Buzzard (*Buteo buteo*), with 67 individuals detected and 25 of them flying at risk height.

Table 4-20 Total number of bird species observed at VP ETL points at risk height in Summer 2024.

Common Name	Scientific Name	Status	IUCN	VP ETL1	VP ETL2	VP ETL3	Total
Common Buzzard	*Buteo buteo*	Resident	LC	10	8	7	25
Eleonora's Falcon	*Falco eleonorae*	Resident	LC	-	7	2	9
Eurasian Kestrel	*Falco tinnunculus*	Resident	LC	-	-	5	5
Northern Goshawk	*Accipiter gentilis*	Resident	LC	-	2	-	2
Short-toed Snake-Eagle	*Circaetus gallicus*	Resident	LC	1	-	-	1
Total	-		-	11	17	14	42

Autumn

During the autumn 2024 surveys at VP ETL points, a total of 119 birds were detected across various species. Out of these, 42 birds, which account for approximately 35% of the total, were observed flying at the height of the transmission lines, placing them at potential risk of collision. The most common species observed was the Common Buzzard (*Buteo buteo*), with 39 individuals detected and 13 of them flying at risk height. (Table 4-21).

Table 4-21 Total number of bird species observed at VP ETL points at risk height in Autumn 2024.

Common Name	Scientific Name	IUCN	Status	VP ETL1	VP ETL2	VP ETL3	Total
Common Buzzard	*Buteo buteo*	Resident	LC	7	5	1	13
Eurasian Sparrowhawk	*Accipiter nisus*	Resident	LC	5	5	-	10
Eurasian Kestrel	*Falco tinnunculus*	Resident	LC	3	-	5	8
Short-toed Snake-Eagle	*Circaetus gallicus*	Resident	LC	2	2	-	4
Unidentified Falcon	*Falco sp.*	Resident	-	1	1	-	2
Unidentified Raptor	*Accipiteridae xx*	Resident	-	1	1	-	2
Northern Goshawk	*Accipiter gentilis*	Resident	LC	-	2	-	2
European Honey-buzzard	*Pernis apivorus*	Migrant	LC	1	-	-	1

Common Name	Scientific Name	IUCN	Status	VP ETL1	VP ETL2	VP ETL3	Total
Total	-		-	20	16	6	42

Summary

Across the three seasons, a total of 324 birds were observed, with 116 individuals (approximately 36%) recorded flying at the height of the transmission lines and therefore considered at potential risk. However, the species observed at risk height were predominantly common and widespread species with a "Least Concern" (LC) conservation status, such as the Common Buzzard (*Buteo buteo*), Eurasian Sparrowhawk (*Accipiter nisus*), and Eurasian Kestrel (*Falco tinnunculus*) (Table 4-22).

Table 4-22 Total number of bird species observed across all VP ETL surveys.

Common Name	Scientific Name	IUCN	VPTL1	VP ETL2	VP ETL3	Total
Common Buzzard	*Buteo buteo*	LC	52	33	52	137
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	27	11	13	51
Eurasian Kestrel	*Falco tinnunculus*	LC	5	2	18	25
Long-legged Buzzard	*Buteo rufinus*	LC	14	-	8	22
Eleonora's Falcon	*Falco eleonorae*	LC	2	14	2	18
European Honey-buzzard	*Pernis apivorus*	LC	14	2	1	17
Eurasian Sparrowhawk	*Accipiter nisus*	LC	7	8	1	16
Northern Goshawk	*Accipiter gentilis*	LC	2	6	2	10
Eurasian Marsh-Harrier	*Circus aeruginosus*	LC	5	2	1	8
Unidentified Falcon	*Falco sp.*	-	5	3	-	8
Unidentified Raptor	*Accipiter xx*	-	2	4	-	6
Peregrine Falcon	*Falco peregrinus*	LC	-	-	2	2
Black Stork	*Ciconia nigra*	LC	1	-	-	1
Lesser Kestrel	*Falco naumanni*	LC	-	-	1	1
White Stork	*Ciconia ciconia*	LC	1	-	-	1
Unidentified Harrier	*Circus sp.*	-	1	-	-	1
Total	-	-	138	85	101	324

Based on the surveys conducted during spring, summer, and autumn of 2024, the overall risk of bird collisions with the energy transmission lines (TL1, TL2, and TL3) is assessed as low. Furthermore, the distribution of bird activity along the transmission line route appeared uniform, with no significant hotspots of high risk identified. This suggests that, while there is some interaction between bird species and the transmission lines, the potential for significant collision impact remains minimal. (Table 4-23)

Table 4-23: Risk quantification values of each VP ETL point based on passage rates.

Season	VP ETL1	VP ETL2	VP ETL3
Spring	0,28	0,33	0,10
Summer	0,27	0,34	0,25
Autumn	0,35	0,33	0,12
Average	0,30	0,33	0,15

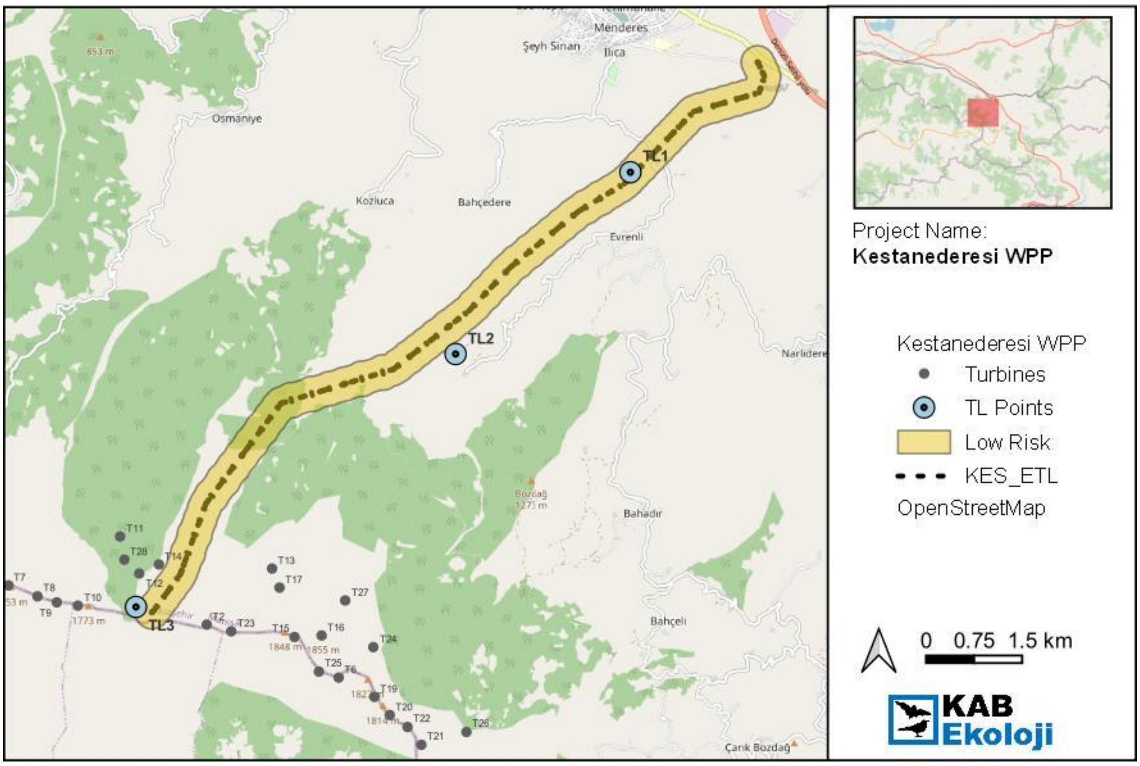


Figure 4-3 ETL segment risk assessment

4.4.3 Collision Risk Model

For collision risk model, the average time spent at each VP for each season was utilized. It would be the most optimal and would provide the best possible results if the individual VP efforts are very similar. However often in field conditions survey effort at each VP may vary due to logistics, weather, surveyor wellbeing and other circumstances that may arise. While bigger differences in survey effort may degrade the predictive power of the model at locations where target bird species are highly active, where activity is even and at low – moderate levels the model's estimations are not considered significantly. Please also refer to Appendix 6.12 for further study of VP effort averaging.

VP observations, where appropriate, ran in parallel to ETL observations to optimize field survey schedules, if shared VPs were available Similar to the first point, while for busy airspaces (such as major migration routes) this would have a negative impact on study results, at locations lower rates of activity, the two methodologies are compatible and do not detract from survey effort. This is due to NatureScot methodology not involving continuous surveillance of the airspace, but rather surveillance at intervals (every 5 minutes). The two methodologies can be stacked due to the interval observations approach.

Total daylight hours in each season are calculated based on 12 hours for residents and 10 hours for migrants. This is a practice that enhances the predictive power of the model which is backed by studies of migrant behaviour from Istanbul migration counts. Migrant soaring species, relative to their resident counterparts, are mostly inactive before the sun is higher and the thermal air currents are better developed since energy conservation during migration is of critical importance. This behaviour is reflected in the hourly distribution of bird passages in most raptor counts (typically between 09:00 and 17:00). Therefore, 2 hours from daylight are subtracted to reflect migrant active hours in the model. There are one published and two unpublished reports on the bird migration over the Bosporus, which also features analysis of the hourly distribution of birds.[11][12][13]

Spring

Sample collision risk calculation for migrant species is shown in Table 4-24. Calculation for all species with risk above 0 is shown on Table 4-25.

Table 4-24 Mortality rate calculation for migrant species in detail.

Variable	Value	Unit
Species	Eurasian Marsh-Harrier	
Recorded number of birds at risk height/zone	2	birds
Duration of observation	41,55	hr/VP
Study Period	2024-03-01	
	2024-06-15	
Total migration hours	1070	hr
Estimated number of birds at risk height/zone (n)	52	birds

[11] Üner, Ö., Boyla, K.A., Bacak, E., Birel, E., Çelikoba, İ., Dalyan, C., Tabur, E. & Yardım, Ü. (2006). Spring migration of soaring birds over the Bosphorus, Turkey, in 2006. Sandgrouse 32.

[12] İKGT. (2010). 2010 İstanbul Boğazı Kuş Göçü Sayımları. İstanbul Kuş Gözlem Topluluğu, İstanbul.

[13] Bilgin, S., Boyla, K.A. & Topluluğu, İ.K.G. (2011). İstanbul Boğazı Göçü–İlkbahar 2011. İstanbul Kuş Gözlem Topluluğu, İstanbul.

Variable	Value	Unit
N	28	
width	11299	m
height	180	m
W	2033820	m2
A	418799,4	m2
A/W	21%	%
n x (A/W)	10,71	birds
P. Probability of bird being hit when flying through the rotor	0,09	
Mortality rate without avoidance	0,99	birds
(1 - avoidance rate)	0,02	
Mortality estimation per year	0,02	birds

Table 4-25 The estimated mortality rates of migrant species in spring 2024 (mort. w/o avo.: mortality without avoidance, mort. w/ avo.: mortality with avoidance)

Common Name	observed	# observed	# thru rotors	Mort. w/o avo.	Mort. w/ avo.
Eurasian Marsh-Harrier	2	51,51	10,7	0,98	0,02
TOTAL	2	51,51	10,7	0,98	0,02

Sample collision risk calculation for resident species is shown in Table 4-26. Calculation for all species with risk above 0 is shown on Table 4-27.

Table 4-26 Mortality rate calculation for resident species in detail.

Variable	Value	Unit
Species	Eurasian Kestrel	
Total duration of individual bird observations	2523,6	sec
Total duration of observations	41,55	hr/VP
Study Period	2024-03-01	
	2024-06-15	
Total migration hours	1284	hr
Estimated total birds x seconds	77993,41	bird x sec
N	28	
Area	13555041	m2
height	180	m
Vw	2439907380	m3
Sweeping Area	422449,1	m2
r	69,3	m
d	4	m
L	0,34	m
Vr = N x πR2 x (d + l)	1833429	m3
n	77993,41	sec
n x (Vr / Vw)	58,61	sec
v	10,1	m/s
t = (d + l) / v	0,43	sec
n x (Vr / Vw) / t	136,39	birds
Probability of bird being hit when flying through the rotor	0,09	

Variable	Value	Unit
Mortality rate without avoidance	12,68	birds
(1 - avoidance rate)	0,02	
Mortality estimation for study period	0,25	birds

Table 4-27 The estimated mortality rates of resident species in spring 2024 (mort. w/o avo.: mortality without avoidance, mort. w/ avo.: mortality with avoidance)

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Eurasian Kestrel	2524	77993	59	136	12,68	0,25
Long-legged Buzzard	2446	75593	59	152	13,97	0,28
Common Buzzard	1818	56172	44	113	10,6	0,21
Short-toed Snake-Eagle	214	6600	5	15	1,33	0,03
Eleonora's Falcon	123	3804	3	8	0,65	0,01
Others	217	6703	5	13	1,22	0,02
TOTAL	7341	226867	176	438	40,46	0,81

Summer

The mortality rate for migrant species was not calculated as no migrants were observed during summer. Sample collision risk calculation for resident species is shown in Table 4-28. Calculation for all species with risk above 0 is shown on Table 4-29.

Table 4-28 Mortality rate calculation for resident species in detail (summer).

Variable	Value	Unit
Species	Lesser Kestrel	
Total duration of individual bird observations	27788,27	sec
Total duration of observations	35,33	hr/VP
Study Period	2024-06-16	
	2024-08-18	
Total migration hours	768	hr
Estimated total birds x seconds	604072,9	bird x sec
N	28	
Area	13555041	m2
height	180	m
Vw	2439907380	m3
Sweeping Area	422449,1	m2
r	69,3	m
d	4	m
L	0,3	m
Vr = N x πR2 x (d + l)	1816531	m3
n	604072,9	sec
n x (Vr / Vw)	449,74	sec
v	11,3	m/s
t = (d + l) / v	0,38	sec
n x (Vr / Vw) / t	1181,87	birds
Probability of bird being hit when flying through the rotor	0,08	
Mortality rate without avoidance	95,73	birds

Variable	Value	Unit
(1 - avoidance rate)	0,02	
Mortality estimation for study period	1,91	birds

Table 4-29 The estimated mortality rates of resident species in summer 2024 (mort. w/o avo.: mortality without avoidance, mort. w/ avo.: mortality with avoidance)

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Lesser Kestrel	27788	604073	450	1182	95,73	1,91
Common Buzzard	6561	142634	113	286	26,93	0,54
Eleonora's Falcon	4589	99761	76	221	17,02	0,34
Eurasian Kestrel	4078	88642	67	155	14,42	0,29
Short-toed Snake-Eagle	1901	41326	33	96	8,34	0,17
Others	1531	33275	26	67	6,09	0,12
Total	46448	1009711	765	2008	168,53	3,37

Autumn

Sample collision risk calculation for migrant species is shown in Table 4-30. Calculation for all species with risk above 0 is shown on Table 4-31.

Table 4-30 Mortality rate calculation for migrant species in detail (Autumn).

Variable	Value	Unit
Species	European Honey-buzzard	
Recorded number of birds at risk height/zone	21	birds
Duration of observation	60,32	hr/VP
Study Period	2024-08-19	
	2024-11-15	
Total migration hours	890	hr
Estimated number of birds at risk height/zone (n)	309,84	birds
N	28	
width	11299	m
height	180	m
W	2033820	m2
A	422449,1	m2
A/W	0,21	%
n x (A/W)	64,36	birds
P. Probability of bird being hit when flying through the rotor	0,09	
Mortality rate without avoidance	5,6	birds
(1 - avoidance rate)	0,02	
Mortality estimation per year	0,11	birds

Table 4-31 The estimated mortality rates of migrant species in Autumn 2024 (mort. w/o avo.: mortality without avoidance, mort. w/ avo.: mortality with avoidance)

Common Name	observed	# observed	# thru rotors	Mort. w/o avo.	Mort. w/ avo.
European Honey-buzzard	21	309,84	64,36	5,60	0,11
Eurasian Sparrowhawk	5	73,77	15,32	1,29	0,03

Common Name	observed	# observed	# thru rotors	Mort. w/o avo.	Mort. w/ avo.
Eurasian Marsh-Harrier	2	29,51	6,13	0,56	0,01
Montagu's Harrier	2	29,51	6,13	0,72	0,01
Total	30	442,63	91,94	8,17	0,16

Sample collision risk calculation for resident species is shown in Table 4-32. Calculation for all species with risk above 0 is shown on Table 4-33.

Table 4-32 Mortality rate calculation for resident species in detail (Autumn).

Variable	Value	Unit
Species	Eurasian Kestrel	
Total duration of individual bird observations	9066,4	sec
Total duration of observations	60,32	hr/VP
Study Period	2024-08-19	
	2024-11-15	
Total migration hours	1068	hr
Estimated total birds x seconds	160523,6	bird x sec
N	28	
Area	13555041	m2
height	180	m
Vw	2439907380	m3
Sweeping Area	422449,1	m2
r	69,3	m
d	4	m
L	0,34	m
Vr = N x πR2 x (d + l)	1833429	m3
n	160523,6	sec
n x (Vr / Vw)	120,62	sec
v	10,1	m/s
t = (d + l) / v	0,43	sec
n x (Vr / Vw) / t	280,71	birds
Probability of bird being hit when flying through the rotor	0,09	
Mortality rate without avoidance	26,11	birds
(1 - avoidance rate)	0,02	
Mortality estimation for study period	0,52	birds

Table 4-33 The estimated mortality rates of resident species in Autumn 2024 (mort. w/o avo.: mortality without avoidance, mort. w/ avo.: mortality with avoidance)

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Eurasian Kestrel	9066	160524	121	281	26,11	0,52
Common Buzzard	3790	67107	53	135	12,67	0,25
Short-toed Snake-Eagle	3404	60266	49	140	12,16	0,24
Peregrine Falcon	661	11707	9	25	2,06	0,04
Booted Eagle	289	5121	4	10	0,9	0,02
Others	855	15146	12	31	2,65	0,05

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Total	18066	319869	247	621	56,55	1,13

4.4.4 Additive Collision Risk (Project Galeforce)

Since each WPP within the financial package is a project of Project Galeforce consisting of 9 WPPs, the Lenders would like an evaluation of avian collision risks of the package in its entirety. The additive collision risk which is a collation of collision risk estimation results from each project are presented in this section.

It should be noted that this section presents an “additive” collision risk evaluation, not a “cumulative” evaluation. Previously, the Consultant has provided a regional, high-level, qualitative assessment for the Project. In this assessment, the Project’s potential impact on the migratory flyways was considered. Submitted qualitative assessment in ESIA Report for each project’s Chapter 17 was based on Gauld et al (2022) study[14] where collision vulnerability of migratory species is identified which was also restricted by the lack of data for majority of the grids for the regional assessment.

The main limitations regarding a qualitative Cumulative Collision Risk for the Project are (1) WPPs in Türkiye either do not carry out collision risk assessments or mortality studies, or do not carry those up to IFI standards, or if conducted, do not publicly disclose such studies, and this leads to (2) a lack of credible publications on mortality risks for WPPs in Türkiye which the quantitative cumulative assessment for Project Galeforce would have benefitted from in terms of data points.

Furthermore, (3) a regional level Cumulative CRA requires an understanding of how the WPPs in the region might potentially synergize, publications on which are not available from the region either. (4) Due to the vast geographical extent of the Project Galeforce, the variety of terrain and habitats, etc., gathering the data needed for a quantitative cumulative assessment is a high effort and long-term task.

Finally, (5) a cumulative risk assessment of the 9 WPPs would need to include rates associated with ETL collision mortality since those are considered project components, the quantitative data for which is also scarce from the region, and modelling methods, such as those associated with turbine mortality, are not well established in literature. These limitations must be considered if a cumulative collision risk assessment is to be undertaken in the future.

For the additive assessment section of the interim reports, National EIA data was incorporated into the evaluations for the purpose of having as little data gap as possible. However, it was already well established that the National EIA collision risk tables were incomplete on multiple accounts, such as on project or season levels, or had methodological inconsistencies or gaps that challenged robust comparison. Additionally, the risk tables clock almost all mortality estimations at “zero” except for Buteo buteo at 0.03 bird/spring season at Dampınar, and Falco tinnunculus at 0.03 birds/spring season for Akköy.

With the completion of the supplementary baseline in 2024 at hand, which was conducted by the same team, applying consistent methodology over 3 seasons across all projects over the same time period, and seeing that the inclusion of National EIA would simply complicate the dataset and dilute the risk estimations, it is more sensible to only consider 2024 results in the final baseline report for 2024 and interim reports for 2024 baseline may be reviewed for a compilation of National EIA results.

An overview of baseline collision risk estimation at each project broken down by resident or migrant status, covering spring, summer and autumn seasons based on 2024 studies are shown in Table 4-34. The results demonstrate that baseline risk over the study period was

[14] Gauld et al (2022). Hotspots in the grid: Avian sensitivity and vulnerability to collision risk from energy infrastructure interactions in Europe and North Africa. Journal of Applied Ecology.

driven mainly by resident activity as opposed to migratory movement over the minor pathways which was a picture that was already emerging at the interim stage.

It is important to note that none of the 2024 surveys account for winter periods. Though activity in winter is expected to be significantly diminished, it is not expected to be non-existent either. projects located in high altitudes, with extensive precipitation and high winds over the winter are not expected to host significant activity over the winter (e.g. Kestanederesi, potentially) while those projects in lowlands and near important wetlands may indeed receive activity (such as Ihlamur, with anecdotal findings, and Akköy, near a well-known protected wetland for wintering bird species). Therefore, the data from the three seasons was not extrapolated to cover winter (such as substituting an average or a minimum value or applying a coefficient to represent "winter" data) since the effect of winter on collision risk is mixed across the projects.

The table features additional lines to account for the potential effect of the discontinued surveys in Hacıhıdırlar WPP which resulted in missed seasons for autumn and summer. The line 8 WPP without Hacıhıdırlar calculates the %migrant and collision per turbine per year values without the project. The line 8 WPP with extrapolated Hacıhıdırlar is obtained by assuming the same collision risk values in summer and autumn as the spring results for the project.

Table 4-34 Collision risk summary for Project Galeforce and each of its projects as calculated in 2024

Projects	Migrant /yr*	Resident /yr*	Total /yr*	%migrant	Turbine count	Collision/ turbine/ yr*
Akköy	0.05	0.49	0.54	9.26	6	0.09
Armutçuk	0.19	0.43	0.62	30.65	20	0.03
Dampınar	0.06	1.44	1.50	4.00	11	0.14
Hacıhıdırlar**	0.00	0.50	0.50	0.00	15	0.03
Harmancık	0.05	0.06	0.11	45.45	10	0.01
Ihlamur	0.27	2.51	2.78	9.71	18	0.15
Kestanederesi	0.18	5.10	5.28	3.41	28	0.19
Ovacık	0.07	0.16	0.23	30.43	13	0.02
Uygar	0.65	1.76	2.41	26.97	60	0.04
Project Galeforce	1.52	12.45	13.97	10.88	181	0.08
8 WPP (- Hacıhıdırlar)	1.52	11.95	13.47	11.28	166	0.08

*Though denoted year (yr), the survey period consists of spring, summer and autumn, and does not account for winter periods

**Hacıhıdırlar WPP baseline collection was disrupted, and summer and autumn data could not be collected.

The data table summarizing the project specific collision risk estimations from the data is presented in Table 4-35.

Table 4-35 Additive Collision Risk Assessment summary for the Project Galeforce

Common Name	Projects	Migrant	Resident	Total
Black Kite	Harmancık	0.00	0.00	0.00
Subtotal		0.00	0.00	0.00
Black Stork	Ihlamur	0.00	0.02	0.02
	Uygar	0.01	0.01	0.02
Subtotal		0.01	0.03	0.04
Booted Eagle	Akköy	0.00	0.00	0.00
	Armutçuk	0.00	0.00	0.00
	Harmancık	0.00	0.00	0.00
	Ihlamur	0.01	0.00	0.01
	Kestanederesi	0.00	0.02	0.02
	Ovacık	0.01	0.00	0.01
	Uygar	0.00	0.02	0.02
Subtotal		0.02	0.04	0.06
Common Buzzard	Akköy	0.00	0.01	0.01
	Armutçuk	0.15	0.21	0.36
	Dampınar	0.00	0.19	0.19
	Hacıhıdırlar	0.00	0.40	0.40
	Harmancık	0.02	0.03	0.05
	Ihlamur	0.11	0.50	0.61
	Kestanederesi	0.00	1.00	1.00
	Ovacık	0.02	0.10	0.12
	Uygar	0.25	0.98	1.23
Subtotal		0.55	3.42	3.97
Dalmatian Pelican	Akköy	0.00	0.06	0.06
Subtotal		0.00	0.06	0.06
Eleonora's Falcon	Armutçuk	0.00	0.07	0.07
	Dampınar	0.00	0.48	0.48
	Hacıhıdırlar	0.00	0.04	0.04
	Harmancık	0.00	0.02	0.02
	Ihlamur	0.04	0.65	0.69
	Kestanederesi	0.00	0.35	0.35
	Ovacık	0.00	0.01	0.01
	Uygar	0.00	0.02	0.02
Subtotal		0.04	1.64	1.68
Eurasian Hobby	Ihlamur	0.00	0.06	0.06
	Ovacık	0.00	0.00	0.00
	Uygar	0.01	0.00	0.01
Subtotal		0.01	0.06	0.07
Eurasian Kestrel	Akköy	0.00	0.05	0.05
	Armutçuk	0.00	0.03	0.03
	Dampınar	0.01	0.00	0.01
	Hacıhıdırlar	0.00	0.02	0.02
	Harmancık	0.00	0.00	0.00
	Ihlamur	0.00	0.74	0.74
	Kestanederesi	0.00	1.06	1.06
	Ovacık	0.00	0.01	0.01
	Uygar	0.01	0.10	0.11
Subtotal		0.02	2.01	2.03
Eurasian Marsh-Harrier	Akköy	0.00	0.00	0.00
	Ihlamur	0.01	0.00	0.01
	Kestanederesi	0.03	0.00	0.03
	Ovacık	0.01	0.00	0.01
Subtotal		0.05	0.00	0.05
Eurasian Sparrowhawk	Akköy	0.00	0.04	0.04
	Armutçuk	0.01	0.04	0.05
	Dampınar	0.03	0.03	0.06
	Hacıhıdırlar	0.00	0.02	0.02
	Harmancık	0.02	0.00	0.02
	Ihlamur	0.03	0.02	0.05
	Kestanederesi	0.03	0.00	0.03
	Ovacık	0.02	0.01	0.03
	Uygar	0.30	0.05	0.35
Subtotal		0.44	0.21	0.65
European Honey-buzzard	Armutçuk	0.02	0.04	0.06
	Dampınar	0.01	0.01	0.02
	Harmancık	0.01	0.00	0.01
	Ihlamur	0.01	0.06	0.07
	Kestanederesi	0.11	0.00	0.11
	Uygar	0.04	0.04	0.08
Subtotal		0.20	0.15	0.35
Hen Harrier	Ihlamur	0.01	0.00	0.01
Subtotal		0.01	0.00	0.01
Lesser Kestrel	Kestanederesi	0.00	1.91	1.91
Subtotal		0.00	1.91	1.91
Levant Sparrowhawk	Harmancık	0.00	0.00	0.00
	Uygar	0.02	0.00	0.02
Subtotal		0.02	0.00	0.02
Long-legged Buzzard	Akköy	0.01	0.01	0.02
	Dampınar	0.00	0.00	0.00
	Kestanederesi	0.00	0.28	0.28
Long-legged Buzzard Total		0.01	0.29	0.30
Montagu's Harrier	Akköy	0.00	0.00	0.00
	Dampınar	0.01	0.00	0.01
	Kestanederesi	0.01	0.00	0.01
Subtotal		0.02	0.00	0.02
Peregrine Falcon	Dampınar	0.00	0.00	0.00
	Kestanederesi	0.00	0.04	0.04
Peregrine Falcon Total		0.00	0.04	0.04
Red-footed Falcon	Ihlamur	0.01	0.00	0.01
Red-footed Falcon Total		0.01	0.00	0.01
Short-toed Snake-Eagle	Akköy	0.03	0.15	0.18
	Armutçuk	0.01	0.04	0.05
	Dampınar	0.00	0.73	0.73
	Hacıhıdırlar	0.00	0.02	0.02
	Harmancık	0.00	0.01	0.01
	Ihlamur	0.04	0.46	0.50
	Kestanederesi	0.00	0.44	0.44
	Ovacık	0.01	0.03	0.04
	Uygar	0.00	0.54	0.54
Subtotal		0.09	2.42	2.51
unidentified Falcon	Harmancık	0.00	0.00	0.00
	Uygar	0.01	0.00	0.01
Subtotal		0.01	0.00	0.01
White Stork	Akköy	0.01	0.17	0.18
Subtotal		0.01	0.17	0.18
Total		1.52	12.45	13.97

4.4.5 Breeding Bird Observations

Species recorded during the breeding bird surveys are listed in Table 4-36, with their breeding bird atlas breeding codes and highest count for each month.

During the breeding bird surveys a total of 81 bird species were recorded. Among these, 69 species have a breeding code higher than 0, indicating active breeding. Notably, the vulnerable European Turtle-Dove (*Streptopelia turtur*) was recorded. The most common species observed were the Common Wood-Pigeon (*Columba palumbus*), Eurasian Jay (*Garrulus glandarius*), and Common Chaffinch (Fringilla coelebs). Additionally, significant observations include the Red-billed Chough (*Pyrrhocorax pyrrhocorax*) and Rock Sparrow (*Petronia petronia*).

Table 4-36 List of species encountered during breeding bird surveys and highest number recorded each month (BC: breeding code, X: observed but not counted).

Common Name	Scientific Name	IUCN	Code	Mar	Apr	May	Jun	Jul
Ruddy Shelduck	*Tadorna ferruginea*	LC	A2	-	2	-	-	-
Chukar	*Alectoris chukar*	LC	A2	2	1	1	-	-
Common Wood-Pigeon	*Columba palumbus*	LC	B4	6	8	21	12	41
European Turtle-Dove	*Streptopelia turtur*	VU	B4	-	3	3	-	4
Common Cuckoo	*Cuculus canorus*	LC	A2	-	1	-	-	-
Common Swift	*Apus apus*	LC	A1	-	-	-	1	20
Black Stork	*Ciconia nigra*	LC	-	1	-	-	-	-
White Stork	*Ciconia ciconia*	LC	-	-	1	-	-	-
European Honey-buzzard	*Pernis apivorus*	LC	B5	-	-	X	X	X
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	C14	X	1	X	2	1
Eurasian Sparrowhawk	*Accipiter nisus*	LC	B4	1	X	X	X	X
Eurasian goshawk	*Astur gentilis*	LC	A1	-	-	X	-	1
Common Buzzard	*Buteo buteo*	LC	C10	X	1	X	3	5
Long-legged Buzzard	*Buteo rufinus*	LC	A1	5	1	X	3	X
Eurasian Hoopoe	*Upupa epops*	LC	-	-	3	-	-	-
European Bee-eater	*Merops apiaster*	LC	-	-	45	-	-	-
Middle Spotted Woodpecker	*Dendrocoptes medius*	LC	B4	-	1	-	-	2
Lesser Spotted Woodpecker	*Dryobates minor*	LC	A2	-	1	-	-	-
Eurasian Green Woodpecker	*Picus viridis*	LC	-	-	1	-	-	-
Lesser Kestrel	*Falco naumanni*	LC	A1	-	-	-	X	X
Eurasian Kestrel	*Falco tinnunculus*	LC	B4	1	2	X	2	3
Eleonora's Falcon	*Falco eleonorae*	LC	A1	-	-	X	4	3
Peregrine Falcon	*Falco peregrinus*	LC	A1	X	1	X	X	X
Eurasian Golden Oriole	*Oriolus oriolus*	LC	B4	-	2	1	-	-
Red-backed Shrike	*Lanius collurio*	LC	C14	-	-	1	1	-
Woodchat Shrike	*Lanius senator*	NT	C12	-	-	-	-	1
Eurasian Jay	*Garrulus glandarius*	LC	B4	1	3	8	3	4
Eurasian Magpie	*Pica pica*	LC	-	9	-	-	-	-
Red-billed Chough	*Pyrrhocorax pyrrhocorax*	LC	B4	32	15	12	40	40
Western jackdaw	*Coloeus monedula*	LC	-	X	-	-	-	-
Hooded Crow	*Corvus cornix*	LC	B4	35	18	25	65	5
Common Raven	*Corvus corax*	LC	B4	11	5	4	9	7
Coal Tit	*Periparus ater*	LC	B4	3	8	6	3	11

Common Name	Scientific Name	IUCN	Code	Mar	Apr	May	Jun	Jul
Sombre Tit	*Poecile lugubris*	LC	-	X	-	-	-	-
Eurasian Blue Tit	*Cyanistes caeruleus*	LC	B4	-	7	1	-	1
Great Tit	*Parus major*	LC	B4	2	6	X	3	4
Wood Lark	*Lullula arborea*	LC	B4	2	6	2	2	-
Crested Lark	*Galerida cristata*	LC	A2	2	3	-	-	-
Horned Lark	*Eremophila alpestris*	LC	B3	4	-	2	-	-
Eurasian Crag-Martin	*Ptyonoprogne rupestris*	LC	C13	5	8	-	5	7
Barn Swallow	*Hirundo rustica*	LC	B4	2	5	7	25	75
Common House-Martin	*Delichon urbicum*	LC	B4	X	-	-	-	5
European red-rumped swallow	*Cecropis rufula*	LC	B4	-	-	8	13	17
Eastern Bonelli's Warbler	*Phylloscopus orientalis*	LC	B4	-	3	1	-	-
Common Chiffchaff	*Phylloscopus collybita*	LC	B4	1	2	5	-	2
Long-tailed Tit	*Aegithalos caudatus*	LC	B4	X	3	13	-	6
Rüppell's Warbler	*Curruca ruppeli*	LC	A2	X	4	1	-	-
Greater Whitethroat	*Curruca communis*	LC	A2	-	-	1	-	-
Krüper's Nuthatch	*Sitta krueperi*	LC	B4	3	5	4	3	1
Western Rock Nuthatch	*Sitta neumayer*	LC	B4	3	3	-	7	3
Eurasian Nuthatch	*Sitta europaea*	LC	A1	1	4	-	-	-
Short-toed Treecreeper	*Certhia brachydactyla*	LC	B4	2	1	3	1	-
Eurasian Wren	*Troglodytes troglodytes*	LC	B4	3	2	2	-	-
Mistle Thrush	*Turdus viscivorus*	LC	A2	3	6	5	2	-
Song Thrush	*Turdus philomelos*	LC	A2	-	-	2	-	-
Eurasian Blackbird	*Turdus merula*	LC	B4	X	5	3	2	-
European Robin	*Erithacus rubecula*	LC	B4	1	3	2	-	-
Black Redstart	*Phoenicurus ochruros*	LC	A2	2	-	-	-	-
Rufous-tailed Rock-Thrush	*Monticola saxatilis*	LC	B4	1	11	1	1	-
Blue Rock-Thrush	*Monticola solitarius*	LC	B3	2	-	-	1	-
European Stonechat	*Saxicola rubicola*	LC	C12	2	3	4	12	6
Northern Wheatear	*Oenanthe oenanthe*	LC	C12	1	8	6	7	8
Eastern Black-eared Wheatear	*Oenanthe melanoleuca*	LC	A2	-	3	1	-	-
House Sparrow	*Passer domesticus*	LC	-	12	-	-	-	-
Spanish Sparrow	*Passer hispaniolensis*	LC	B4	-	-	-	3	-
Rock Sparrow	*Petronia petronia*	LC	B4	35	4	6	4	7
Gray Wagtail	*Motacilla cinerea*	LC	-	2	-	-	-	-
White Wagtail	*Motacilla alba*	LC	-	-	-	2	-	-
Tawny Pipit	*Anthus campestris*	LC	B4	-	6	5	8	2
Water Pipit	*Anthus spinoletta*	LC	C12	2	2	4	4	4
Common Chaffinch	*Fringilla coelebs*	LC	C12	15	8	7	6	18
European Greenfinch	*Chloris chloris*	LC	B4	2	X	4	4	-
Eurasian Linnet	*Linaria cannabina*	LC	B4	4	5	6	5	4
Red Crossbill	*Loxia curvirostra*	LC	A1	-	-	-	2	-
European Goldfinch	*Carduelis carduelis*	LC	C12	3	4	4	6	7
European Serin	*Serinus serinus*	LC	B4	4	4	8	2	1

Common Name	Scientific Name	IUCN	Code	Mar	Apr	May	Jun	Jul
Eurasian Siskin	*Spinus spinus*	LC	-	X	-	-	-	-
Corn Bunting	*Emberiza calandra*	LC	B4	-	4	4	-	2
Rock Bunting	*Emberiza cia*	LC	A1	-	-	-	1	-
Cirl Bunting	*Emberiza cirlus*	LC	A2	1	1	-	-	-
Ortolan Bunting	*Emberiza hortulana*	LC	C14	-	12	16	6	12

4.5 Bat

Spring

Based on Auto-ID results, a total of 87,908 recordings were made. 24,221 recordings, or 27.54%, were identified as bat recordings in spring. Noise accounted for the majority of the recordings (72.45%), with an average nightly noise percentage ranging from 14.41% to 98.46%. Nights 3, 5, and 8 were selected for manual species identification. A summary is shown on Table 4-37.

Table 4-37 Number of bat recordings and noise recorded each night based on Auto-ID in spring.

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
1	16	1513	13158	14671	89.69%	
2	16	1511	12126	13637	88.92%	
3	16	687	11145	11832	94.19%	Manual_ID
4	16	1582	1108	2690	41.19%	
5	16	7740	1303	9043	14.41%	Manual_ID
6	16	974	7033	8007	87.84%	
7	16	1296	3294	4590	71.76%	
8	16	4522	1382	5904	23.41%	Manual_ID
9	16	3278	1349	4627	29.15%	
10	16	870	1544	2414	63.96%	
11	16	123	7879	8002	98.46%	
12	16	125	2366	2491	94.98%	
Total	-	24221	63687	87908	72.45%	-

Table 4-38 presents the distribution of bat recordings across 16 SPs based on Auto-ID results. SP04 had the highest average recordings, accounting for 2.73 of all detections, followed by SP08 and SP06. Night 5 recorded the highest bat activity (7740), which is 46.63 times the average value, showing the highest potential of the site. Failures of the recorders are indicated by blank cells in the table.

Table 4-39 and Table 4-40 summarizes the results of the Manual-ID analysis of bat recordings for the selected nights (5, 7, and 9), yielding a total of 2,946 recordings across six SPs over three nights. Overall, the number of recordings identified through Manual-ID closely aligns with those identified through Auto-ID, with a difference of approximately 5%. However, in some instances, noise was misclassified as bat calls by one detector, widening the discrepancy. Ultimately, the total number of bat recordings identified through Manual-ID corresponds to 86.33% of the total results from Auto-ID for the surveyed period.

Table 4-38 Distribution of bat recordings across SPs by night based on Auto-ID results in spring

Night	SP01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	Total
1	11	102	14	130	1	1152	6	97	0	0	0	0	0	0	0		1513
2	29	9	36	1031	13	30	16	248	67	32	0	0	0	0	0		1511
3	13	0	28	141	3	4	1	197	66	44	2	40	9	3	136		687
4	94	57	157	191	25	31	23	209	358	188	158		16	33	42		1582
5	559	392	597	1288	513	233	383	1235	556	413	232		235	454	650		7740
6	65	19	57	90	26	83	40	175	235	33	101		1	34	15		974
7	125	20	61	351	41	97	48	110	229	42	49		8	69	46		1296
8	520	231	526	985	170	286	208		324	317	154		154	108	539		4522
9	111		731	640	116	209	264		420	261	60		143	46	277		3278
10	100		79	149	9	98	21		204	18	14		78	32	68		870
11	13		7	3	4		26		45	4	3		5	8	5		123
12	119		1	0	1		4		0	0	0		0	0	0		125
Ave.	147	119	191	454	77	222	87	324	250	135	86	40	72	87	198	0	166
Ave_cor	176	142	228	543	92	265	104	387	299	161	103	48	86	104	237	0	198

Table 4-39 Distribution of bat recordings across SPs by selected nights based on Auto-ID results in spring

Night	Method	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	SP13	SP14	SP15	Total
5	Auto ID	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	40
7	Auto ID	559	392	597	1288	513	233	383	1235	556	413	232	0	235	454	650	7740
9	Auto ID	520	0	526	985	170	286	208	0	324	317	154	0	154	108	539	4291
Total	Auto ID	1079	392	1123	2273	683	519	591	1235	880	730	386	40	389	562	1189	12071

Table 4-40 Distribution of bat recordings across SPs by selected nights based on Manual-ID results in spring

Night	Method	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	SP13	SP14	SP15	Total
5	Manual ID	0	0	0	0	0	0	0	0	0	0	0	39	0	0	0	39
7	Manual ID	688	478	678	1613	654	279	426	1845	579	503	247	0	254	473	741	9458
9	Manual ID	555	0	643	1229	184	307	217	0	321	347	103	0	177	102	745	4930
Total	Manual ID	1243	478	1321	2842	838	586	643	1845	900	850	350	39	431	575	1486	14427

The Auto-ID analysis of sounds across all nights shows the most common species was Common Pipistrelle (*Pipistrellus pipistrellus*), with 38.06% of recordings and 52.49% of recordings when unidentified species are distributed evenly. The second most common species was European Free-tailed Bat (*Tadarida teniotis*), accounting for 11.20% of recordings and 15.45% when unidentified species are distributed evenly. A notable finding is the presence of *Miniopterus schreibersii* and *Nyctalus lasiopterus*, Vulnerable species (VU) on the IUCN Red List.

The software failed to identify more than 27.49% of the recordings/ When comparing the species identification results between Manual-ID and Auto-ID for the total of 14,427 recordings in Manual-ID, several key differences are observed. Common Pipistrelle (Pipistrellus pipistrellus): Manual-ID recorded 46.36% of the total recordings for this species, compared to 38.06% in Auto-ID. This suggests that Manual-ID might be more sensitive to detecting P. pipistrellus activity. Lesser Noctule (*Nyctalus leisleri*): Manual-ID accounted for 16.19% of the total recordings for this species, a significant increase compared to 2.72% identified in Auto-ID. This indicates that Manual-ID potentially resolves noctule calls more effectively or correctly than Auto-ID. European Free-tailed Bat (*Tadarida teniotis*): In Manual-ID, 9.55% of the recordings were attributed to this species, compared to 11.20% in Auto-ID. Although the overall percentages are close, this slight difference demonstrates consistency between the two methods. (Table 4-42).

Table 4-41 Bat groups and species recorded during selected nights at each SP based on Auto-ID in spring

Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	SP13	SP14	SP15	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	629	288	1363	3023	462	394	642	572	420	336	87	1	123	68	810	9218	38.06%	52.49%
Pipistrelloid	MINSCH	VU	89	11	54	655	19	110	32	160	114	39	23	16	34	8	149	1513	6.25%	8.61%
Pipistrelloid	HYPSAV	LC	25	62	94	121	67	39	24	238	158	126	48	0	55	107	54	1218	5.03%	6.94%
Pipistrelloid	PIPKUH	LC	6	4	11	13	9	4	5	25	17	5	4	0	5	4	3	115	0.47%	0.65%
Pipistrelloid	PIPPYG	LC	8	8	1	5	0	0	0	0	3	1	1	1	1	1	4	34	0.14%	0.19%
Pipistrelloid	PIPNAT	LC	0	1	1	0	0	0	1	1	3	0	0	0	0	0	1	8	0.03%	0.05%
Nyctaloid	NYCLEI	LC	51	28	59	57	53	45	27	62	33	84	47	1	31	16	65	659	2.72%	3.75%
Nyctaloid	NYCNOC	LC	30	36	71	51	38	37	30	40	23	68	49	0	24	46	57	600	2.48%	3.42%
Nyctaloid	EPTSER	LC	117	28	48	30	10	12	4	145	84	64	9	0	27	9	11	598	2.47%	3.40%
Nyctaloid	VESMUR	LC	12	6	14	39	12	11	8	14	7	14	14	0	8	5	32	196	0.81%	1.12%
Nyctaloid	NYCLAS	VU	1	3	1	1	0	0	0	20	10	19	0	0	1	5	13	74	0.31%	0.42%
Tadarida	TADTEN	LC	207	143	147	116	55	79	87	351	494	220	150	1	113	373	177	2713	11.20%	15.45%
Plecotus	PLESPE	NA	1	0	3	2	0	0	0	8	72	4	1	0	2	1	1	95	0.39%	0.54%
Myotis	MYOSPE	NA	7	0	12	104	0	0	1	20	223	0	0	0	2	0	0	369	1.52%	2.10%
Rhinolophus	RHIHIP	NT(E,M)	19	3	4	2	2	41	2	1	1	1	0	0	1	0	1	78	0.32%	0.44%
Rhinolophus	RHIFER	NT(E,M)	55	0	3	1	0	1	2	1	9	0	1	0	1	0	0	74	0.31%	0.42%
Rhinolophus	RHIEUR	VU(E,M)	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.00%	0.01%
-	NoID	-	502	209	407	779	195	1450	175	613	833	371	339	20	221	144	400	6658	27.49%	
Total	-	-	1759	830	2294	4999	922	2223	1040	2271	2504	1352	773	40	649	787	1778	24221	-	-

Table 4-42 Bat groups and species recorded during selected nights at each SP based on Manual ID in spring

Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	SP13	SP14	SP15	Total	Percent
Pipistrelloid	PIPPIP	LC	503	235	768	1725	477	315	512	696	246	221	71	3	100	53	763	6688	46.36%
Pipistrelloid	HYPSAV	LC	58	48	83	162	127	45	23	387	62	138	44	0	42	90	56	1365	9.46%
Pipistrelloid	MINSCH	VU	91	11	44	271	34	56	16	88	49	43	8	35	54	4	177	981	6.80%
Pipistrelloid	PIPKUH/PIPNAT	-	12	5	23	41	5	8	17	24	28	8	1	0	6	7	6	191	1.32%
Pipistrelloid	PIPPYG	LC	12	0	4	0	0	0	0	0	1	0	0	0	2	0	1	20	0.14%
Nyctaloid	NYCLEI	LC	202	96	234	479	141	82	43	244	64	153	124	1	122	84	267	2336	16.19%
Nyctaloid	NYCNOC	LC	47	24	45	34	16	29	14	55	18	86	28	0	15	39	40	490	3.40%
Nyctaloid	EPTSER	LC	152	13	41	22	3	3	3	38	12	49	5	0	8	8	3	360	2.50%
Nyctaloid	NYCLAS	VU	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	7	0.05%
Tadarida	TADTEN	LC	72	44	50	48	30	15	10	251	133	141	58	0	80	285	161	1378	9.55%
Plecotus	PLESPE	NA	11	0	0	4	1	2	0	5	56	3	2	0	0	0	5	89	0.62%
Myotis	MYOSPE	NA	10	0	15	32	0	1	0	46	212	5	2	0	1	0	2	326	2.26%
Rhinolophus	RHIBLA	VU(E)	9	1	2	22	2	30	5	2	8	1	7	0	0	5	4	98	0.68%
Rhinolophus	RHIFER	NT(E,M)	44	0	5	0	0	0	0	2	6	1	0	0	1	0	0	59	0.41%
Rhinolophus	RHIHIP	NT(E,M)	13	1	3	1	2	0	0	0	0	1	0	0	0	0	0	21	0.15%
Rhinolophus	RHIEUR	VU(E,M)	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.04%
Barbastella	BARBAR	VU(E)	1	0	4	1	0	0	0	0	5	0	0	0	0	0	1	12	0.08%
Total	-	-	1243	478	1321	2842	838	586	643	1845	900	850	350	39	431	575	1486	14427	-

The bat activity during the hours of the night was analysed for Pipistrelloid, Nyctaloid, and Tadarida groups, as they are known to be high and middle altitude fliers (Rodrigues et al. 2014), making them potential subjects to possible curtailment planning. Figure 4-4 illustrates the activity patterns of these selected species throughout the night during the spring season, spanning from 20:00 to 06:00.

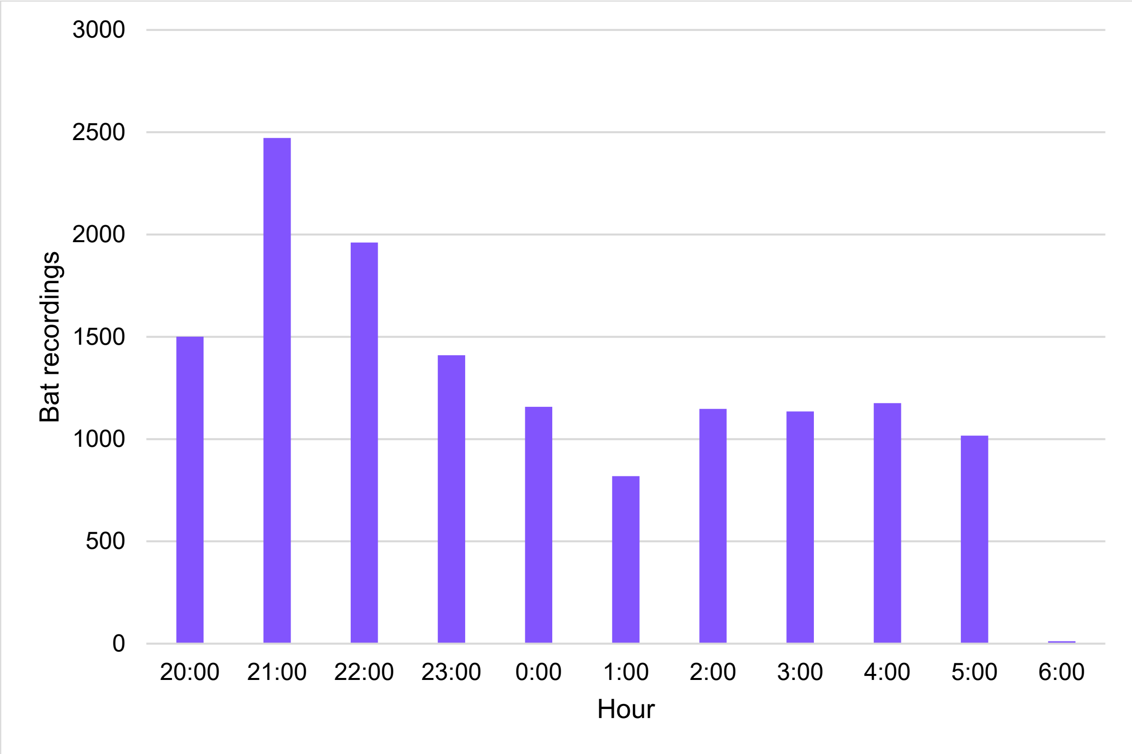


Figure 4-4 Hourly distribution of bat recordings through the night in spring

Summer

Based on Auto-ID results, a total of 132,216 recordings were made. 39,312 recordings, or approximately 29.7%, were identified as bat recordings in the summer season. Noise accounted for the majority of the recordings, with 92,904 noise recordings, representing 70.27% of the total. The average nightly noise percentage ranged from 53.37% to 94.90%.

Nights 1 and 4 were selected for manual species identification. (Table 4-43).

Table 4-43 Number of bat recordings and noise recorded each night based on Auto-ID in summer

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
1	16	11933	13659	25592	53.37%	Manual_ID
2	16	4020	18638	22658	82.26%	
3	16	5191	18347	23538	77.95%	
4	16	5617	17090	22707	75.26%	Manual_ID
5	16	5430	11023	16453	67.00%	
6	16	3319	7813	11132	70.19%	
7	16	3055	3526	6581	53.58%	
8	16	510	1456	1966	74.06%	
9	16	217	980	1197	81.87%	
10	16	20	372	392	94.90%	
Total	-	39312	92904	132216	70.27%	-

Table 4-44 presents the distribution of bat recordings across 16 SPs based on Auto-ID results. SP08 had the highest average recordings, accounting for 15.4% of all detections, followed by SP16 and SP01. Night 1 recorded the highest bat activity, with 11,933 detections, significantly surpassing the average value, indicating the site's high potential.

The failures of the recorders are indicated by blank cells in the table. The SIM cards at SP04 and SP015 were empty, resulting in no data being recorded.

Table 4-45 and Table 4-46 summarizes the results of the Manual-ID analysis of bat recordings for the selected nights (Nights 1 and 4), yielding a total of 17,034 recordings across 14 SPs over two nights. Overall, the number of recordings identified through Manual-ID closely aligns with those identified through Auto-ID, with a difference of approximately 5%. However, in some instances, noise was misclassified as bat calls by one detector, widening the discrepancy. Ultimately, the total number of bat recordings identified through Manual-ID corresponds to approximately 97.05% of the total results from Auto-ID for the summer season.

Table 4-44 Distribution of bat recordings across SPs by night based on Auto-ID results in summer

Night	SP01	02	03	05	06	07	08	09	10	11	12	13	14	16	Total
1	970	487	1083	706	508	599	1597	666	865	921	931	298	843	1459	11933
2	387	327	137	178	182	459	601	258	227	134	97	47	799	187	4020
3	434	465	182	207	295	413	785	172	531	332	122	15	776	462	5191
4	908	116	328	226	286	345	658	194	309	622	113	20	921	571	5617
5	565	30	497	290	183	232	1507	324	333	614	38	185	632		5430
6			618	148	164	388	1235	244		196		76	250		3319
7			567	609	476	80		5		1296			22		3055
8			79	272	54					105					510
9				159	58										217
10				4	16										20
Average	653	285	436	280	222	359	1064	266	453	528	260	107	606	670	442

Table 4-45 Distribution of bat recordings across SPs by selected nights based on Manual-ID results in summer

Night	Method	SP01	02	03	05	06	07	08	09	10	11	12	13	14	16	Total
1	Manual	1040	317	1310	794	541	605	1633	700	473	875	954	225	923	1641	12031
4	Manual	438	22	307	225	295	337	678	164	33	635	105	10	1356	398	5003
Total	Manual	1478	339	1617	1019	836	942	2311	864	506	1510	1059	235	2279	2039	17034

Table 4-46 Distribution of bat recordings across SPs by selected nights based on Auto-ID results in summer

Night	Method	SP01	02	03	05	06	07	08	09	10	11	12	13	14	16	Total
1	Auto ID	970	487	1083	706	508	599	1597	666	865	921	931	298	843	1459	11933
4	Auto ID	908	116	328	226	286	345	658	194	309	622	113	20	921	571	5617
Total	Auto ID	1878	603	1411	932	794	944	2255	860	1174	1543	1044	318	1764	2030	17550

The Auto-ID results for the selected nights show that the most common species was Common Pipistrelle (*Pipistrellus pipistrellus*), with 52.42% of the total recordings, and 70.26% when non-identified species are distributed evenly. The second most common species was Savi's Pipistrelle (*Hypsugo savii*), with 9.73% of the recordings, or 13.05% when non-identified species are distributed evenly.

Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) and Giant Noctule (*Nyctalus lasiopterus*), vulnerable species were recorded. The software failed to identify more than 25.39% of the recordings. When checking the manual ID species of 17,034 records in total, we can see some differences. The Common Pipistrelle (*Pipistrellus pipistrellus*) was recorded in 68.44% of the manual ID data (11,658 records) compared to 52.42% in the Auto-ID data (20,606 records), indicating a higher proportion of this species in the manual ID dataset. The Savi's Pipistrelle (*Hypsugo savi*i) appeared in 11.08% of the manual ID data (1,887 records) compared to 9.73% in the Auto-ID data (3,826 records), showing a slightly higher percentage in the manual ID results. The Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) was recorded in 4.60% of the manual ID data (784 records) compared to 2.47% in the Auto-ID data (970 records), indicating a higher frequency of this species in the manual ID data. (Table 4-48)

Table 4-47 Bat groups and species recorded during selected nights at each SP based on Auto-ID in summer

Group	Species	IUCN	SP01	SP02	SP03	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	SP13	SP14	SP16	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	1488	352	1870	2041	1417	1599	2241	611	539	3219	806	247	2847	1329	20606	52.42%	70.26%
Pipistrelloid	HYPSAV	LC	22	13	599	490	198	183	762	262	67	202	53	58	698	219	3826	9.73%	13.05%
Pipistrelloid	PIPKUH	LC	77	10	232	25	110	93	512	124	21	27	64	33	35	131	1494	3.80%	5.09%
Pipistrelloid	MINSCH	VU	183	1	6	2	54	36	400	23	12	33	94	0	2	124	970	2.47%	3.31%
Pipistrelloid	PIPNAT	LC	0	0	17	2	1	6	35	0	1	2	0	2	2	4	72	0.18%	0.25%
Pipistrelloid	PIPPYG	LC	25	0	1	0	0	0	2	0	2	2	5	0	2	15	54	0.14%	0.18%
Nyctaloid	EPTSER	LC	100	27	108	17	23	31	381	200	11	14	10	4	13	29	968	2.46%	3.30%
Nyctaloid	NYCNOC	LC	5	30	5	5	19	17	16	3	136	5	11	13	17	15	297	0.76%	1.01%
Nyctaloid	NYCLEI	LC	7	0	19	7	15	6	80	23	5	11	0	4	6	1	184	0.47%	0.63%
Nyctaloid	NYCLAS	VU	0	5	0	2	0	3	74	2	1	2	2	5	1	1	98	0.25%	0.33%
Nyctaloid	VESMUR	LC	1	2	4	4	3	6	21	4	12	7	1	1	2	0	68	0.17%	0.23%
Tadarida	TADTEN	LC	3	5	14	11	7	11	140	40	14	51	11	16	33	27	383	0.97%	1.31%
Plecotus	PLESPE	NA	2	0	5	0	1	1	5	2	0	1	0	0	0	2	19	0.05%	0.06%
Myotis	MYOSPE	NA	53	0	8	1	1	0	61	29	1	0	4	5	0	20	183	0.47%	0.62%
Rhinolophus	RHIFER	NT(E,M)	47	0	0	0	0	0	4	1	2	0	0	0	0	0	54	0.14%	0.18%
Rhinolophus	RHIHIP	NT(E,M)	16	0	9	0	0	0	1	1	2	0	0	0	0	0	29	0.07%	0.10%
Rhinolophus	RHIEUR	VU(E,M)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.01%	0.01%
Barbastella	BARBAR	VU(E)	0	0	0	0	0	0	22	0	0	0	0	0	221	144	400	6658	27.49%
-	NoID	-	1233	980	594	192	373	524	1626	538	1439	644	240	253	649	787	1778	24221	-
Total	-	-	3264	1425	3491	2799	2222	2516	6383	1863	2265	4220	1301	641	4243	2679	39312	-	-

Table 4-48 Bat groups and species recorded during selected nights at each SP based on Manual ID in summer

Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	SP13	SP14	SP15	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	629	288	1363	3023	462	394	642	572	420	336	87	1	123	68	810	9218	38.06%	52.49%
Pipistrelloid	MINSCH	VU	89	11	54	655	19	110	32	160	114	39	23	16	34	8	149	1513	6.25%	8.61%
Pipistrelloid	HYPSAV	LC	25	62	94	121	67	39	24	238	158	126	48	0	55	107	54	1218	5.03%	6.94%
Pipistrelloid	PIPKUH	LC	6	4	11	13	9	4	5	25	17	5	4	0	5	4	3	115	0.47%	0.65%
Pipistrelloid	PIPPYG	LC	8	8	1	5	0	0	0	0	3	1	1	1	1	1	4	34	0.14%	0.19%
Pipistrelloid	PIPNAT	LC	0	1	1	0	0	0	1	1	3	0	0	0	0	0	1	8	0.03%	0.05%
Nyctaloid	NYCLEI	LC	51	28	59	57	53	45	27	62	33	84	47	1	31	16	65	659	2.72%	3.75%
Nyctaloid	NYCNOC	LC	30	36	71	51	38	37	30	40	23	68	49	0	24	46	57	600	2.48%	3.42%
Nyctaloid	EPTSER	LC	117	28	48	30	10	12	4	145	84	64	9	0	27	9	11	598	2.47%	3.40%
Nyctaloid	VESMUR	LC	12	6	14	39	12	11	8	14	7	14	14	0	8	5	32	196	0.81%	1.12%
Nyctaloid	NYCLAS	VU	1	3	1	1	0	0	0	20	10	19	0	0	1	5	13	74	0.31%	0.42%
Tadarida	TADTEN	LC	207	143	147	116	55	79	87	351	494	220	150	1	113	373	177	2713	11.20%	15.45%
Plecotus	PLESPE	NA	1	0	3	2	0	0	0	8	72	4	1	0	2	1	1	95	0.39%	0.54%
Myotis	MYOSPE	NA	7	0	12	104	0	0	1	20	223	0	0	0	2	0	0	369	1.52%	2.10%
Rhinolophus	RHIHIP	NT(E,M)	19	3	4	2	2	41	2	1	1	1	0	0	1	0	1	78	0.32%	0.44%
Rhinolophus	RHIFER	NT(E,M)	55	0	3	1	0	1	2	1	9	0	1	0	1	0	0	74	0.31%	0.42%
Rhinolophus	RHIEUR	VU(E,M)	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.00%	0.01%
-	NoID	-	502	209	407	779	195	1450	175	613	833	371	339	20	221	144	400	6658	27.49%	
Total	-	-	1759	830	2294	4999	922	2223	1040	2271	2504	1352	773	40	649	787	1778	24221	-	-

The bat activity during the hours of the night was analyzed for Pipistrelloid, Nyctaloid, and Tadarida groups, as they are known to be high and middle altitude fliers (Rodrigues et al. 2014), making them potential subjects to possible curtailment planning. Figure 4-5 illustrates the activity patterns of these selected species throughout the night during the summer season, spanning from 20:00 to 05:00.

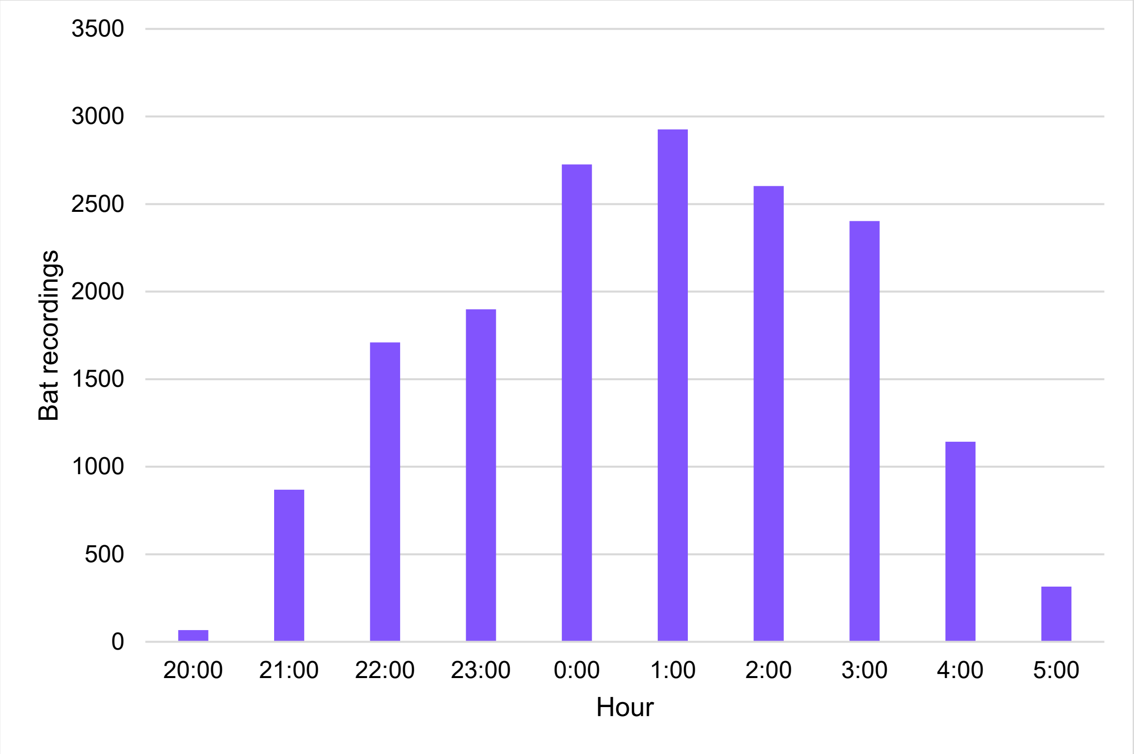


Figure 4-5 Hourly distribution of bat recordings through the night in summer

Autumn

Based on Auto-ID results, a total of 58,056 recordings were made during the autumn season. Of these, 19,379 recordings, or 33.38% of the total, were identified as bat recordings. Noise accounted for the majority of the recordings, representing 66.62% of the total, with an average nightly noise percentage ranging from 43.01% to 78.92%.

Nights 2 and 7 were selected for manual species identification. (Table 4-49).

Table 4-49 Number of bat recordings and noise recorded each night based on Auto-ID in autumn

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
1	16	276	365	641	56.94%	
2	16	4279	7363	11642	63.25%	Manual_ID
3	16	1887	4759	6646	71.61%	
4	16	1989	4459	6448	69.15%	
5	16	1663	1255	2918	43.01%	
6	16	2036	5604	7640	73.35%	
7	16	2440	5193	7633	68.03%	Manual_ID
8	16	2338	3629	5967	60.82%	
9	16	1629	2897	4526	64.01%	
10	16	842	3153	3995	78.92%	
Total	-	19379	38677	58056	66.62%	-

Table 4-50 presents the distribution of bat recordings across 16 SPs based on Auto-ID results. SP08 had the highest average recordings, followed by SP16 (255) and SP01 (137). Night 2 recorded the highest bat activity with 4,279 recordings, which is approximately 31.2 times the average value of 137, demonstrating the highest potential for bat activity at the site.

Table 4-51 and Table 4-52 summarizes the results of the Manual-ID analysis of bat recordings for the selected nights (Nights 2 and 7), yielding a total of 7,135 recordings across 16 SPs over two nights. Overall, the number of recordings identified through Manual-ID closely aligns with those identified through Auto-ID, with a difference of approximately 5.8%. However, in certain cases, noise was misclassified as bat calls by one detector, leading to slight discrepancies. The total number of bat recordings identified through Manual-ID corresponds to 106.2% (7,135/6,719) of the total results from Auto-ID for autumn, showcasing the reliability of the manual identification process despite minor deviations.

Table 4-50 Distribution of bat recordings across SPs by night based on Auto-ID results in autumn

Night	SP01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	Total
1	6	15	9	24	9	7	5	150	0	4	0	0	3	9	24	11	276
2	168	65	125	274	12	61	32	1827	446	114	16	133	98	11	185	712	4279
3	62	33	37	57	9	55	25	1211	42	26	5	44	36	18	66	161	1887
4	95	15	28	75	12	14	14	1415	32	44	5	33	21	8	88	90	1989
5	112	22	63	39	8	43	72	890	111	24	11	38	20	11	32	167	1663
6	231	31	86	104	12	20	61	1011	89	44	11	51	18	14	26	227	2036
7	205	38	116	155	20	36	72	1124	102	51	33	46	17	22	45	358	2440
8	134	15	133	147	14	62	75	1219	77	66	21	52	22	27	38	236	2338
9	142	28	99	139	12	25	31	546	98	14	73	34	10	13	32	333	1629
10	136	21	71	92	11	28	47	0	122	14	152	16	1	19	9	103	842
Ave	129	28	77	111	12	35	43	1044	124	40	36	50	25	15	54	240	129

Table 4-51 Distribution of bat recordings across SPs by selected nights based on Auto-ID results in autumn

Night	Method	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	SP13	SP14	SP15	SP16	Total
2	Manual ID	165	64	126	272	9	56	33	2328	288	75	16	136	104	12	188	630	4502
7	Manual ID	207	36	120	155	19	35	76	1357	95	42	35	46	18	23	47	322	2633
Total	Manual ID	372	100	246	427	28	91	109	3685	383	117	51	182	122	35	235	952	7135

Table 4-52 Distribution of bat recordings across SPs by selected nights based on Manual-ID results in autumn

Night	Method	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	SP13	SP14	SP15	SP16	Total
2	Auto ID	168	65	125	274	12	61	32	1827	446	114	16	133	98	11	185	712	4279
7	Auto ID	205	38	116	155	20	36	72	1124	102	51	33	46	17	22	45	358	2440
Total	Auto ID	373	103	241	429	32	97	104	2951	548	165	49	179	115	33	230	1070	6719

The Auto-ID results for all nights reveal that the most common species was the Common Pipistrelle (Pipistrellus pipistrellus), which accounted for 15.41% of the recordings and 22.18% when non-identified species were distributed evenly. The second most common species was the European free-tailed bat (*Tadarida teniotis*), with 17.90% of the recordings and 25.75% when non-identified species were distributed evenly. (Table 4-53).

When checking the manual id species of 7135 records in total, we can see some differences. The common pipistrelle (*Pipistrellus pipistrellus*) remains the most frequently recorded species in both methods; however, its representation is much higher in the manual ID, accounting for 29.45% of the total recordings, compared to 15.41% in the auto ID. (Table 4-54):

The European free-tailed bat (*Tadarida teniotis*), identified as the second most common species in the auto ID with 17.90%, is ranked third in the manual ID, with a slightly lower proportion of 16.06%. Additionally, Kuhl's pipistrelle and Nathusius' pipistrelle (*Pipistrellus kuhlii / Pipistrellus nathusii*), grouped together in the manual ID, represent 9.71% of the total recordings, whereas these species are listed separately in the auto ID and collectively account for 6.36%.

Table 4-53 Bat groups and species recorded during selected nights at each SP based on Auto-ID in autumn

Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	SP13	SP14	SP15	SP16	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	423	80	157	183	36	76	99	1301	51	77	31	92	41	28	102	210	2987	15.41%	22.18%
Pipistrelloid	PIPKUH	LC	19	26	28	110	8	10	71	475	38	13	3	47	18	17	11	216	1110	5.73%	8.24%
Pipistrelloid	HYPSAV	LC	40	31	65	111	5	18	45	311	27	23	8	26	16	15	24	97	862	4.45%	6.40%
Pipistrelloid	MINSCH	VU	74	1	12	54	4	9	10	189	17	15	2	51	3	2	116	48	607	3.13%	4.51%
Pipistrelloid	PIPNAT	LC	4	3	4	13	1	5	0	39	6	0	1	3	5	3	3	33	123	0.63%	0.91%
Pipistrelloid	PIPPYG	LC	33	0	2	3	0	0	0	6	0	1	0	0	0	0	0	1	46	0.24%	0.34%
Nyctaloid	NYCLAS	VU	6	1	5	3	1	0	0	1852	11	4	1	1	1	4	0	6	1896	9.78%	14.08%
Nyctaloid	EPTSER	LC	8	3	30	13	1	7	5	274	11	7	2	6	1	1	2	184	555	2.86%	4.12%
Nyctaloid	NYCLEI	LC	25	16	33	38	7	13	15	133	12	9	6	13	10	8	14	17	369	1.90%	2.74%
Nyctaloid	VESMUR	LC	11	1	3	19	0	7	3	48	7	9	2	4	5	4	11	6	140	0.72%	1.04%
Nyctaloid	NYCNOC	LC	8	1	7	16	1	5	1	23	3	6	3	2	0	2	3	4	85	0.44%	0.63%
Tadarida	TADTEN	LC	54	70	133	231	34	94	92	1971	358	44	27	56	76	39	104	85	3468	17.90%	25.75%
Plecotus	PLESPE	NA	4	0	60	12	1	0	12	37	189	4	2	0	1	0	2	524	848	4.38%	6.30%
Myotis	MYOSPE	NA	22	4	8	12	1	4	3	139	54	9	0	24	1	0	0	3	284	1.47%	2.11%
Rhinolophus	RHIHIP	NT (E,M)	9	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	10	0.05%	0.07%
Rhinolophus	RHIFER	NT (E,M)	1	0	0	0	0	0	1	2	0	0	2	0	0	0	1	0	7	0.04%	0.05%
Rhinolophus	RHIEUR	VU (E,M)	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.03%	0.04%
Barbastella	BARBAR	VU (E)	25	0	4	2	0	2	0	19	7	2	0	0	221	144	400	6658	27.49%	0.35%	0.50%
-	NoID	-	519	46	216	286	19	101	77	2573	328	178	240	253	649	787	1778	24221	-	30.49%	
Total	-	-	1291	283	767	1106	119	351	434	9393	1119	401	1301	641	4243	2679	39312	-	-	-	-

Table 4-54 Bat groups and species recorded during selected nights at each SP based on Manual ID in autumn

Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	SP13	SP14	SP15	SP16	Total	Percent
Pipistrelloid	PIPPIP	LC	151	35	108	92	9	39	48	909	94	26	16	38	22	6	37	471	2101	29.45%
Pipistrelloid	PIPKUH/PIPNAT	-	7	12	14	31	3	8	19	363	22	8	2	8	19	5	10	162	693	9.71%
Pipistrelloid	MINSCH	VU	35	0	15	84	2	4	3	205	7	20	2	50	1	1	110	51	590	8.27%
Pipistrelloid	HYPSAV	LC	15	11	17	45	1	6	2	140	7	15	5	13	6	4	10	39	336	4.71%
Pipistrelloid	PIPPYG	LC	1	0	1	3	0	0	0	10	2	0	0	0	0	0	0	2	19	0.27%
Nyctaloid	NYCLAS	VU	3	0	5	2	0	0	0	629	9	2	0	0	0	1	0	0	651	9.12%
Nyctaloid	NYCLEI	LC	48	17	34	76	4	19	13	176	24	11	10	17	18	11	36	18	522	7.32%
Nyctaloid	EPTSER	LC	6	2	6	8	0	3	0	300	16	15	3	10	3	1	1	60	444	6.22%
Nyctaloid	NYCNOC	LC	0	0	3	6	0	3	0	1	0	1	0	0	2	1	0	0	17	0.24%
Tadarida	TADTEN	LC	39	20	18	58	6	6	22	704	124	11	13	32	47	5	29	12	1146	16.06%
Plecotus	PLESPE	NA	3	0	21	14	1	0	0	44	0	4	0	0	0	0	0	0	87	1.22%
Myotis	MYOSPE	NA	13	3	3	8	2	3	2	201	77	4	0	12	1	0	0	137	466	6.53%
Rhinolophus	RHIBLA	VU (E)	31	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	35	0.49%
Rhinolophus	RHIFER	NT (E,M)	6	0	1	0	0	0	0	1	1	0	0	1	1	0	1	0	12	0.17%
Rhinolophus	RHIHIP	NT (E,M)	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0.14%
Rhinolophus	RHIEUR	VU (E,M)	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.06%
Barbastella	BARBAR	VU (E)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0.03%
Total	-	-	372	100	246	427	28	91	109	3685	383	117	0	0	221	144	400	6658	27.49%	-
Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	240	253	649	787	1778	24221	-	Percent
Pipistrelloid	PIPPIP	LC	151	35	108	92	9	39	48	909	94	26	1301	641	4243	2679	39312	-	-	29.45%

The bat activity during the hours of the night was analyzed for Pipistrelloid, Nyctaloid, and Tadarida groups, as they are known to be high and middle altitude fliers (Rodrigues et al. 2014), making them potential subjects to possible curtailment planning. Figure 4-6illustrates the activity patterns of these selected species throughout the night during the autumn season, spanning from 19:00 to 06:00.

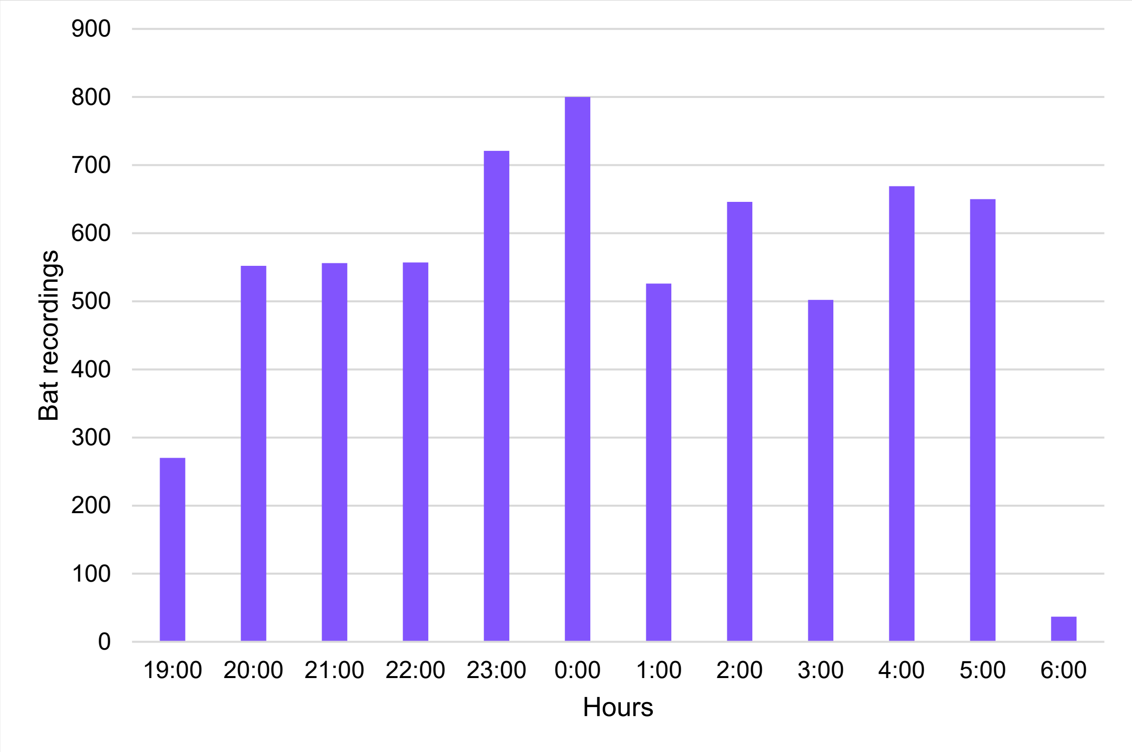


Figure 4-6 Bat groups and species recorded during the hours of the night in autumn

Transect Surveys

Based on mobile surveys, a total of 3013 recordings were made. 1533 recordings, or 50.90%, identified as bat recordings in spring, summer, and autumn 2024. Noise accounted for the majority of the recordings (49.12%), with an average nightly noise percentage ranging from 13.11% to 81.51%. (Table 4-55)

Table 4-55 Number of bat recordings and noise recorded each night during transect surveys

Date	Bat	Noise	Total	Noise Ratio
2024-04-26	167	252	419	60.14%
2024-04-27	141	79	220	35.91%
2024-07-22	169	135	304	44.41%
2024-07-23	81	357	438	81.51%
2024-07-24	125	192	317	60.57%
2024-07-25	76	301	377	79.84%
2024-09-13	232	54	286	18.88%
2024-09-14	213	44	257	17.12%
2024-09-15	150	39	189	20.63%
2024-09-16	179	27	206	13.11%
Total	1533	1480	3013	49.12%

The Auto ID of the sounds at all nights shows the most common species was Noctule (N*yctalus noctule*) with 55.51% of recordings and with 70.86% of recordings when non-ID species are distributed evenly. The second most common species is Common Pipistrelle (Pipistrellus pipistrellus) with 10.11% of recordings and with 12.91% of recordings when non-ID species are distributed evenly. Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) and Giant Noctule (*Nyctalus lasiopterus*), vulnerable species according to the IUCN Red List, were also recorded during mobile surveys. (Table 4-56)

When comparing the Manual ID results for a total of 465 records with the Auto ID results, notable differences emerge in the proportions of common species. The Common Pipistrelle (Pipistrellus pipistrellus), for instance, constituted 43.66% of the total recordings in the Manual ID, a significantly higher proportion than the 10.11% recorded in Auto ID, suggesting that Manual ID may better capture its prevalence. In contrast, the Noctule (*Nyctalus noctula*), which was the dominant species in Auto ID with 55.51% of the total recordings, is entirely absent in the Manual ID results, highlighting potential biases or limitations in one or both methods. Similarly, Savi's Pipistrelle (*Hypsugo savii*) accounted for 10.32% of the Manual ID results compared to just 2.94% in Auto ID, showing a degree of consistency but also some variability between methods. (Table 4-57)

Note that in Table 4-56 and Table 4-57 each night of transect surveys is denoted with the month (4, 7, or 9) followed by a letter to differentiate each night (a, b, c…).

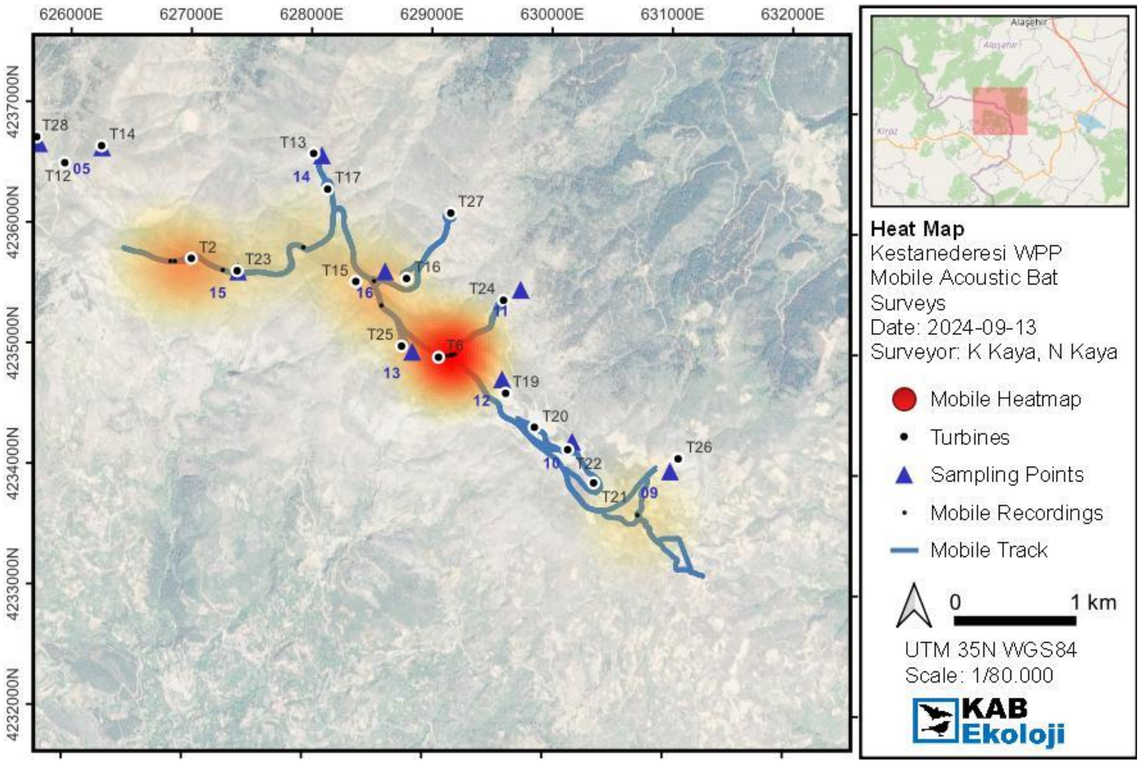
Heat maps for the autumn season are shown on Figure 4-7.

Table 4-56 Bat groups and species recorded during mobile surveys based on Auto-ID results

Group	Species	IUCN	4a	4b	7a	7b	7c	7d	9a	9b	9c	9d	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	19	41	46	15	21	2	2	9	0	0	155	10.11%	12.91%
Pipistrelloid	HYPSAV	LC	2	11	13	6	6	1	1	1	1	3	45	2.94%	3.75%
Pipistrelloid	MINSCH	VU	6	7	14	0	5	0	0	3	0	1	36	2.35%	3.00%
Pipistrelloid	PIPKUH	LC	0	1	11	0	2	0	1	0	0	0	15	0.98%	1.25%
Pipistrelloid	PIPPYG	LC	1	0	1	0	0	1	0	0	0	1	4	0.26%	0.33%
Nyctaloid	NYCNOC	LC	72	42	41	37	57	25	165	162	128	122	851	55.51%	70.86%
Nyctaloid	NYCLEI	LC	1	1	3	2	2	4	5	2	1	3	24	1.57%	2.00%
Nyctaloid	EPTSER	LC	8	0	2	1	0	0	0	0	0	0	11	0.72%	0.92%
Nyctaloid	VESMUR	LC	0	1	0	0	0	1	0	2	0	2	6	0.39%	0.50%
Nyctaloid	NYCLAS	VU	0	0	0	0	1	0	0	0	0	0	1	0.07%	0.08%
Tadarida	TADTEN	LC	0	5	4	1	7	13	8	3	2	4	47	3.07%	3.91%
Plecotus	PLESPE	NA	2	0	0	0	0	0	0	0	0	0	2	0.13%	0.17%
Myotis	MYOSPE	NA	0	0	1	0	0	0	0	0	0	0	1	0.07%	0.08%
Rhinolophus	RHIHIP	NT(E,M)	0	0	0	2	0	0	0	0	0	0	2	0.13%	0.17%
Barbastella	BARBAR	VU(E)	0	0	0	0	1	0	0	0	0	0	1	0.07%	0.08%
-	NoID	-	56	32	33	17	23	29	50	31	18	43	332	21.66%	
Total	-	-	167	141	169	81	125	76	232	213	150	179	1533	-	-

Table 4-57 Bat groups and species recorded during mobile surveys based on Manual ID results

Group	Species	IUCN	4a	4b	7a	7b	7c	7d	9a	9b	9c	9d	Total	Percent
Pipistrelloid	PIPPIP	LC	26	51	64	15	22	2	2	19	1	1	203	43.66%
Pipistrelloid	MINSCH	VU	7	10	24	0	8	0	1	5	0	1	56	12.04%
Pipistrelloid	HYPSAV	LC	0	14	13	5	7	1	0	1	1	6	48	10.32%
Pipistrelloid	PIPKUH/PIPNAT	-	2	0	19	0	3	0	0	2	0	2	28	6.02%
Pipistrelloid	PIPPYG	LC	0	0	0	0	0	1	0	0	0	0	1	0.22%
Nyctaloid	NYCLEI	LC	6	12	6	1	3	3	3	5	0	6	45	9.68%
Nyctaloid	EPTSER	LC	12	13	3	3	4	0	0	6	0	0	41	8.82%
Tadarida	TADTEN	LC	0	3	2	0	2	5	5	6	0	5	28	6.02%
Plecotus	PLESPE	NA	5	1	0	0	0	0	0	0	0	0	6	1.29%
Myotis	MYOSPE	NA	1	0	1	0	3	0	0	0	0	2	7	1.51%
Barbastella	BARBAR	VU(E)	0	0	1	0	1	0	0	0	0	0	2	0.43%
Total	-	-	59	104	133	24	53	12	11	44	2	23	465	-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Alaşehir
Kiraz
Heat Map
Kestanederesi WPP
Mobile Acoustic Bat
Surveys
Date: 2024-09-13
Surveyor: K Kaya, N Kaya
Mobile Heatmap
Turbines
Sampling Points
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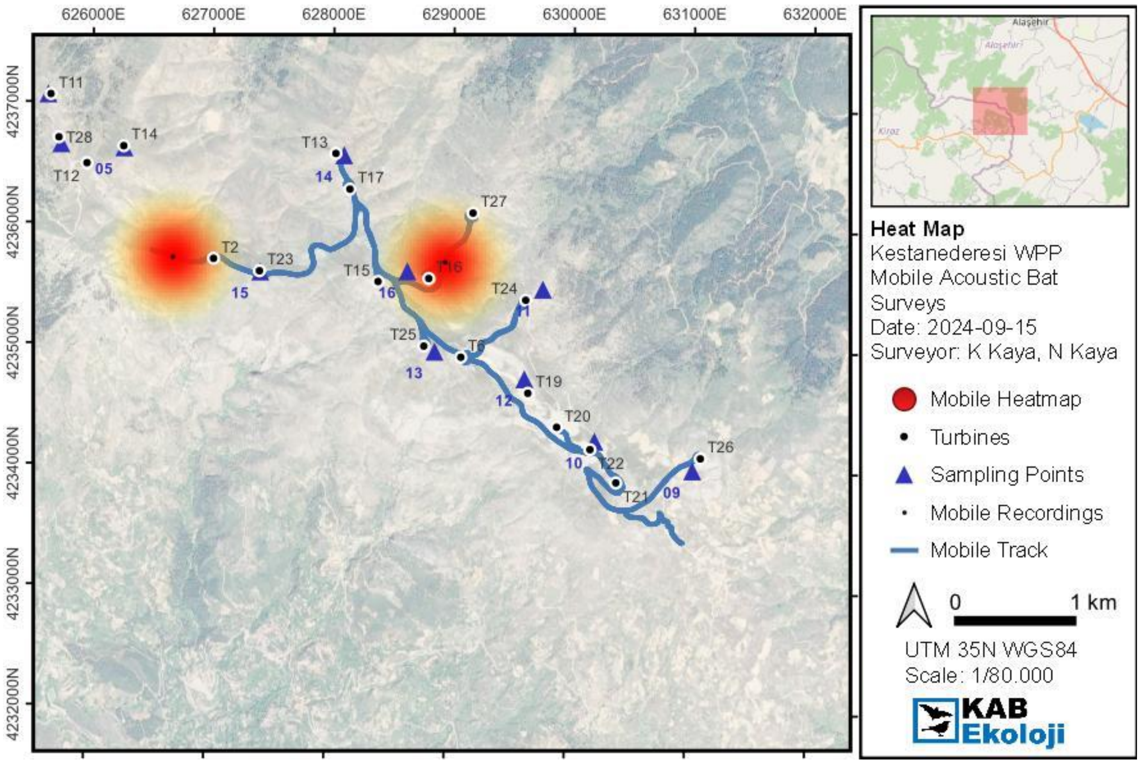
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Alaşehir
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Heat Map
Kestanederesi WPP
Mobile Acoustic Bat
Surveys
Date: 2024-09-15
Surveyor: K Kaya, N Kaya
Mobile Heatmap
Turbines
Sampling Points
Mobile Recordings
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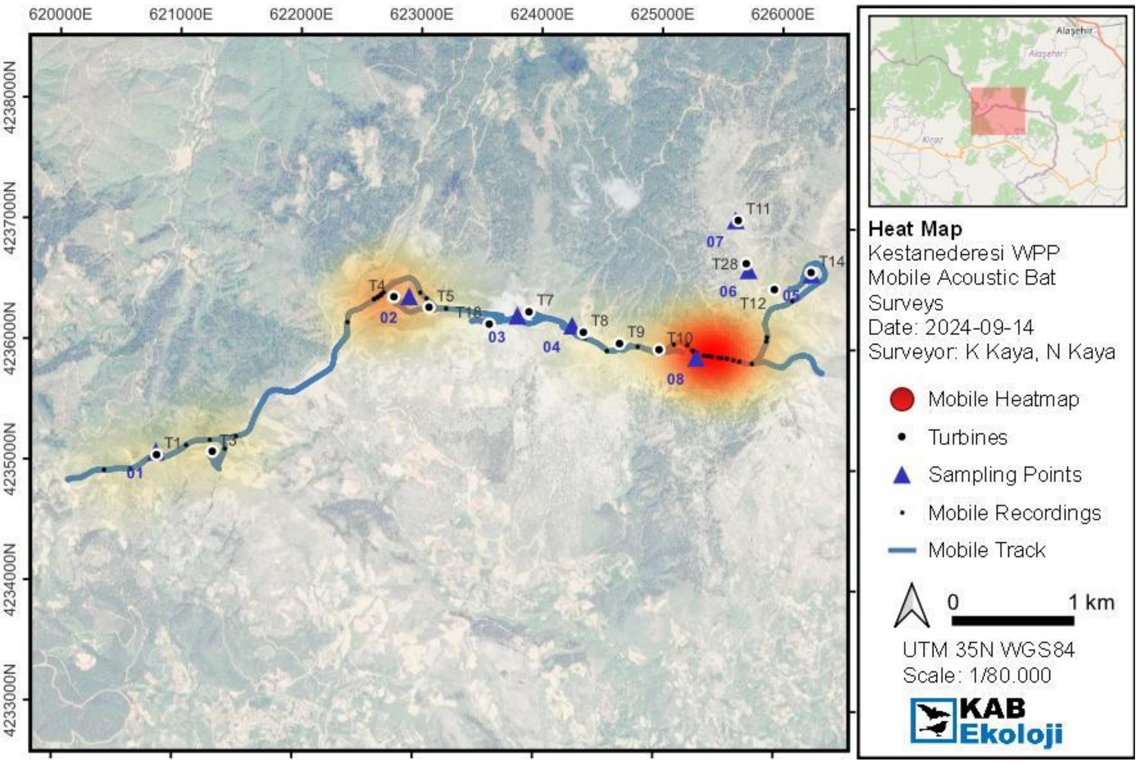

Figure 4-7 Heat maps from transect surveys

4.6 Butterfly

The Apollo butterfly has been designated as the sole invertabrate PBF (Priority Biodiversity Feature) in the Kestanederesi WPP CHA, and supplementary surveys have been conducted exclusively for this species.

The Apollo butterfly goes through the stages of egg, caterpillar, pupa, and adult in its life cycle. Female butterflies typically lay their eggs near plants of the Sedum genus. The species spends the winter in the egg stage, and the caterpillars hatch in the spring and begin feeding. These caterpillars typically feed on *Sedum album* and other Sedum species. After the feeding period, the caterpillars enter the pupa stage, which lasts for several weeks. Adult butterflies emerge between May and September, depending on altitude, and feed on the nectar of suitable plants in the area. The Apollo butterfly requires specific climatic conditions, such as cold winters and sunny summers, and is typically found in mountainous regions at altitudes between 400 and 2300 meters. In the Boz Dağlar KBA, the Apollo butterfly has been recorded at 1200 meters.[15] According to the IUCN 2024-2 categories, the Apollo butterfly (*Parnassius apollo*) is assessed as Least Concern (LC).

During the field studies conducted, 11 butterfly species were identified within the study area. The recorded butterfly species reflect the late summer and autumn seasons in terms of butterfly activity. This period is quite late for the recording of the Apollo butterfly and its host plant. Due to seasonal shifts, field research for the Apollo butterfly needs to be scheduled to earlier periods of summer. No sightings of the Apollo butterfly (*Parnassius apollo*), *Sedum album*, were observed on the southern slopes of the study area. However, dry samples of *Sedum album* were observed on the northern slopes. Additionally, the northern slopes provide suitable habitat for the species' distribution. The observed species are classified as Least Concern (LC) according to the IUCN categories. Furthermore, these species are not listed in any appendices of the BERN Convention or CITES (Table 4-58).

Table 4-58 Butterfly Taxa and Threatened Categories Identified in the Project Area of Influence

Family	Species Name	English Name	Turkish Name	Endemism	IUCN	BERN	CITES
HESPERIIDAE	*Carcharodus alceae*	Mallow Skipper	Hatmi Zıpzıpı	-	LC	-	-
	Pyrgus melotis	Aegean Skipper	Ege Zıpzıpı	-	LC	-	-
LYCAENIDAE	*Aricia agestis*	Brown Argus	Çokgözlü Esmer	-	LC	-	-
	Polyommatus daphnis	Meleager's Blue	Çokgözlü Dafnis	-	LC	-	-
	Polyommatus icarus	Common Blue	Çokgözlü Mavi	-	LC	-	-
NYMPHALIDAE	*Chazara briseis*	The Hermit	Cadı	-	LC	-	-
	Coenonympha pamphilus	Small Heath	Küçük Zıpzıp Perisi	-	LC	-	-
	Hipparchia syriaca	Eastern Rock Grayling	Büyük Karamelek	-	LC	-	-

[15] Hesselbarth, G., van Oorschot, H., ve Wagener, S. (1995). Die Tagfalter der Türkei. Bocholt, Almanya: Selbstverlag Sigbert Wagener.

	Melitaea didyma	Spotted Fritillary	Benekli İparhan	-	LC	-	-
	Pseudochazara lydia	Lydian Tawny Rockbrown	Lidya Yalancı Cadısı	-	LC	-	-
	Brintesia circe	Great Banded Grayling	Kara Murat	-	LC	-	-

5 Discussion

5.1 Flora

- The field study identified a total of 2 endemic plant species, according to the TRDB threatened categories, two of the identified plant taxa are classified as "LC (Least Concern). The endemic flora species are widespread endemics.
- According to the global IUCN threatened categories, one of the identified plant taxa Cedar (*Cedrus libani*) is classified as "VU (Vulnerable)," 24 are classified as "LC (Least Concern). The Cedar (*Cedrus libani*) is a naturalized species in Turkey. However, it is not naturally found in the habitats of the project area of influence, but it is used in afforestation efforts within the project area of influence.
- The target species, including *Sedum album*, *Sedum amplexicaule*, and *Sedum rubens* (species researched due to the apollo butterfly) were observed within the study area.
- During the field studies conducted within the study area, none of the six target plant taxa identified in the Boz Mountains KBA were observed.

5.2 Mammal

- The sensitivity of the terrestrial fauna within the project area, as assessed in the ESIA, has been categorized as low. Given the mitigation measures outlined in the ESIA, no significant impacts are expected on terrestrial fauna due to the project operational activities. Additionally, the monitoring schedule proposed in BMP will enable the assessment of long-term effects on terrestrial fauna during the operational phase. This monitoring framework will allow for the identification and addressing of any potential ecological disturbances over time. Based on the current evaluation and mitigation strategies, the project is not expected to cause any lasting or significant impact on the terrestrial mammal.
- The monitoring period and frequency for the mammal species should be conducted annually during the operational phase, specifically for 10 days each in April, May, and June.

5.3 Herpetofauna

- The sensitivity of the herpetofauna, as determined in the ESIA, has been classified as low. With the implementation of the impact mitigation measures outlined in the ESIA, the significance of potential impacts on herpetofauna is considered negligible. Monitoring schedule provided in the BMP will facilitate the assessment of long-term effects on herpetofauna during the operational phase. Based on the available data and the mitigation measures in place, no significant or lasting impacts on herpetofauna are anticipated because of the project.
- Among the reptiles identified in the project area and its surroundings, ıt is recommended to relocate the species *Testudo graeca*, which was detected in the field, Additionally, if the species is identified within the project area, translocation (relocation) efforts should be carried out.
- The ESIA demonstrates that the impacts on *Testudo graeca* are expected to be minor. Moreover, the implementation of the BMP actions will be sufficient to address and mitigate any potential effects.

5.4 Bird

For spring VP surveys, an average of 41 hours has been spent at four vantage points for bird surveys. A total of 198 birds were counted during the observations, comprising 9 migrant birds and 189 resident birds. Among these observed birds, 152 passed through the risk zone of the wind farm. The collision risk modelling for spring indicated a medium rate of 0.02 and 0.81 for migrant and resident birds, respectively.

For summer VP surveys, an average of 53 hours has been spent at four vantage points for bird surveys. A total of 393 birds were counted during the observations, comprising all resident birds. Among these observed birds, 340 passed through the risk zone of the wind farm. The collision risk modelling for summer indicated a rate of 0 and 3.37 for migrants and resident birds, respectively.

For autumn VP survey, an average of 52 hours has been spent at four vantage points for bird surveys. A total of 374 birds were counted during the observations, comprising 45 migrant birds and 329 resident birds. Among these observed birds, 302 passed through the risk zone of the wind farm. The collision risk modelling for autumn indicated a rate of 0.09 and 0.99 collisions for migrant and resident birds, respectively.

During spring, summer and autumn VP surveys, at least 36 hours of observations was completed, which is recommended by SHN for a single season.

While spring surveys indicated minimal migratory movement, autumn surveys recorded passage of European Honey-buzzard, along with migrant passage of a few more species at about 0.75 birds/hr. While migratory activity is not expected to be heavy for the project, the results demonstrate the necessity of the operation phase bird monitoring to establish sporadic migratory activity patterns.

The risk assessment for resident birds indicates possibly a medium to high level of risk. The site offers suitable breeding and hunting habitats for some local raptor species. Among resident species, the Lesser Kestrel (*Falco naumanni*) exhibited the highest mortality rate, followed by the Eurasian Kestrel (*Falco tinnunculus*) and the Common Buzzard (*Buteo buteo*). Due to the absence of winter surveys, resident activity during winter is not accounted for. However, given the high-altitude location of the site, fewer birds are expected to be present during winter months. While these species are common and widespread, their hovering flight behaviour and frequent foraging near hilltops increase their susceptibility to collisions. Continued population monitoring is advised.

The alpine nature of the project site may influence activity levels of these raptors, as their behaviour likely correlates with the availability of rodent prey. Fluctuations in rodent populations can lead to increased bird activity and extended presence at the site. To establish a robust baseline dataset, a two-year standard monitoring would not be sufficient to capture the rodent-cycles and population fluctuations. Therefore, a review of whether such dynamics were well captured is recommended after the second year.

No globally threatened soaring bird species were recorded during the surveys; only common species were observed.

During the ETL surveys, all recorded species were classified as Least Concern (LC). Observations along the electric transmission line indicate relatively low bird passage frequency. Based on the current data, no mitigation measures are required. Bird observations along the transect line indicate that bird passages are relatively evenly distributed along the transmission line route. We did not record the exact flight route of every bird, still, the surveyors did not notice any segment with a higher passage rate. During TL surveys, the Ruddy Shelduck (*Tadorna ferruginea*) was observed. This species is known for its unique breeding behaviour, often nesting away from water sources and wetlands, typically on rock faces—an uncommon trait among duck species. Its presence does not necessarily indicate that the ETL poses a threat to other waterbird species.

During the breeding bird surveys, the majority of observed species are classified as Least Concern (LC) and are both common and widespread. The only globally threatened species recorded was the European Turtle Dove (*Streptopelia turtur*). Despite its status, this species is common and widespread in Turkey and is known for its fast and low flight, which reduces its susceptibility to turbine collisions, as supported by carcass search data in Turkey. This species will be discussed at the final report.

Additive Collision Risk Assessment (Project Galeforce)

Additive collision risk evaluation for Project Galeforce established from the 2024 baseline collection estimated the yearly total target species collision risk at 14 birds for the study period (spring, summer, autumn). The results indicate that about 11% of the collision risk was driven by migrant activity, while 80% of migrant collision risk was attributed to autumn period movement as opposed to spring migration. This finding is congruent with literature information regarding spring and autumn movement across Anatolia. Whereas spring movement occurs in a more concentrated manner spatially and temporally, autumn movement is usually more dispersed both over autumn period and geographically.

Interestingly, due to the correlation with autumn migrant activity, the project which accounted for the most estimated migrant risk was Uygar, followed by a three-way tie between Armutçuk, Ihlamur and Kestanederesi. Due to the massive area that over which Uygar spreads, its higher proportion in total migrant risk makes sense. Harmancık receiving little migratory activity and accounting for low risk this year was the least expected result, however Harmancık is indeed distinct in the sense that it is the only project where the percentage of migrant risk overall is approximately 50%, while others are lower, meaning risk at Harmancık is more so driven by migrants than any other project. This is significant due to the year-on-year variations in migratory rates over minor routes, which are not as consistently active each year as the major routes are, however can exhibit bursts of activity over some years. This is one of the reasons long-term monitoring datasets are crucial.

For residents, approximately half of the collision risk is attributed to summer season while spring and autumn are more or less equivalent. In terms of species, Common Buzzard, Short-toed Snake Eagle and Eurasian Kestrel, which are common, abundant, breeding raptors, topped the collision risk estimations and accounted for approximately 65% of the estimated risk for residents. These species are expected to continue to be active post-construction due to the habituation effect, and many of the projects providing adequate habitat for feeding and opportunities for perching. Additionally, Eleanora's Falcon activity will continue to be associated with late-summer and autumn passerine migration movement, since their breeding activity is reliant on the food source represented by migrant passerines in autumn. The species is also an indirect indicator of passerine migration at each project and wherever they are active can be assumed to be significant fly-over and/or rest habitats for songbirds.

Two further considerations are pertinent for the additive collision risk evaluation. (1) Regarding substitution of data for Hacıhıdırlar, if summer and autumn are assumed homogenous with spring, the overall results are not altered much. However, if resident bird species are relatively more active over the summer, or if autumn migratory movement is similarly moderate like with some other projects, this has the potential to have a medium level of influence on the overall picture, which is the more likely case. Operation phase monitoring and management may require a more pro-active approach due to baseline data gaps. Scheduling additional baseline collection study, while ensuring its smooth implementation ahead of construction is another option.

The second consideration is that (2) the baseline does not account for winter activity. As previously mentioned, target species activity in the WPP airspaces are generally expected to be diminished, though not non-existent. For some projects near important wetlands, such as Akköy and Ihlamur, wintering waterbird and wetland associating raptor activity might be a concern and these are discussed in respective final baseline reports. If winter activity is factored in as about the same as overall spring collision risk (which would indicate the maximum expected risk level), overall target species mortality for Project Galeforce would be contained within the range of 14-17 birds annually.

5.5 Bat

The methodology was applied effectively, and the results appear reliable. The survey confirmed that the equipment was deployed successfully, and recordings were completed across all seasons. The NatureScot methodology demonstrated that the 10-day monitoring period is effective. Drastic changes in bat call recordings across days highlighted significant fluctuations in bat activity.

Some technical issues were noted during specific surveys. During the analyses, some detectors were observed to fail or stop recording on certain nights. During the spring season, detector SP 12 failed after the third night of operation. In the summer, five detectors experienced failures after the fifth night. In contrast, the autumn season saw flawless performance, with all detectors working perfectly without any failures throughout the monitoring period. To overcome the issues related to the missing nights at certain Sampling Points, we calculated the average bat passes for each SP. Despite these issues, five full days of recordings from these detectors provided sufficient data for a meaningful analysis.

The highest bat activity was recorded in specific areas of the wind farm, particularly at the following SPs:

- By far the most active area was SP8 near T10,
- SP1, corresponding to T1 and T3
- SP14 and SP16, near turbines T13, T17 and T16

Transect surveys revealed significant bat movement, but in alpine conditions, bat concentrations did not exhibit a consistent pattern. As expected, the bats seem to move a lot between different feeding areas.

In Turkey, assessing the risk level of a wind turbine is challenging due to the lack of datasets and analytical ecological studies on bat population sizes. Based on ground static acoustic monitoring methodology, an indirect measure of activity levels is obtained in terms of recording numbers per unit time, which is not equivalent to number of individuals, yet is still a useful measure for gauging relative activity. The activity level, on average, is in the range of 150-250 recordings / night / turbine for the Project in the spring season, 300-500 recordings / night / turbine in summer, and 100-200 recordings / night / turbine in autumn. While these are average values, it is worth noting that maximum values / night / turbine are significantly higher in some cases. Maximum recordings include 1288 at SP4 and 1235 at SP6 in spring, up to 1500s at SP8 and SP16 in summer, and up to 1800s in autumn at SP8. The project recorded the most significant levels of activity for the 9 WPP on a per device per night basis for multiple species, and a overall richness of species detected.

While activity at SP8 was driven by *Pipistrellus pipistrellus* in spring and summer, which is a species that is Least Concern but highly collision prone due to its flight height at turbine blade levels, activity in autumn was notably driven by the collision prone *Nyctalus lasiopterus* (Vulnerable) and *Tadarida teniotis*.

In autumn, the Vulnerable Giant Noctule (Nyctalus lasiopterus) appears to migrate to the highlands for feeding purposes. This significant observation underscores the need for further research into its behaviour and habitat requirements in these areas. Similarly, the European Free-tailed Bat (*Tadarida teniotis*) and the high-altitude feeder Savi's Pipistrelle (Hypsugo savii) serve as indicators of high-altitude grassland ecosystems.

During the spring surveys, the most frequently recorded bat species was the Common Pipistrelle (*Pipistrellus pipistrellus*), accounting for 46% of all detections. The second most common species was Leisler's Bat (*Nyctalus leisleri*), representing 16%. Other significant contributors included the European Free-tailed Bat (*Tadarida teniotis*), which made up 10% of detections, and Savi's Pipistrelle (*Hypsugo savii*), at 9%. Notably, the Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), categorized as vulnerable, constituted 7% of observations.

During the summer surveys, the most frequently recorded bat species was the Common Pipistrelle (Pipistrellus pipistrellus), comprising 68% of all detections. Savi's Pipistrelle (*Hypsugo savii*) followed as the second most common, representing 11% of observations. The Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), a vulnerable species, accounted for 5%. The Serotine Bat (Eptesicus serotinus) made up 3% of detections, and Leisler's Bat (*Nyctalus leisleri*) accounted for 2%.

During the autumn surveys, the most frequently observed bat species was the Common Pipistrelle (Pipistrellus pipistrellus), comprising 29% of all detections. The European Free-tailed Bat (*Tadarida teniotis*) followed, representing 16%. The Vulnerable Giant Noctule (*Nyctalus lasiopterus*) made up 9%. Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), also classified as vulnerable, contributed 8%. Other species included Leisler's Bat (*Nyctalus leisleri*), which represented 7%. The Serotine Bat (Eptesicus serotinus) accounted for 6%, while Savi's Pipistrelle (*Hypsugo savii*) comprised 5% of the detections.

Notably, the globally threatened Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), classified as Vulnerable and requiring conservation attention, comprised approximately 6–18% of the recordings, representing a remarkably high proportion. Its presence suggests the existence of caves in the area, highlighting the importance of conserving these valuable habitats.

The presence of Leisler's Bat (*Nyctalus leisleri*), often associated with well-maintained forest habitats, suggests healthy forest ecosystems in the area. Notably, Özkurt and Bulut (2020) highlight that this region represents a previously undocumented latitude for the species, likely the southernmost extent of its range. This finding underscores the ecological significance of the forest, which harbours species typically found in northern Turkey's forest habitats, emphasizing the importance of conserving its unique biodiversity.

5.6 Butterfly

- A monitoring study should be conducted in 2025 to confirm the presence of the Apollo (*Parnassius apollo*) butterfly in the northern slopes of the study area, as these areas provide suitable habitat and host plan.
- Due to seasonal shifts, field research for the Apollo butterfly needs to be scheduled to earlier periods of summer (May-June- early July) as defined in Section 5.7.

5.7 Monitoring and Mitigation Implications

The implications for additional project monitoring and mitigation measures based on final results are summarised below:

- Flora: The monitoring actions outlined in the BMP should be implemented, with the current status, presented and evaluated in the E&S Progress Reports.

- Habitats: All natural habitats, including turbine locations and access roads, particularly in KBA overlap areas, should be monitored for disturbances, with BMP actions implemented and progress evaluated in reports. No net loss of these habitats should be achieved.
- Birds: No additional monitoring and mitigation implications than for which commitments have already been established are indicated for bird species based on baseline results.
    - The project is contributing an outsized proportion of collision risk in Project Galeforce, most of which is driven by resident activity. The project can be evaluated as the top priority project for shutdown on demand implementation to address resident species mortality. The first-year design of PCFM should establish operation mortality baseline (sans shutdown on demand) and subsequent years should demonstrate efficacy of turbine management once implemented.
    - Operation phase VP and breeding bird / raptor monitoring, collision risk estimates, post-construction fatality monitoring will further inform adaptive management.
    - Though migratory rates in spring were low, moderate activity in autumn was recorded. If the 3-year operation phase monitoring program does not satisfactorily capture the rodent population dependent activity patterns of residents, or the migration patterns (or lack thereof), the operation phase monitoring may be extended to 5 years.
    - Waterbird activity is not being considered as a significant issue based on final results, and winter surveys are not indicated for the project at this stage.
- Bats:
    - Notable activity of *Nyctalus lasiopterus* near SP8 suggests presence of favoured roost trees potentially to the north, and movement up the valley to preferred feeding areas. Additional surveys should be scheduled in 2025 in summer and autumn to clarify movement patterns near SP8. The surveys would most likely expand on the existing methodology to include visual searches at dusk and dawn to identify movement routes, potential roost areas and feeding areas. This information should be leveraged to pinpoint the *when*, *how* and *why* of increased activity, especially of threatened species, which would enable finetuning of the turbine curtailment program since the highly active species are also under protection, collision prone and threatened.
- Fauna: The monitoring actions outlined in the BMP should be implemented, with progress reports.
- Butterfly: It is recommended to conduct five different field studies for apollo butterfly in northern slopes of the Project area:
    - 1st survey: A three-day field study is recommended for mid-May.
    - 2nd survey: A three-day field study is recommended for the end of May.
    - 3rd survey: A three-day field study is recommended for mid-June.
    - 4th survey: A three-day field study is recommended for the end of June.
    - 5th survey: A three-day field study is recommended for the beginning of July.

6 Appendix

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6.7 Bird Survey Conditions

Date	Surveyor	VP	Cloud %	WindDir	WindSp (m/s)	Prec	Temp (°)	Vis (km)
24/03	MY	VP1	0	SW	2	0	13	10
24/03	CG	VP3	10	SW	2	0	13	8
24/03	BD	VP4	20	SW	2	0	8	14
26/03	MY	VP1	30	NE	1	0	12	10
26/03	CG	VP3	80	SW	6	0	10	10
26/03	BD	VP4	60	SW	6	0	10	10
27/03	CG	VP3	70	NE	4	15	20	8
27/03	BD	VP4	40	SE	4	15	8	14
28/03	BD	VP1	90	S	8	0	19	14
28/03	CG	VP2	90	S	8	0	10	13
29/03	CG	VP2	0	S	6	0	18	8
26/04	CG	VP2	10	N	5	0	22	10
26/04	MY	VP3	0	NW	2	0	21	10
26/04	BD	VP4	20	NW	8	0	22	10
27/04	CG	VP2	10	NW	4	0	25	10
27/04	MY	VP3	0	N	2	0	26	10
27/04	BD	VP4	20	NW	7	0	23	10
28/04	MY	VP1	50	N	3	0	22	10
29/04	CG	VP1	20	NE	3	0	22	10
24/05	CG	VP1	80	N	9	0	17	5
24/05	MY	VP3	90	NW	9	0	21	10
24/05	BD	VP4	80	NW	8	0	17	10
25/05	CG	VP1	10	N	7	0	24	10
26/05	CG	VP2	80	N	7	15	19	10
26/05	MY	VP3	80	N	5	60	20	10
26/05	BD	VP4	100	W	4	60	16	10
27/05	CG	VP2	80	N	11	0	14	5

Date	Surveyor	VP	Cloud %	WindDir	WindSp (m/s)	Prec	Temp (°)	Vis (km)
25/06	CG	VP2	0	N	7	0	35	10
25/06	MY	VP3	20	N	5	0	36	10
25/06	BD	VP4	10	N	3	0	35	10
26/06	MY	VP2	0	N	5	0	35	10
26/06	CG	VP3	0	N	8	0	34	10
26/06	BD	VP4	0	N	7	0	36	10
27/06	MY	VP1	0	N	5	0	36	10
27/06	CG	VP2	0	N	7	0	36	10
28/06	CG	VP2	20	N	8	0	33	10
28/06	MY	VP1	40	NW	5	0	32	10
30/06	BD	VP4	0	N	13	0	33	10
30/06	CG	VP2	0	NE	11	0	32	10
30/06	MY	VP3	0	NE	10	0	33	10

01/07	CG	VP1	0	N	7	0	32	10
02/07	CG	VP1	0	N	5	0	35	10
23/07	CG	VP2	20	N	7	0	37	10
23/07	MY	VP3	70	N	6	0	37	10
23/07	BD	VP4	20	NW	5	0	38	10
24/07	CG	VP2	20	N	6	0	33	10
24/07	MY	VP1	20	N	7	0	33	10
25/07	CG	VP1	40	N	6	0	31	10

Date	Surveyor	VP	Cloud %	WindDir	WindSp (m/s)	Prec	Temp (°)	Vis (km)
20/08	CG	VP2	0	W	7	0	35	10
20/08	MY	VP3	0	W	5	0	36	10
20/08	BD	VP4	10	W	6	0	36	10
21/08	CG	VP3	10	W	8	0	32	10
21/08	BD	VP4	10	W	12	0	33	10
22/08	CG	VP4	30	N	5	0	31	10
22/08	MY	VP3	30	N	7	0	32	10
23/08	MY	VP1	0	NE	6	0	33	10
23/08	CG	VP2	10	NW	6	0	33	10
24/08	CG	VP1	10	NW	9	0	33	10
07/09	CG	VP2	10	NE	11	0	30	10
07/09	MY	VP3	0	N	8	0	30	10
07/09	BD	VP4	10	N	12	0	29	10
08/09	CG	VP1	30	NE	10	0	27	10
09/09	BD	VP4	30	N	6	0	31	10
09/09	MY	VP3	50	NE	5	0	31	10
09/09	CG	VP2	30	NE	3	0	30	10
10/09	CG	VP1	80	SW	10	0	28	10
01/10	MY	VP3	50	N	5	0	20	10
01/10	CG	VP2	40	N	6	0	20	10
01/10	BD	VP4	40	N	6	0	21	10
02/10	MY	VP3	0	NE	5	0	22	10
02/10	CG	VP2	10	NE	6	0	22	10
02/10	BD	VP4	0	N	6	0	22	10
03/10	CG	VP1	10	SW	10	0	23	10
04/10	CG	VP1	0	S	4	0	28	10
19/10	CG	VP1	0	NE	8	0	16	10
19/10	MY	VP3	0	NE	8	0	16	10
19/10	BD	VP4	10	NE	6	0	16	10
20/10	MY	VP1	50	NE	6	0	19	10
20/10	CG	VP2	70	NE	4	0	19	10
20/10	BD	VP4	10	NE	2	0	18	10
21/10	CG	VP2	0	NE	12	0	18	10

6.8 Bird Observation Data

Sample rows from the Project bird data table is provided. Total duration of flight is noted as Dur. The height intervals are below the rotor height (a), at rotor height (b) and above the rotor height (c). Spec* abbreviations follow first three letters of genus name and first two letters of species name convention (for example, Cirga denotes *Circaetus gallicus*)

Date	VP	Time	Spec*	Number	Dur (sec)	Flight_Height	Behaviour	Status
24/03	VP1	11:13	Butru	1	30	bb------------------	patrolling	Resident
24/03	VP1	12:21	Butru	1	300	aabbbbbbbbbbcccccccc	perched	Resident
24/03	VP1	12:45	Accxx	1	300	bbbbabbbbbbbcccccccc	perched	Resident
24/03	VP1	14:47	Butru	1	60	bbba----------------	patrolling	Resident
24/03	VP1	13:07	Falti	1	300	bbbbbbbbaabbbbaabbbb	hunting/foraging	Resident
24/03	VP1	16:17	Butru	2	240	cccccccccccccccc----	patrolling	Resident
24/03	VP3	14:18	Cirae	1	30	cc------------------	migrating	Migrant
24/03	VP3	14:21	Butru	1	45	ccc-----------------	patrolling	Resident
24/03	VP3	15:07	Falti	1	75	babbb---------------	hunting/foraging	Resident
24/03	VP3	15:28	Falti	1	90	bbbabb--------------	hunting/foraging	Resident
24/03	VP3	15:35	Butru	1	15	b-------------------	patrolling	Resident
24/03	VP3	16:02	Cirga	1	30	cc------------------	hunting/foraging	Resident
24/03	VP4	16:51	Butru	1	30	cc------------------	patrolling	Resident
24/03	VP4	16:56	Butru	1	75	bbbba---------------	perched	Resident
26/03	VP1	11:04	Butru	1	30	aa------------------	perched	Resident
26/03	VP1	11:54	Accxx	1	240	ccccccccccbbbbaa----	patrolling	Resident
26/03	VP1	12:51	Cirae	1	15	b-------------------	migrating	Migrant
26/03	VP1	13:26	Falti	2	45	bbb-----------------	patrolling	Resident
26/03	VP1	13:53	Accxx	3	60	cccc----------------	patrolling	Resident
26/03	VP1	15:48	Falti	2	270	bbbbaabbbbbbaabbbb--	hunting/foraging	Resident
26/03	VP1	16:52	Cirae	2	75	bbccc---------------	migrating	Migrant
…								

6.9 Collision Probability Calculation

Calculation of collision risk for bird passing through rotor area as in NatureScot (2010),

Only enter input parameters in blue

Parameters	Value	Unit
K: [1D or [3D] (0 or 1)	1	
NoBlades	3	
MaxChord	4,2	m
Pitch (degrees)	30	
Species	Common Buzzard	
BirdLength	0,58	m
Wingspan	1,37	m
F: Flapping (0) or gliding (+1)	1	
Bird speed	11,6	m/sec
RotorDiam	138	m
RotationPeriod	5,00	sec

Calculation of alpha and p(collision) as a function of radius

			Upwind:			Downwind:		
r/R	c/C	a	collide		contribution	collide		contribution
radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r
0,025	0,575	5,35	17,07	0,88	0,00110	14,65	0,76	0,00095
0,075	0,575	1,78	6,49	0,34	0,00252	4,08	0,21	0,00158
0,125	0,702	1,07	5,14	0,27	0,00332	2,19	0,11	0,00142
0,175	0,860	0,76	4,86	0,25	0,00440	1,25	0,06	0,00113
0,225	0,994	0,59	4,76	0,25	0,00554	0,58	0,03	0,00068
0,275	0,947	0,49	4,09	0,21	0,00581	0,74	0,04	0,00105
0,325	0,899	0,41	3,81	0,20	0,00640	1,12	0,06	0,00188
0,375	0,851	0,36	3,47	0,18	0,00673	1,26	0,07	0,00244
0,425	0,804	0,31	3,18	0,16	0,00700	1,34	0,07	0,00295
0,475	0,756	0,28	2,94	0,15	0,00721	1,39	0,07	0,00341
0,525	0,708	0,25	2,72	0,14	0,00738	1,41	0,07	0,00382
0,575	0,660	0,23	2,52	0,13	0,00750	1,40	0,07	0,00417
0,625	0,613	0,21	2,34	0,12	0,00756	1,38	0,07	0,00448
0,675	0,565	0,20	2,17	0,11	0,00757	1,35	0,07	0,00473
0,725	0,517	0,18	2,01	0,10	0,00753	1,31	0,07	0,00493
0,775	0,470	0,17	1,86	0,10	0,00744	1,27	0,07	0,00508
0,825	0,422	0,16	1,71	0,09	0,00730	1,21	0,06	0,00517
0,875	0,374	0,15	1,57	0,08	0,00710	1,15	0,06	0,00522
0,925	0,327	0,14	1,43	0,07	0,00685	1,09	0,06	0,00521
0,975	0,279	0,14	1,30	0,07	0,00655	1,02	0,05	0,00515

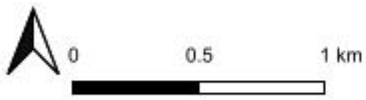
Overall p(collision) =	Up-wind	12,3%	Downwind	6,5%
	Average	9,4%		

6.10 Sample Field Recording Sheets

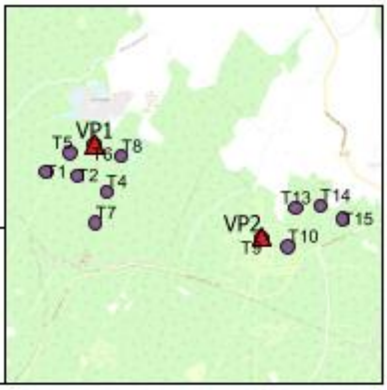
6.10.1 VP Map and Sheet

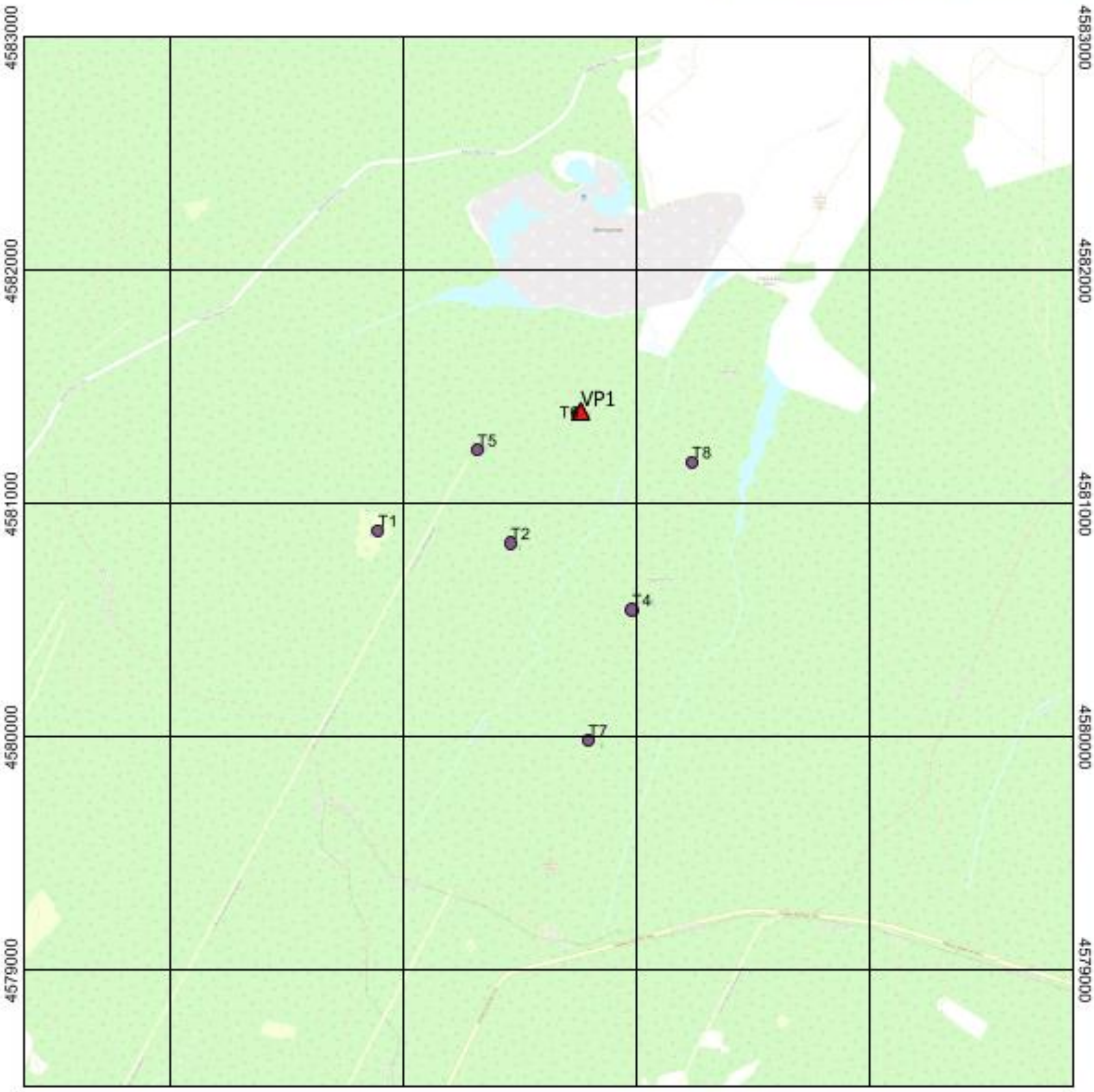
VP Number	
Surveyor	
Project	

Date	
Start Time	
End Time	



1:25.000
WGS 84 UTM 35N





Project		VP		Cloud cover		%	Precipitation	mm
Date		Start1-Finish1-		Wind Direction			Temp. (max)	ºC
Surveyor		Start2-Finish2		Wind Speed		m/s	Visibility	km
Comments								

Height: A (below rotor height), B (at rotor height), C (above rotor height)

	Time	Species	Count	Behaviour	Resident/Migrant/Unclear	Duration (sec)	Height	60	120	180	240	300
1							C					
							B					
							A					
2							C					
							B					
							A					
3							C					
							B					
							A					
4							C					
							B					
							A					
5							C					
							B					
							A					
6							C					
							B					
							A					
7							C					
							B					
							A					
8							C					
							B					
							A					
9							C					
							B					
							A					

6.10.2 Breeding Bird

Project		Point		Start time		Temperature (Celsius)	
Date		North (UTM)		Finish time		Wind direction	
Surveyor		East (UTM)		Duration (min)		Wind speed (m/s)	
Notes						Precipitation (mm)	
						Visibility (km)	

Species	Min. count	Max. count	Breeding code	Species	Min. count	Max. count	Breeding code

6.10.3 Acoustic Bat

Project			Coordinates (Utm-Wgs84)	
Surveyor			Folder Name	
Location			4 Directional Photo	☐
Detector Serial#			Notes	

Start	Control	Finish	Date	Hour	# Recording	Temp (C°)	Cloud (%)	Wind (M/S)	Precipitation?	Fog?	Notes
☐	☐	☐	__/__/__	__:__					☐	☐	
☐	☐	☐	__/__/__	__:__					☐	☐	
☐	☐	☐	__/__/__	__:__					☐	☐	
☐	☐	☐	__/__/__	__:__					☐	☐	
☐	☐	☐	__/__/__	__:__					☐	☐	

6.11 Flight Line Maps

[Maps were provided in a separate document.]

6.12 Error Study of VP Effort Averaging

This appendix is an experimental section intended for investigating the effects of VP effort averaging on baseline survey results where VP effort durations were more than a few hours different from each other. First, the results presented as is are shown. Then, results if the summer season cutoff was not changed is shown. Finally, an approach where each VP are evaluated separately (model ran individually for each VP and effort duration) is presented.

Comparison of results from alternative models show that for projects below a certain level of activity such as Kestanederesi WPP, VP effort averaging in uneven effort distribution, though not best practice, results in a tolerable level of uncertainty. Effort averaging is not advisable for any project identified to exhibit a clear bias for bird activity on certain parts of the WPP, or high levels of bird activity.

6.12.1 Supplementary Baseline CRM

For easy reference, summer and autumn VP effort and collision risk model results are provided. The tables presented here are the versions currently featured as Supplementary Baseline results. Note summer VP effort is stunted in this version due to applying a different cutoff date for end of summer.

Effort

Table 6-1 VP survey effort and dates in summer.

Week	First Day	VP1	VP2	VP3	VP4	Total (h)
W26	24/06	13:20	31:30	21:10	22:02	88:02
W27	01/07	11:57	-	-	-	11:57
W30	22/07	11:43	14:10	7:33	7:54	41:20
Total	-	37:00	45:40	28:43	29:56	141:19

Table 6-2 VP survey effort and dates in autumn.

Week	First Day	VP1	VP2	VP3	VP4	Total (h)
W34	19/08	13:01	14:30	22:47	22:25	72:43
W36	02/09	7:02	7:18	7:37	7:51	29:48
W37	09/09	4:43	7:29	7:44	7:50	27:46
W40	30/09	12:59	14:41	15:12	15:50	58:42
W42	14/10	14:46	7:42	7:48	16:04	46:20
W43	21/10	-	5:58	-	-	5:58
Total	-	52:31	57:38	61:08	70:00	241:17

CRM

No migrant calculation in summer 2024 since no migrants were recorded. (CRA date cutoff was shifted to mid-August when Kestanederesi WPP migratory activity was seen to be higher than expected in early autumn. Mid-August cutoff is standard application for WPPs on major-minor routes in Turkiye. Hence no summer migrants). Migrant risk is 0 in summer 2024.

Table 6-3 The estimated mortality rates of resident species in summer 2024

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Lesser Kestrel	27788	604073	450	1182	95,73	1,91

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Common Buzzard	6561	142634	113	286	26,93	0,54
Eleonora's Falcon	4589	99761	76	221	17,02	0,34
Eurasian Kestrel	4078	88642	67	155	14,42	0,29
Short-toed Snake-Eagle	1901	41326	33	96	8,34	0,17
Others	1531	33275	26	67	6,09	0,12
Total	46448	1009711	765	2008	168,53	3,37

Table 6-4 The estimated mortality rates of migrant species in Autumn 2024

Common Name	observed	# observed	# thru rotors	Mort. w/o avo.	Mort. w/ avo.
European Honey-buzzard	21	309,84	64,36	5,60	0,11
Eurasian Sparrowhawk	5	73,77	15,32	1,29	0,03
Eurasian Marsh-Harrier	2	29,51	6,13	0,56	0,01
Montagu's Harrier	2	29,51	6,13	0,72	0,01
Total	30	442,63	91,94	8,17	0,16

Table 6-5 The estimated mortality rates of resident species in Autumn 2024

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Eurasian Kestrel	9066	160524	121	281	26,11	0,52
Common Buzzard	3790	67107	53	135	12,67	0,25
Short-toed Snake-Eagle	3404	60266	49	140	12,16	0,24
Peregrine Falcon	661	11707	9	25	2,06	0,04
Booted Eagle	289	5121	4	10	0,9	0,02
Others	855	15146	12	31	2,65	0,05
Total	18066	319869	247	621	56,55	1,13

Summer and autumn total estimations based on these calculations is 0.16 birds/period for migrants and 4.50 birds/period for residents.

6.12.2 Alternative CRM #1

In this calculation, VP efforts are still averaged, but CRA date cutoff is not shifted to mid-August and therefore summer season extends to end of August. Note combined total effort for summer and autumn are the same as the original version since this is the same data set. Some migrants are now calculated as part of summer season due to season date changes. Summer VP effort now reaches minimum required effort.

Effort

Table 6-6 VP survey effort and dates in summer (alternative 1).

Week	FirstDay	VP1	VP2	VP3	VP4	Total
W26	24/06	13:20	31:30	21:10	22:02	88:02
W27	01/07	11:57	-	-	-	11:57
W30	22/07	11:43	14:10	7:33	7:54	41:20

Week	FirstDay	VP1	VP2	VP3	VP4	Total
W34	19/08	13:01	14:30	22:47	22:25	72:43
Total	-	50:01	60:10	51:30	52:21	214:02

Table 6-7 VP survey effort and dates in autumn (alternative 1).

Week	FirstDay	VP1	VP2	VP3	VP4	Total
W36	02/09	7:02	7:18	7:37	7:51	29:48
W37	09/09	4:43	7:29	7:44	7:50	27:46
W40	30/09	12:59	14:41	15:12	15:50	58:42
W42	14/10	14:46	7:42	7:48	16:04	46:20
W43	21/10	-	5:58	-	-	5:58
Total	-	39:30	43:08	38:21	47:35	168:34

CRM

Table 6-8 The estimated mortality rates of migrant species in Summer 2024 (alternative 1).

Common Name	observed	# observed	# thru rotors	Mort. w/o avo.	Mort. w/ avo.
European Honey-buzzard	14	201,46	41,85	3,64	0,07
Eurasian Marsh-Harrier	1	14,39	2,99	0,27	0,01
Eurasian Sparrowhawk	1	14,39	2,99	0,25	0,01
Montagu's Harrier	1	14,39	2,99	0,35	0,01
Total	17	244,63	50,81	4,52	0,09

Table 6-9 The estimated mortality rates of resident species in summer 2024 (alternative 1).

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Lesser Kestrel	27788	479857	357	939	76,05	1,52
Common Buzzard	7699	132946	105	267	25,1	0,50
Eurasian Kestrel	6083	105035	79	184	17,08	0,34
Eleonora's Falcon	4852	83785	64	186	14,3	0,29
Short-toed Snake-Eagle	3386	58470	47	136	11,8	0,24
Others	1702	29384	23	60	5,37	0,11
Total	51509	889478	675	1771	149,7	2,99

Table 6-10 The estimated mortality rates of migrant species in Autumn 2024 (alternative 1).

Common Name	observed	# observed	# thru rotors	Mort. w/o avo.	Mort. w/ avo.
European Honey-buzzard	7	126,24	26,22	2,28	0,05
Eurasian Sparrowhawk	4	72,14	14,98	1,26	0,03
Eurasian Marsh-Harrier	1	18,03	3,75	0,34	0,01
Montagu's Harrier	1	18,03	3,75	0,44	0,01

Common Name	observed	# observed	# thru rotors	Mort. w/o avo.	Mort. w/ avo.
Total	13	234,45	48,7	4,33	0,09

Table 6-11 The estimated mortality rates of resident species in Autumn 2024 (alternative 1).

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Eurasian Kestrel	7062	152821	115	267	24,85	0,50
Common Buzzard	2653	57409	45	115	10,84	0,22
Short-toed Snake-Eagle	1919	41527	33	96	8,38	0,17
Peregrine Falcon	571	12361	10	26	2,18	0,04
Booted Eagle	276	5963	5	12	1,05	0,02
Others	525	11371	9	23	1,99	0,04
Total	13005	281452	217	539	49,29	0,99

Summer and autumn total estimations based on these calculations is 0.18 birds/period for migrants and 3.98 birds/period for residents.

6.12.3 Alternative CRM #2

In this calculation, VP efforts are not averaged. Each VP is calculated for its own visual coverage – matched to the flight lines associated with the visual field of each VP, and each VP's own effort duration. Date cutoff is applied as mid-August.

Effort

Table 6-12 VP survey effort and dates in summer.

Week	First Day	VP1	VP2	VP3	VP4	Total (h)
W26	24/06	13:20	31:30	21:10	22:02	88:02
W27	01/07	11:57	-	-	-	11:57
W30	22/07	11:43	14:10	7:33	7:54	41:20
Total	-	37:00	45:40	28:43	29:56	141:19

Table 6-13 VP survey effort and dates in autumn.

Week	First Day	VP1	VP2	VP3	VP4	Total (h)
W34	19/08	13:01	14:30	22:47	22:25	72:43
W36	02/09	7:02	7:18	7:37	7:51	29:48
W37	09/09	4:43	7:29	7:44	7:50	27:46
W40	30/09	12:59	14:41	15:12	15:50	58:42
W42	14/10	14:46	7:42	7:48	16:04	46:20
W43	21/10	-	5:58	-	-	5:58
Total	-	52:31	57:38	61:08	70:00	241:17

CRM

No migrant calculation in summer 2024 since no migrants were recorded. (CRA date cutoff was shifted to mid-August when Kestanederesi WPP migratory activity was seen to be higher than expected in early autumn. Mid-August cutoff is standard application for WPPs on major-minor routes in Turkiye. Hence no summer migrants). Migrant risk is 0 in summer 2024.

Table 6-14 The estimated mortality rates of resident species in summer 2024 (alternative 2)

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Lesser Kestrel	27,657	470,438	350	921	74.55	1.49
Common Buzzard	7,127	114,009	90	230	21.52	0.44
Eleonora's Falcon	4,668	86,753	66	192	14.81	0.29
Eurasian Kestrel	3,909	69,587	52	122	11.32	0.24
Short-toed Snake-Eagle	2,101	39,301	31	91	7.92	0.15
Others	1,163	20,672	16	43	3.80	0.07
Long-legged Buzzard	368	4,453	4	9	0.82	0.02
unidentified Raptor	60	1,106	-	2	0.20	-
Grand Total	47,053	806,319	609	1,610	134.94	2.70

Table 6-15 The estimated mortality rates of migrant species in Autumn 2024 (alternative 2)

Common Name	observed	# observed	# thru rotors	Mort. w/o avo.	Mort. w/ avo.
European Honey-buzzard	21	347	72	6.27	0.13
Eurasian Sparrowhawk	5	84	17	1.47	0.03
Montagu's Harrier	2	32	7	0.78	0.02
Eurasian Marsh-Harrier	2	32	7	0.61	0.02
Grand Total	30	495	103	9.13	0.20

Table 6-16 The estimated mortality rates of resident species in Autumn 2024 (alternative 2)

Common Name	Total	Total (sec/year)	Occupancy	# passage	Mort. w/o avo.	Mort. w/ avo.
Eurasian Kestrel	9066	167278	126	293	27.21	0.53
Common Buzzard	3789	73670	58	148	13.9	0.27
Short-toed Snake-Eagle	3404	60578	49	141	12.23	0.25
Peregrine Falcon	619	10936	8	23	1.92	0.04
Others	290	4979	4	9	0.88	0.02
Eleonora's Falcon	261	4611	4	10	0.79	0.02
Booted Eagle	289	4462	3	9	0.79	0.02
Long-legged Buzzard	181	2948	3	6	0.54	0.01
Eurasian Sparrowhawk	125	2409	2	4	0.4	0.01
European Honey-buzzard	40	825	1	2	0.16	0.00
Grand Total	18064	332696	258	645	58.82	1.17

Summer and autumn total estimations based on these calculations is 0.20 birds/period for migrants and 3.87 birds/period for residents.

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