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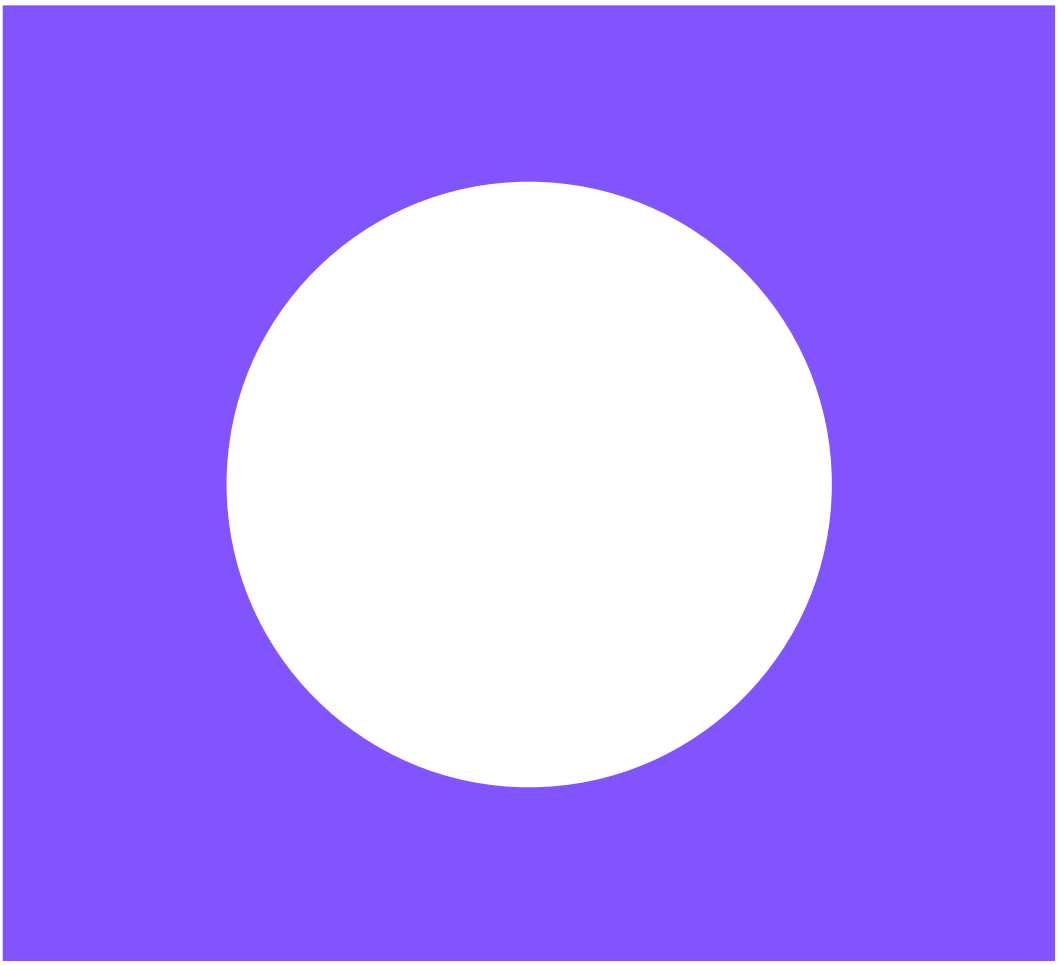

Ihlamur Wind Power Plant (WPP) Project

Supplementary Biodiversity Surveys Final Report

May 2025

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Ihlamur Wind Power Plant (WPP) Project

Supplementary Biodiversity Surveys Final Report

May 2025

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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

Ihlamur Wind Power Plant (WPP) Project ("the Project") with 18 turbines and 75.6 MW_m 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.

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, other herpetofauna species 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. Among the mammal species identified in the Project Area of Influence, 6 species are listed in Annex II of the Bern Convention, 9 species in Annex III, and 3 species in Annex III, 2 species in Annex III and 1 species in Annes I of CITES. According to the IUCN Red List, no species in the area is classified as endangered, with 2 species categorized as Vulnerable (VU). The remaining species are classified as Least Concern (LC). All vulnerable species have been recorded as literature.

The flora field studies identified a total of 2 regional endemic (*Erodium somanum* (EN) and *Cirsium balikesirense* (VU)) and 1 rare distribution but not endemic (*Cyclamen hederifolium* (VU)) plant species. The plant species have been recorded in areas such as turbine locations and site roads. Due to habitat similarities, their presence in the access road and ETL areas is also considered likely, despite the absence of direct observations. The seed of *Erodium somanum* and Cirsium balikesirense are collected and delivered to Ankara Seed-Gen Bank. The population of *Cycalamen hederifolium* in the region is at a very good level. Therefore, no additional action is deemed necessary in 2024. It is recommended to re-evaluate future actions with population monitoring during the operation period.

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 with a moderate uptick in autumn, and medium to high overall collision risk estimations for resident species based on this year's results. ETL segment with higher collision hazard was identified. Additional mitigation and monitoring approaches were recommended.

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 with potential migratory activity in autumn, and including threatened species M. schreibersii. 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 Çanakkale Connection Region on 30 May 2019 within the scope of “Renewable Energy Resource Areas (YEKA) Regulation” and “Allocation of Wind Energy Based Renewable Energy Resource Areas (YEKA) and Total Connection Capacities”[1]. Upon this award, a “YEKA Use Rights Agreement” was signed between Enerjisa Üretim Santralleri Anonim Şirketi and Ministry of Energy and Natural Resources (MoENR) on 09 March 2020. Subsequently, the "YEKA Use Rights Agreement" signed by Enerjisa Üretim Santralleri Anonim Şirketi for the 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.

Ihlamur Wind Power Plant (WPP) Project (“the Project”) with 18 turbines and 75.6 MW_m total installed power, is planned to be implemented by Enerjisa Üretim. The Project components consists of 18 turbines, a switchyard, Project roads (i.e., access and site roads), a 68.75 tonnes/hour capacity mobile crushing and screening facility and an energy transmission line (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 the 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) Terrestrial Hunting Law (11.07.2003/25165 - 28.10.2020) Law on Animal Protection (01.07.2004/25509 - 13.12.2010) Regulation on the Protection of Wetlands (04.04.2014/28962 - 23.06.2022) Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (27.12.2001/24623 - 20.07.2019) Regulation on Protection of Wildlife and Wildlife Development Areas (08.11.2004/25637) Law on Protection of Cultural and Natural Assets (23.07.1983/18113 - 15.06.2022) Regulation on Collection, Protection and Usage of Plant Genetic Resources (19.07.2012/28358) Law on Fisheries (04.04.1971/ 13799 - 17.02.2021) The Environmental Protection Agency for Special Areas (08.07.2011/ 27988) Environment Law (11.08.1983 / 18132 - 15.06.2022) Forestry Law (08.09.1956 / 9402 - 25.12.2021) Law on Pasture (28.02.1998 / 23272 - 18.01.2019) Law on Coastal Areas Management (17.04.1990 / 20495 - 28.10.2020)	National Plan on on-site Protection of Plant Genetic Diversity (1998) National Environmental Action Plan (1999) National Forestry Program (2004) Climate Change Action Plan (2012) Turkish National Action Plan against Desertification (2015) National Rural Development Strategy (2015) National Biological Diversity Strategy and Action Plan (2019)

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 ETL and Access Road areas, 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. The Project's well-studied National EIA for flora includes a flora study covering turbine locations.
- 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 Kaz Mountains and Manyas Lake KBA.

Field Studies:

- Field studies were conducted in areas that were not surveyed previously, specifically in areas where target species could potentially be observed. The flora studies, as a supplementary component, have been primarily concentrated on the ETL and access road areas, while turbine locations may be considered but are not the primary focus of the study. These surveys were also designed to status of endemic flora species were present in the project 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 below 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

The survey was conducted in June, July and October. Seed collection was conducted in the months of June, July, and October, A translocation activity for *Cyclamen hederifolium* was initially planned for October; however, due to the species’ robust population status within the survey area, the intervention was deemed unnecessary and therefore not implemented.These activities were performed as part of the planned conservation and management efforts to ensure the successful relocation and preservation of the 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	40° 5'27.79"N - 27°38'44.87"E	Access Road	1	40° 5'30.90"N - 27°38'52.51"E	40° 5'28.22"N - 27°38'37.43"E	Access Road
2	40° 4'41.35"N - 27°38'13.65"E	Access Road	2	40° 4'45.95"N - 27°38'14.30"E	40° 4'33.64"N - 27°38'9.50"E	Access Road
3	40° 3'42.62"N - 27°37'54.32"E	Access Road	3	40° 3'37.50"N - 27°38'0.84"E	40° 3'48.79"N - 27°37'44.15"E	Access Road
4	40° 2'50.51"N - 27°37'16.70"E	Access Road	4	40° 2'55.90"N - 27°37'16.61"E	40° 2'45.52"N - 27°37'16.56"E	Access Road

5	40° 1'58.33"N - 27°37'8.72"E	Access Road	5	40° 2'7.11"N - 27°37'9.51"E	40° 1'57.82"N - 27°37'2.76"E	Access Road
6	40° 1'53.99"N - 27°36'54.80"E	Access Road	6	40° 2'0.63"N - 27°37'0.70"E	40° 1'47.02"N - 27°36'51.00"E	Access Road
7	40° 1'26.51"N - 27°36'45.06"E	Access Road	7	40° 1'30.02"N - 27°36'45.69"E	40° 1'7.45"N - 27°36'38.99"E	Access Road
8	40° 0'52.08"N - 27°36'42.47"E	Access Road	8	40° 0'57.28"N - 27°36'42.48"E	40° 0'46.95"N - 27°36'41.38"E	Access Road
9	40° 0'22.66"N - 27°36'10.20"E	Access Road	9	40° 0'23.41"N - 27°36'16.45"E	40° 0'18.43"N - 27°36'14.14"E	Access Road
10	27°36'10.20"E - 27°36'1.90"E	Access Road	10	39°59'55.68"N - 27°36'2.96"E	39°59'49.88"N - 27°35'58.47"E	Access Road
11	39°59'34.08"N - 27°35'26.00"E	Access Road	11	39°59'32.19"N - 27°35'34.61"E	39°59'33.12"N - 27°35'26.29"E	Access Road
12	39°58'56.68"N - 27°35'20.49"E	Access Road	12	39°59'1.54"N - 27°35'17.40"E	39°58'52.71"N - 27°35'12.37"E	Access Road
13	39°57'51.11"N - 27°31'54.43"E	ETL - Switch Yard - T14	13	39°57'57.14"N - 27°31'51.28"E	39°57'55.82"N - 27°32'0.28"E	ETL - Switch Yard - T14
14	39°58'11.19"N - 27°32'2.30"E	ETL - Target Flora Species - Switch Yard - T14 - T2	14	39°58'6.06"N - 27°31'50.09"E	39°58'21.50"N - 27°31'58.44"E	ETL - Target Flora Species - Switch Yard - T14 - T2
15	39°58'23.26"N - 27°31'38.87"E	ETL - Target Flora Species - T2	15	39°58'21.48"N - 27°31'50.56"E	39°58'34.27"N - 27°31'51.10"E	ETL - Target Flora Species - T2
16	39°58'58.37"N - 27°31'43.06"E	ETL - Target Flora Species - T11	16	39°58'45.12"N - 27°31'31.22"E	39°58'58.47"N - 27°31'54.70"E	ETL - Target Flora Species - T11
17	39°58'54.66"N - 27°31'18.67"E	ETL	17	39°58'54.47"N - 27°31'24.35"E	39°58'56.62"N - 27°31'2.83"E	ETL
18	39°59'6.78"N - 27°31'11.89"E	ETL	18	39°59'3.53"N - 27°31'16.62"E	39°59'2.51"N - 27°31'0.49"E	ETL
19	39°59'17.12"N - 27°30'23.98"E	ETL	19	39°59'17.07"N - 27°30'24.69"E	39°59'6.63"N - 27°30'33.46"E	ETL
20	39°59'39.96"N - 27°30'7.40"E	ETL	20	39°59'29.03"N - 27°30'21.01"E	39°59'47.73"N - 27°30'12.84"E	ETL
21	40° 0'7.19"N - 27°30'18.11"E	ETL	21	39°59'59.07"N - 27°30'10.75"E	40° 0'9.85"N - 27°30'10.16"E	ETL
22	40° 0'30.62"N - 27°30'0.82"E	ETL	22	40° 0'24.83"N - 27°30'9.07"E	40° 0'35.65"N - 27°29'57.65"E	ETL
23	40° 1'3.00"N - 27°30'20.29"E	ETL	23	40° 0'55.88"N - 27°30'9.91"E	40° 1'6.95"N - 27°30'17.09"E	ETL
24	40° 0'27.69"N - 27°29'23.72"E	ETL	24	40° 0'37.20"N - 27°29'32.95"E	40° 0'20.82"N - 27°29'19.51"E	ETL
25	39°58'46.31"N - 27°32'18.35"E	Target Flora Species - T6 - T17	25	39°58'39.23"N - 27°32'3.33"E	39°58'54.69"N - 27°32'32.10"E	Target Flora Species - T6 - T17

26	39°59'21.25"N - 27°31'41.43"E	Target Flora Species - T8-T15	26	39°59'10.68"N - 27°31'45.08"E	39°59'19.18"N - 27°31'39.43"E	Target Flora Species - T8-T15
27	39°57'21.28"N - 27°31'9.48"E	Target Flora Species - T16 - T9	27	39°57'25.91"N - 27°31'3.34"E	39°57'15.32"N - 27°30'57.70"E	Target Flora Species - T16 - T9
28	39°58'13.99"N - 27°30'47.33"E	Target Flora Species - T7 - T3	28	39°58'15.16"N - 27°30'57.82"E	39°58'11.64"N - 27°30'45.72"E	Target Flora Species - T7 - T3
29	39°58'15.17"N - 27°31'14.95"E	Target Flora Species - T18	29	39°58'13.87"N - 27°31'7.91"E	39°58'10.13"N - 27°31'27.17"E	Target Flora Species - T18
30	39°57'54.95"N - 27°30'11.44"E	Target Flora Species - T4	30	39°57'58.14"N - 27°30'21.90"E	39°57'49.41"N - 27°29'59.73"E	Target Flora Species - T4
31	39°57'52.06"N - 27°28'48.30"E	Target Flora Species - T5 - T1	31	39°57'56.82"N - 27°28'56.32"E	39°57'57.66"N - 27°28'37.93"E	Target Flora Species - T5 - T1
32	39°56'59.45"N - 27°29'27.16"E	Target Flora Species	32	39°57'12.24"N - 27°29'42.08"E	39°56'49.95"N - 27°29'30.93"E	Target Flora Species

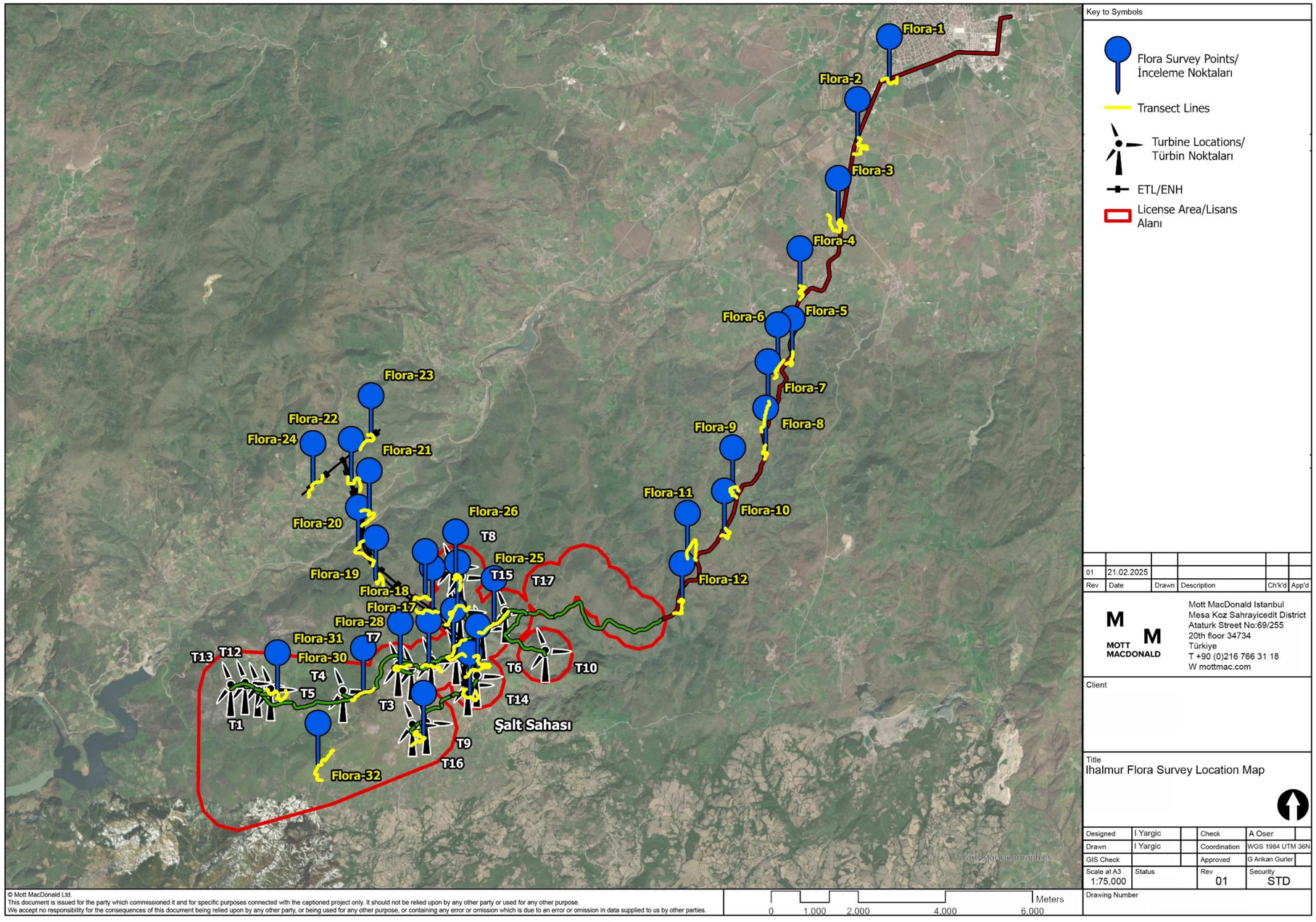


Figure 3-1 Flora Survey Location Map

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 areas, 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 May 2024 and 5 consecutive days in June 2024.

3.2.2 Field Schedule

A total of 20 days of survey was conducted in 2024 during the active season (May and June) 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	40° 4'40.61"N - 27°38'26.30"E	Access Road	1	40° 4'50.93"N - 27°38'16.99"E	40° 4'20.46"N - 27°38'36.85"E	Access Road
2	40° 3'11.89"N - 27°37'35.32"E	Access Road	2	40° 3'21.48"N - 27°37'54.89"E	40° 3'7.03"N - 27°37'45.16"E	Access Road
3	40° 3'12.69"N - 27°35'3.75"E	Access Road	3	40° 3'13.82"N - 27°35'33.04"E	40° 3'5.70"N - 27°34'46.00"E	Access Road
4	40° 1'40.46"N - 27°36'43.82"E	Access Road	4	40° 1'53.97"N - 27°36'54.91"E	40° 1'28.03"N - 27°36'35.40"E	Access Road
5	40° 0'47.97"N - 27°36'57.76"E	Access Road	5	40° 1'3.26"N - 27°36'52.87"E	40° 0'35.32"N - 27°36'52.50"E	Access Road
6	39°59'40.65"N - 27°35'45.19"E	Access Road	6	39°59'56.19"N - 27°36'3.86"E	39°59'37.82"N - 27°35'42.21"E	Access Road
7	39°58'51.37"N - 27°35'23.68"E	Access Road	7	39°58'52.74"N - 27°35'14.30"E	39°58'54.37"N - 27°35'46.04"E	Access Road
8	39°58'1.95"N - 27°32'4.12"E	ETL - Switch Yard - T14	8	39°57'53.28"N - 27°32'8.68"E	39°58'11.34"N - 27°31'57.63"E	ETL - Switch Yard - T14
9	39°58'42.04"N - 27°31'28.54"E	ETL - T11	9	39°58'44.01"N - 27°31'43.78"E	39°58'32.87"N - 27°31'16.37"E	ETL - T11
10	39°59'10.83"N - 27°31'17.92"E	ETL	10	39°58'55.21"N - 27°31'18.31"E	39°59'14.21"N - 27°31'18.17"E	ETL
11	39°59'35.15"N - 27°30'22.09"E	ETL	11	39°59'26.11"N - 27°30'24.80"E	39°59'47.75"N - 27°30'12.19"E	ETL
12	39°59'59.95"N - 27°30'22.11"E	ETL	12	39°59'55.55"N - 27°30'34.46"E	40° 0'2.92"N - 27°30'24.35"E	ETL

13	40° 0'35.62"N - 27°30'10.29"E	ETL	13	40° 0'25.35"N - 27°30'10.67"E	40° 0'38.19"N - 27°30'21.27"E	ETL

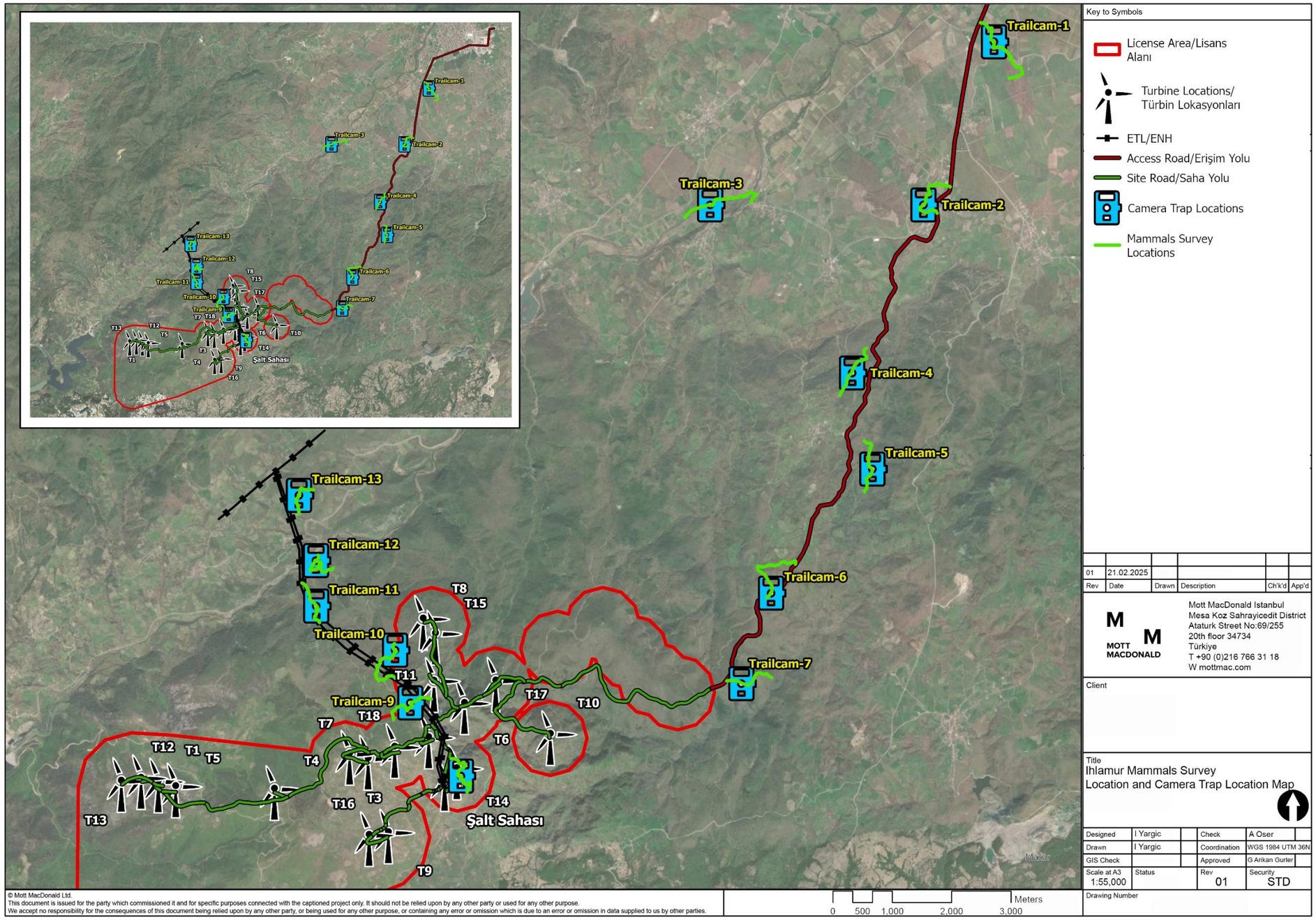


Figure 3-2 Terrestrial Mammal Camera Trap and Transect Survey Locations

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 ETL and Access areas, with research efforts focused on identifying suitable locations for sampling points and transects, while turbine locations may be considered but are not the primary focus of the study.

- 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 21 stations and 21 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

Survey Point			Transect			
Station No	Survey Point	Nearest Project Element	Transect No	Transect Start Location	Transect End Location	Nearest Project Element
1	40° 5'31.50"N - 27°38'41.07"E	Access Road	1	40° 5'29.13"N - 27°38'44.06"E	40° 5'15.22"N - 27°38'30.20"E	Access Road
2	40° 4'44.81"N - 27°38'20.46"E	Access Road	2	40° 4'51.43"N - 27°38'17.36"E	40° 4'33.61"N - 27°38'9.30"E	Access Road
3	40° 3'27.26"N - 27°38'9.15"E	Access Road	3	40° 3'41.08"N - 27°37'57.65"E	40° 3'20.80"N - 27°37'55.53"E	Access Road
4	40° 2'41.69"N - 27°37'24.75"E	Access Road	4	40° 2'53.92"N - 27°37'27.70"E	40° 2'26.87"N - 27°37'15.41"E	Access Road
5	40° 1'58.00"N - 27°37'1.20"E	Access Road	5	40° 2'6.63"N - 27°37'8.48"E	40° 1'49.93"N - 27°37'1.67"E	Access Road
6	40° 1'8.49"N - 27°36'37.02"E	Access Road	6	40° 1'16.63"N - 27°36'45.92"E	40° 1'2.72"N - 27°36'41.61"E	Access Road
7	40° 0'49.86"N - 27°36'33.00"E	Access Road	7	40° 0'57.73"N - 27°36'42.62"E	40° 0'38.14"N - 27°36'37.00"E	Access Road
8	40° 0'28.18"N - 27°36'30.12"E	Access Road	8	40° 0'33.09"N - 27°36'33.58"E	40° 0'22.48"N - 27°36'16.68"E	Access Road
9	40° 0'5.41"N - 27°36'2.95"E	Access Road	9	40° 0'11.85"N - 27°36'12.78"E	39°59'56.48"N - 27°36'2.88"E	Access Road
10	39°59'36.13"N - 27°35'38.22"E	Access Road	10	39°59'38.73"N - 27°35'48.55"E	39°59'34.10"N - 27°35'35.10"E	Access Road
11	39°59'33.03"N - 27°34'46.54"E	Access Road	11	39°59'39.82"N - 27°35'1.03"E	39°59'27.98"N - 27°34'42.70"E	Access Road
12	39°57'59.12"N - 27°31'46.45"E	ETL - Switch Yard - T14	12	39°57'57.58"N - 27°31'50.78"E	39°58'12.23"N - 27°31'48.35"E	ETL - Switch Yard - T14
13	39°58'19.49"N - 27°31'47.32"E	ETL - T2	13	39°58'18.40"N - 27°31'52.50"E	39°58'30.03"N - 27°31'35.09"E	ETL - T2
14	39°58'48.68"N - 27°31'48.26"E	ETL - T11	14	39°58'44.04"N - 27°31'48.39"E	39°58'54.74"N - 27°31'45.37"E	ETL - T11
15	39°59'1.20"N - 27°31'36.04"E	ETL	15	39°58'57.20"N - 27°31'30.41"E	39°59'1.64"N - 27°31'41.85"E	ETL
16	39°59'38.55"N - 27°30'47.66"E	ETL	16	39°59'34.92"N - 27°30'59.77"E	39°59'40.70"N - 27°30'46.94"E	ETL
17	39°58'59.18"N - 27°29'57.97"E	ETL	17	39°59'0.74"N - 27°30'4.50"E	39°58'57.06"N - 27°29'47.96"E	ETL

18	40° 0'6.56"N - 27°30'17.65"E	ETL	18	39°59'58.18"N - 27°30'8.76"E	40° 0'13.12"N - 27°30'13.48"E	ETL
19	40° 0'29.83"N - 27°29'50.04"E	ETL	19	40° 0'29.95"N - 27°30'3.79"E	40° 0'33.60"N - 27°29'49.36"E	ETL
20	40° 0'32.99"N - 27°29'37.34"E	ETL	20	40° 0'31.04"N - 27°29'44.10"E	40° 0'28.80"N - 27°29'15.43"E	ETL
21	40° 1'5.44"N - 27°30'22.27"E	ETL	21	40° 1'2.40"N - 27°30'19.24"E	40° 1'5.43"N - 27°30'5.83"E	ETL

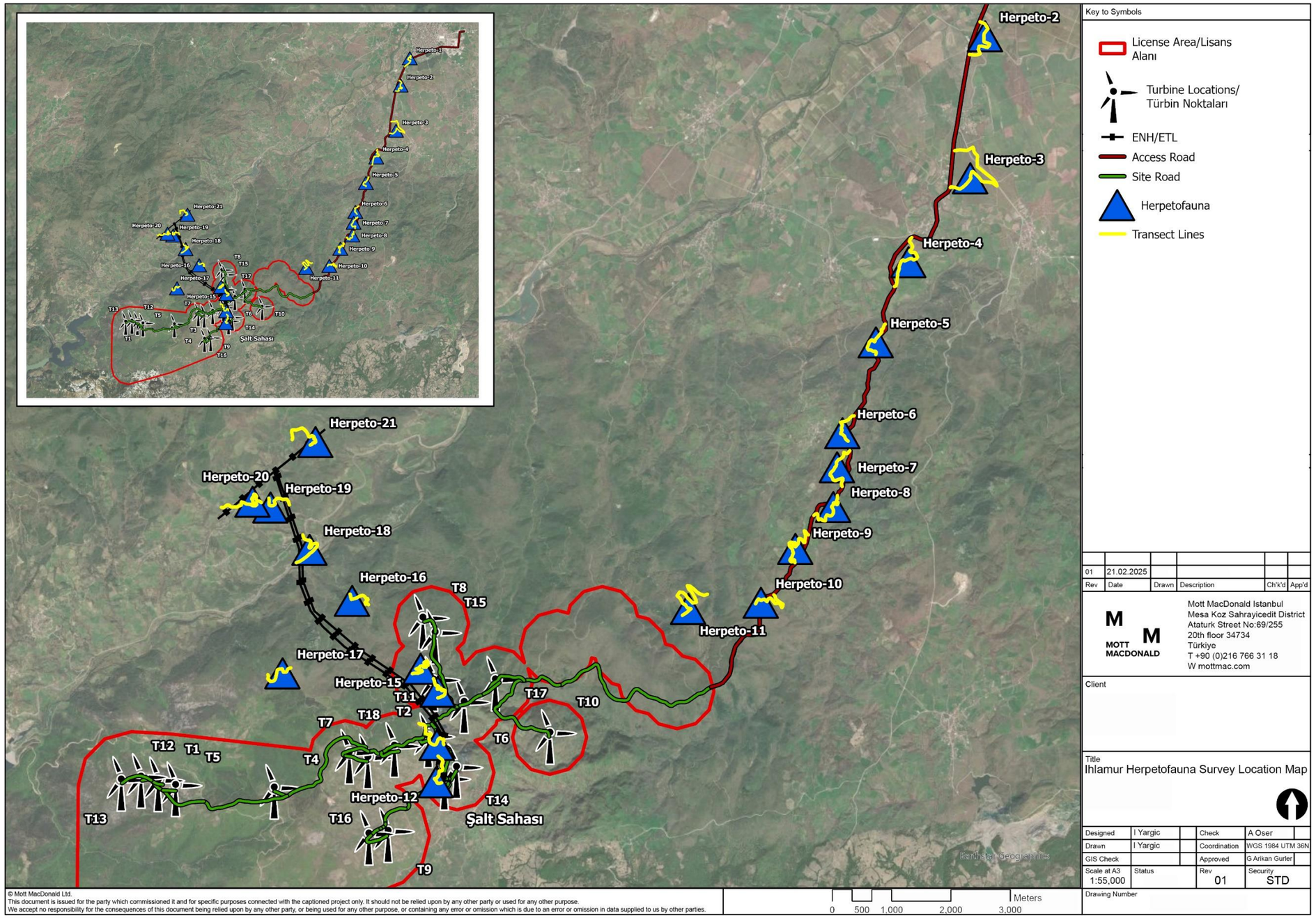


Figure 3-3 Transect and Point Survey Locations of Herpetofauna

3.4 Bird

As previously presented in the standalone methodology reports, studies on birds were carried out on 3 main topics: Turbine VP survey, ETL VP survey, Breeding Bird Survey.

No major changes to bird methodology were made. Minor changes to established methodologies were made based on field ground truthing as summarised below;

- VP located near T3 was moved to near T2 for improved coverage for T9, 10 and 16.
- VP located near T6 was moved north for better coverage of T8 and T15 areas.
- VPs were renamed (numeration) for field surveyor convenience.
- Spring season for the Project region was considered as extending to mid-June as confirmed by the local ornithology experts.

Locations of VPs are shown on Figure 3-4.

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. NatureScot (formerly known as SNH) guidelines are widely used for ecological impact assessment studies on wind farms and referred at EHS Guidelines for Wind Energy.

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 observations started at around 12:00 and finished at 17:00 on most days. 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.

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.

3.4.1.1 Vantage Point Field Schedule

During Spring 2024, a total of 138 hours and 32 minutes of surveys were conducted across three vantage points (VP1, VP2, and VP3) as presented in Table 3-4. Week number of the year are denoted with Monday as first day. The surveys started in mid-April and continued until mid-June. On average, approximately 46 hours and 10 minutes of surveys were conducted per vantage point.

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

Week	First Day	VP1	VP2	VP3	Total (h)
W16	15/04	1:37	10:37	7:17	19:31
W20	13/05	12:29	14:25	15:04	41:58
W22	27/05	12:08	12:06	12:21	36:35
W24	10/06	12:09	13:41	14:38	40:28
Total	-	38:23	50:49	49:20	138:32

During summer 2024, a total of 126 hours of surveys were conducted across three vantage points (VP1, VP2, and VP3) as presented in Table 3-5. Week number of the year are denoted with Monday as first day. The surveys started in mid-June and continued until the end of August. On average, approximately 41 hours and 56 minutes of surveys were conducted per vantage point.

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

Week	First Day	VP1	VP2	VP3	Total (h)
W29	15/07	23:27	13:01	14:30	50:58
W30	22/07	-	6:04	6:02	12:06
W31	29/07	-	-	6:02	6:02
W32	05/08	6:43	12:00	6:01	24:44
W33	12/08	5:19	-	-	5:19
W35	26/08	8:21	10:52	7:38	26:51
Total	-	43:50	41:57	40:13	126:00

During autumn 2024, a total of 114 hours and 19 minutes of surveys were conducted across three vantage points (VP1, VP2, and VP3) as presented in Table 3-6. Week number of the year are denoted with Monday as first day. The surveys started in the beginning of September and continued until mid-November. On average, approximately 38 hours and 6 minutes of surveys were conducted per vantage point.

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

Week	First Day	VP1	VP2	VP3	Total (h)
W37	09/09	12:56	14:21	15:25	42:42
W41	07/10	6:45	12:35	9:40	29:00
W43	21/10	-	-	5:37	5:37
W44	28/10	-	-	6:25	6:25
W45	04/11	6:20	5:21	-	11:41
W46	11/11	11:56	6:58	-	18:54
Total	-	37:57	39:15	37:07	114:19

3.4.1.2 VP Locations

3 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	543184	4427071
VP2	545099	4424854
VP3	540754	4424056

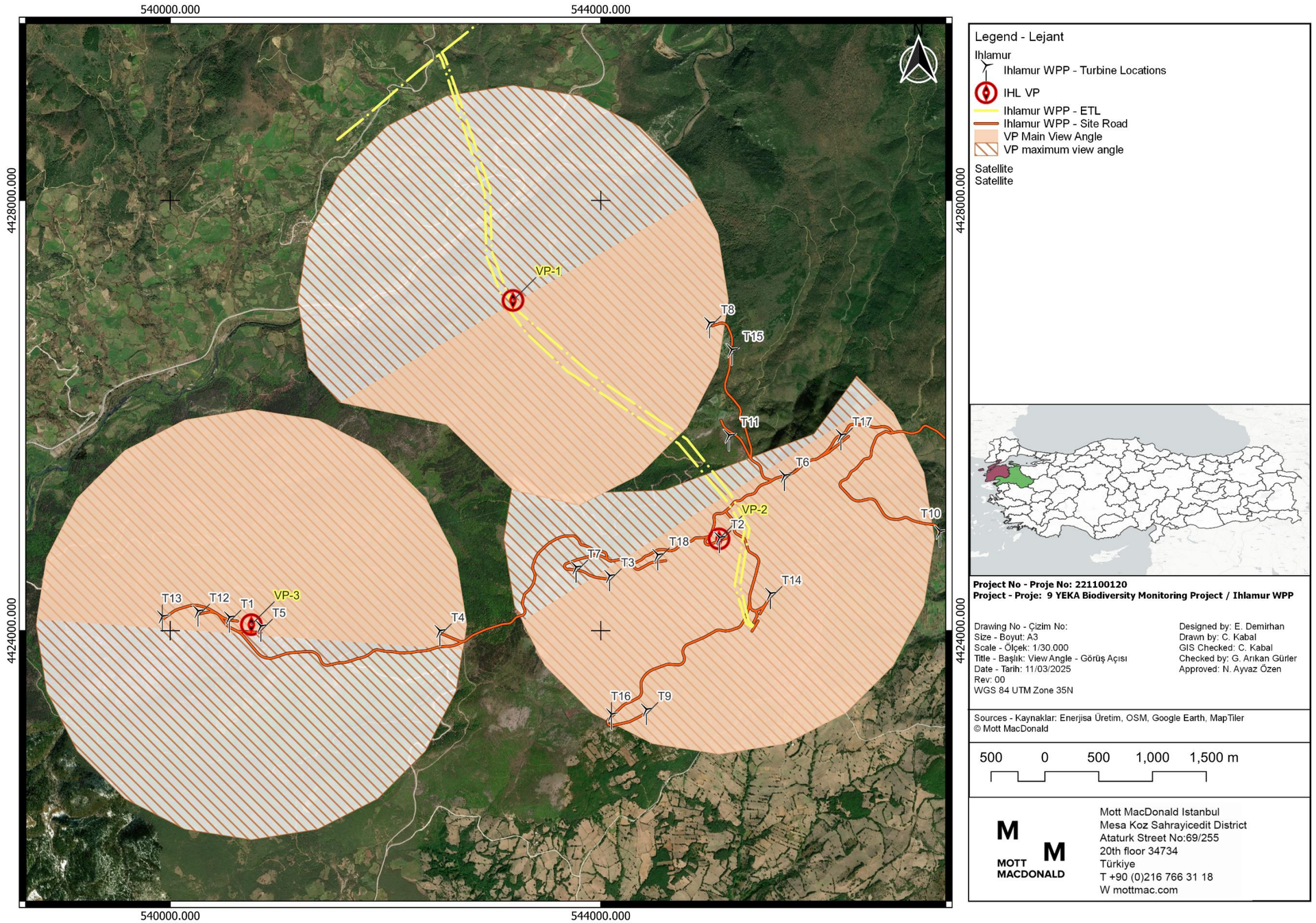


Figure 3-4 Locations of the VPs

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.

Electric 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, three vantage points (VP ETLs) were thoughtfully selected, and observations were conducted at these points (Figure 3-5). 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.

3.4.2.1 ETL Observation Field Schedule

A total of 107 hours and 15 minutes of surveys were conducted during the spring of 2024, starting on March 1 and finishing on June 15. The surveys were carried out at three transmission line points (VPs ETL1, ETL2 and ETL3). ETL3 was added to accommodate changes to the ETL route after initial mobilization. On average, approximately 35 hr of survey was conducted per vantage point (VP ETL) as shown in Table 3-8.

Table 3-8 ETL survey effort and dates

Week	First Day	VP ETL1	VP ETL2	VP ETL3	Total
W16	15/04	1:37	10:37	-	12:14
W20	13/05	12:29	14:25	-	26:54
W21	20/05	-	-	6:19	6:19
W22	27/05	12:08	12:06	11:44	35:58
W24	10/06	12:09	13:41	-	25:50
Total	-	38:23	50:49	18:03	107:15

A total of 134 hours and 43 minutes of surveys were conducted during the summer of 2024, starting on June 16, and finishing on August 31. The surveys were carried out at three transmission line points (VPs ETL1, ETL2 and ETL3). On average, approximately 44 hours and 55 minutes 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
W29	15/07	23:27	13:01	12:04	48:32

Week	First Day	VP ETL1	VP ETL2	VP ETL3	Total
W30	22/07	-	6:04	11:23	17:27
W31	29/07	-	-	6:59	6:59
W32	05/08	6:43	12:00	12:25	31:08
W33	12/08	5:19	-	6:05	11:24
W35	26/08	8:21	10:52	-	19:13
Total	-	43:50	41:57	48:56	134:43

A total of 113 hours and 47 minutes of surveys were conducted during the autumn of 2024, starting on September 1, and finishing on November 15. The surveys were carried out at three transmission line points (VPs ETL1, ETL2 and ETL3). On average, approximately 37 hours and 51 minutes 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
W37	09/09	12:56	14:21	-	27:17
W41	07/10	6:45	12:35	-	19:20
W43	21/10	-	-	6:42	6:42
W44	28/10	-	-	5:25	5:25
W45	04/11	6:20	5:21	12:45	24:26
W46	11/11	11:56	6:58	11:43	30:37
Total	-	37:57	39:15	36:35	113:47

3.4.2.2 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	543239	4427032
VP ETL2	545123	4424847
VP ETL3	542479	4429320

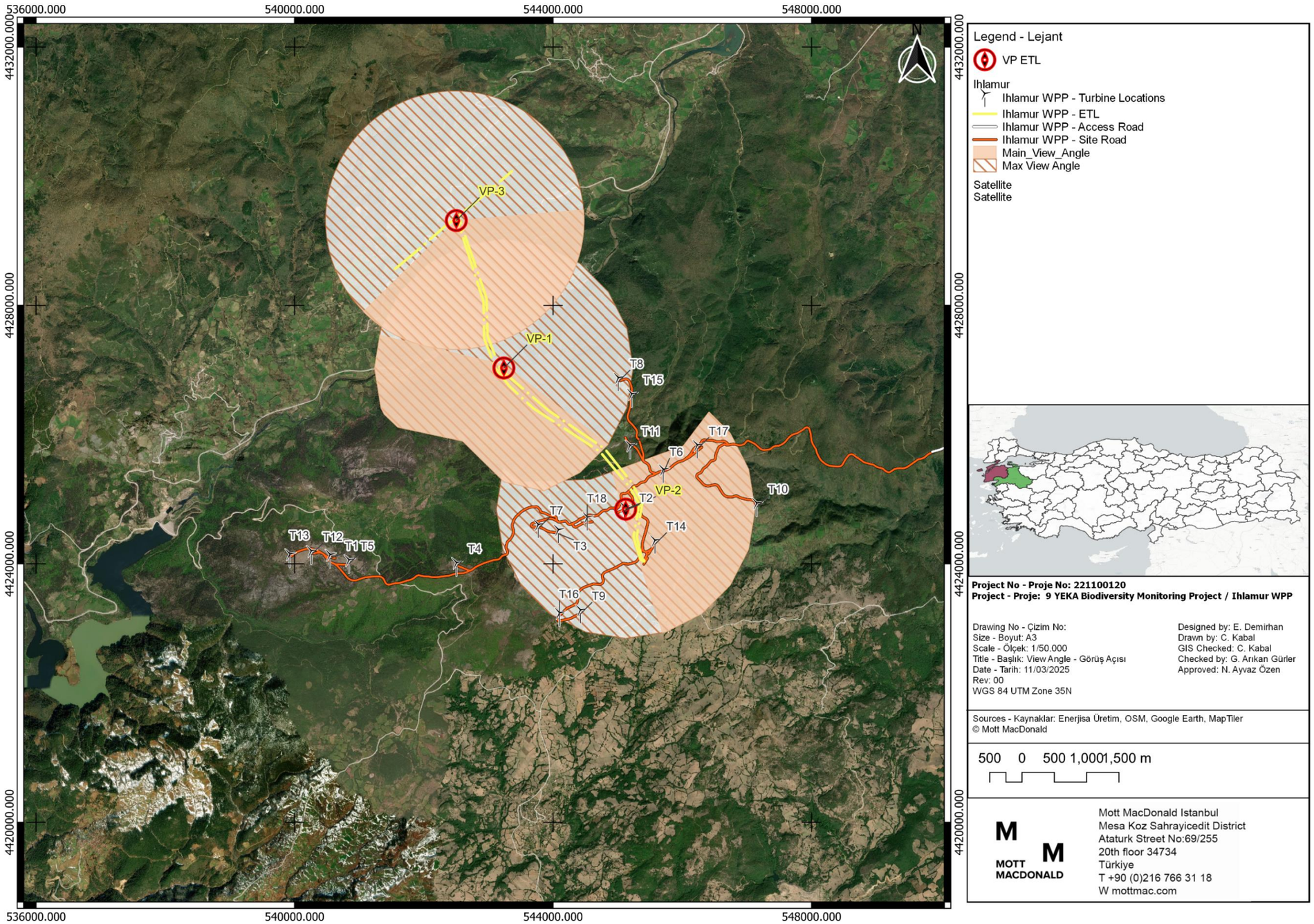


Figure 3-5 Locations of the ETL VPs

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%.

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.

3.4.3.1 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: $A = N \times \pi R2$ 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)

3.4.3.2 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 Turkey, the breeding season for most bird lies between March and July, according to the Turkish Breeding Bird Atlas. 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 Table 3-12. For the point count method, observers recorded each potential breeding bird observed at VP and 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
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

3.4.4.1 Breeding Bird Field Schedule and Locations

During the breeding bird surveys, a total of 6 transect walks were conducted in May and June (Table 3-13, Figure 3-6). The walks lasted an average of 70.5 minutes and covered 1.5 km. Most walks were conducted at around 09:00 in the morning.

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

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

Transect Location	Date	Month	Time (start)	Min.s	Distance (km)
IHL-VP3	17/05	May	09:17:00	77	1
IHL-VP1	17/05	May	09:53:00	95	1
IHL-VP2	18/05	May	09:33:00	60	2
IHL-VP3	10/06	Jun	09:20:00	60	1
IHL-VP1	10/06	Jun	09:38:00	71	2
IHL-VP2	10/06	Jun	09:50:00	60	2

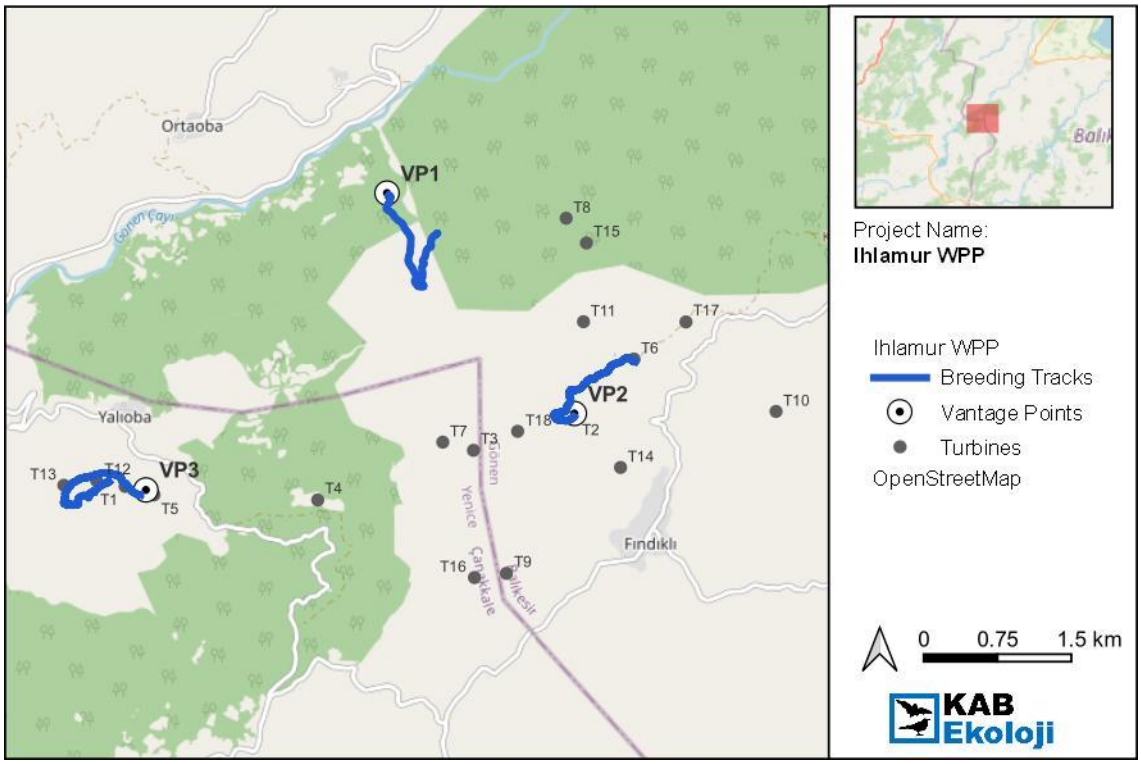


Figure 3-6 Line transects used for breeding surveys at the project site

3.5 Bat

No major changes to bird methodology were made. Minor changes to established methodologies were made based on field ground truthing as summarised below;

An additional bat detector was deployed between T12 and T1 for improved survey coverage. Total bat detector count increased from 11 to 12.

Some data loss occured due to device failures of unknown causes. Despite device recording failures which were intermittent and unpredictable, enough nights of data were collected for analysis due to NatureScot methodology's high consecutive recording requirements. Detector recording success for spring can be seen in Table 4-39, summer in Table 4-45 and autumn in Table 4-51. 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, twelve 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 3-7). 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.

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 (see Appendix 6.5). 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.

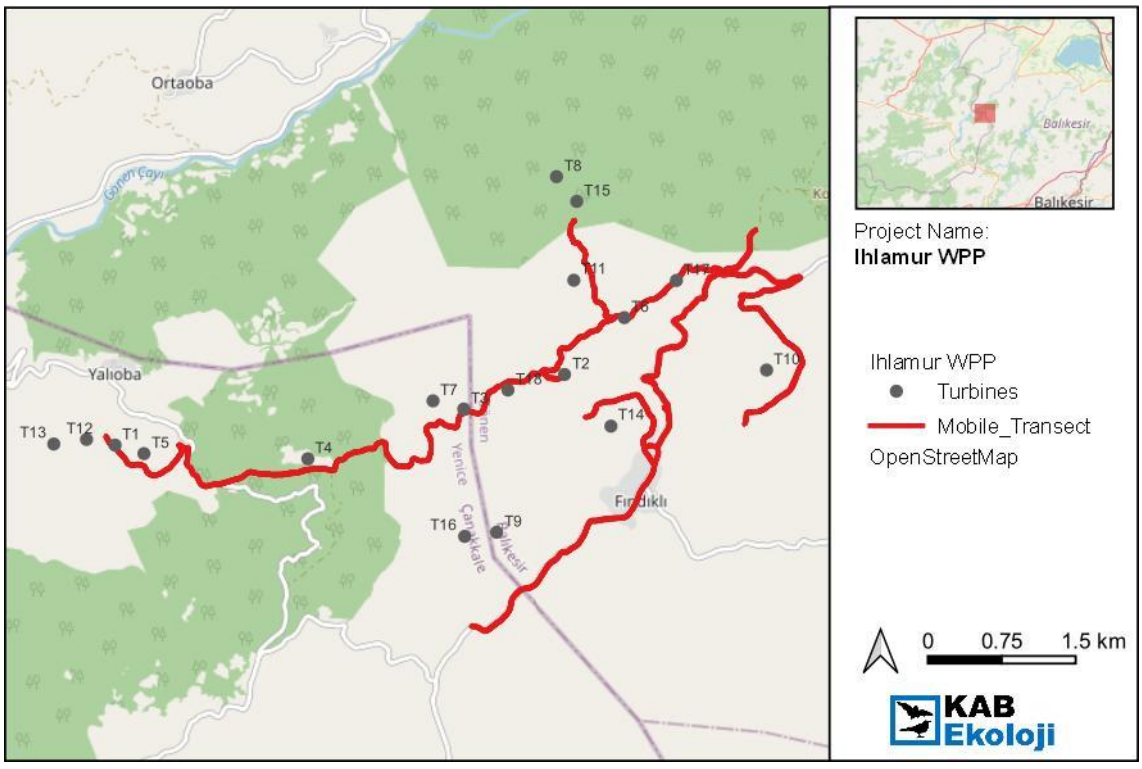


Figure 3-7 Transect survey route at the project.

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	28 June	8 July	10 nights
Spring Transect Survey 1	31 June	31 June	1 night
Spring Transect Survey 2	8 July	8 July	1 night
Summer Static Surveys	11 August	22 August	10 nights
Summer Transect Survey 1	12 August	12 August	1 night
Summer Transect Survey 2	22 August	22 August	1 night
Autumn Static Surveys	27 September	10 October	10 nights
Autumn Transect Survey 1	29 September	29 September	1 night
Autumn Transect Survey 2	30 September	30 September	1 night

Table 3-15 Weather conditions during the surveys.

Date	Temperature (°C)	Wind Speed (m/s)	Cloud cover %	Precipitation (mm)
2024-06-28	18	2	0	0
2024-06-29	21	6	50	0
2024-06-30	20	4	20	0
2024-07-01	21	2	0	0
2024-07-02	21	1	0	0
2024-07-03	22	1	20	0
2024-07-04	21	2	50	0
2024-07-05	19	1	50	0.8
2024-07-06	20	2	10	0
2024-07-07	21	4	20	0
2024-07-08	22	3	0	0
2024-08-11	22	4	11	0
2024-08-12	23	3	20	0
2024-08-13	23	3	0	0
2024-08-14	22	2	0	0
2024-08-15	23	3	0	0
2024-08-16	22	3	0	0
2024-08-17	21	4	10	0
2024-08-18	21	3	0	0
2024-08-19	20	1	10	0
2024-08-20	20	1	0	0
2024-08-21	21	1	10	0
2024-08-22	21	1	10	0
2024-08-23	24	2	0	0
2024-09-27	16	1	0	0
2024-09-28	16	1	0	0
2024-09-29	18	1	30	0
2024-09-30	17	1	100	2,6
2024-10-01	12	1	50	0
2024-10-02	12	1	10	0
2024-10-03	12	1	0	0
2024-10-04	14	2	0	0

Date	Temperature (°C)	Wind Speed (m/s)	Cloud cover %	Precipitation (mm)
2024-10-05	19	2	0	0
2024-10-06	20	2	80	0
2024-10-07	17	2	0	0
2024-10-08	16	1	40	0
2024-10-09	16	1	0	0
2024-10-10	17	2	10	0
2024-10-11	17	2	0	0

3.5.4 Survey Locations

Ground static bat detector locations (Sampling Point, SP) are provided in (Table 3-16) and shown on (Figure 3-8).

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

SP	Easting	Northing	Nearest Turbine
SP1	544620	4422653	T9
SP2	545557	4424540	T14
SP3	546328	4425124	T10
SP4	546238	4425787	T17
SP5	545726	4425427	T6
SP6	545331	4425666	T11
SP7	545094	4424824	T2
SP8	544463	4424618	T18
SP9	544080	4424466	T3
SP10	542502	4423922	T4
SP11	540606	4424413	T1
SP12	540434	4424173	T12

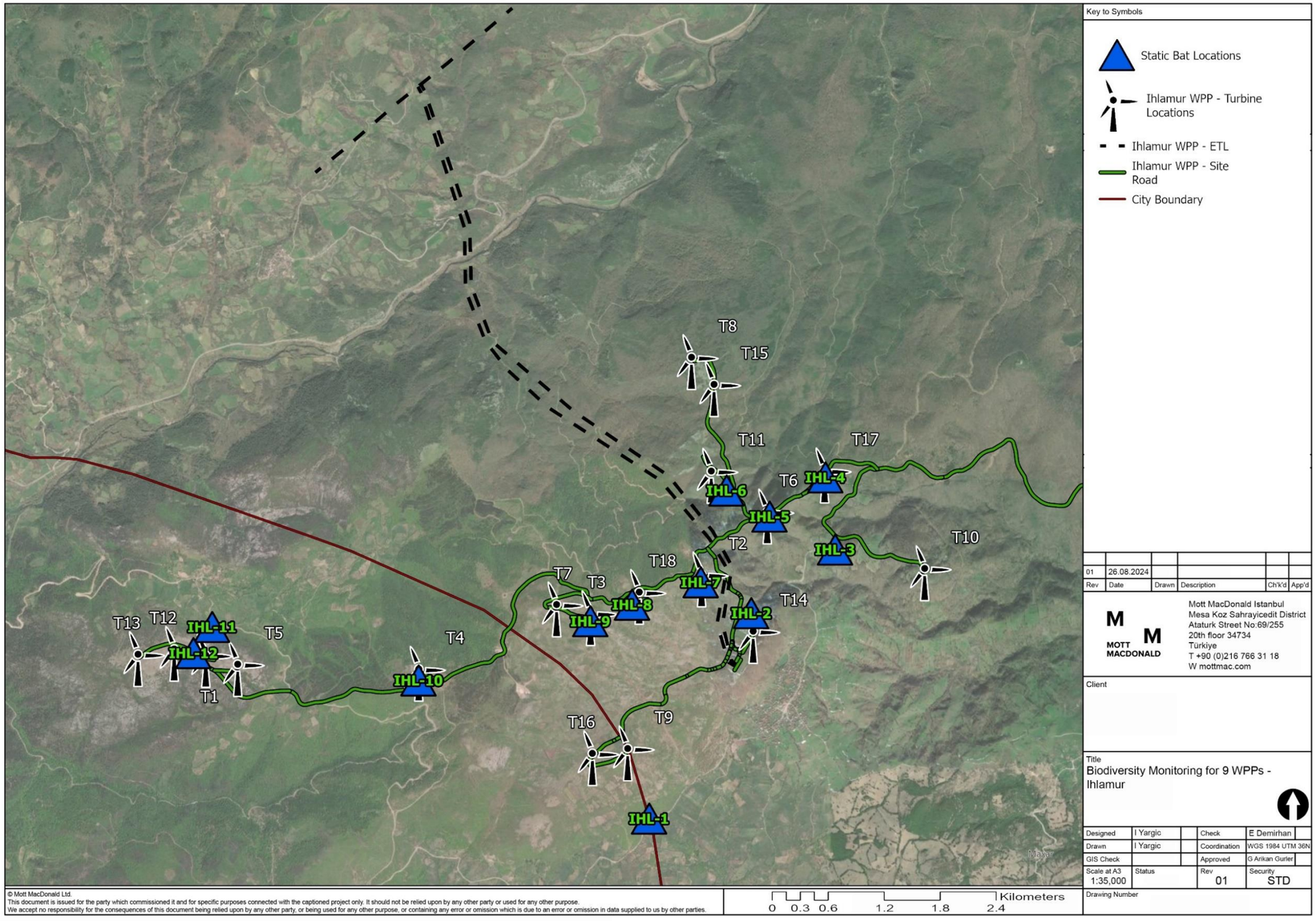


Figure 3-8 Ground static bat detector locations

4 Results

4.1 Flora

4.1.1 Kaz Mountains and Manyas Lake Key Biodiversity Area

Ihlamur WPP, including its components such as the ETL and access roads, is not located within a legally protected or internationally recognised area. The closest Key Biodiversity Area (KBA) is Manyas Lake KBA[2], which is within 11.6 km of the access road and no overlap with the Area of Influence (AoI) of the Project. Other closest KBA is Kaz mountains KBA[3] which is within 14.5 km of the closest turbine area and no overlap with the Area of Influence of the Project. KBAs are internationally recognised areas that currently do not have legal protection in Türkiye but are widely used for various conservation aims.

According to the Manyas Lake KBA database, no plant species with KBA triggers are present in the area. Table 4-1 lists the plant species identified within the Kaz Mountains KBA. During the field survey conducted within the Project area KBA associated flora species not observed.

Table 4-1 KBA Flora Species

Family	Species	Observation Status
POACEAE	*Festuca ustulata (Hack. ex St.-Yves) Markgr.-Dann.*	Not observed
	Bromus sipyleus Boiss.	Not observed
IRIDACEAE	*Crocus candidus* E.D.Clarke	Not observed
AMARYLLIDACEAE	*Allium kurtzianum Asch. & Sint. ex Kollmann*	Not observed
ASPARAGACEAE	*Muscari latifolium J.Kirk*	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 the Table 4-2 below and shown in Figure 4-1, along with their wide distribution areas within the study area. The amount of habitat lost due to site roads, turbine footprints and switchyard area are given in Table 4-3 through Table 4-6.

Table 4-2 Habitat Types of the Project AoI

Broad habitat type	EUNIS Habitat Type	Extend within Project Footprint (ha)	Percentage (%)
Woodland	G1.A Meso- and eutrophic Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus and related woodland	953.3407625	9.945%
	G1.3 Mediterranean riparian woodland	76.56489999	0.799%
	G1.7 Termophilus deciduous woodland	3792.201672	39.561%
	G1.6 Beech woodland	863.5591646	9.009%
Maquis	F5.2 Maquis	1007.365262	10.509%
Grassland	E1.2 Perennial calcareous grassland and basic steppes	121.9628939	1.272%
	E2.1 Permanent mesotrophic pastures and aftermath-grazed meadows	24.53491001	0.256%

[2] https://www.keybiodiversityareas.org/site/factsheet/783

[3] https://www.keybiodiversityareas.org/site/factsheet/24048

Broad habitat type	EUNIS Habitat Type	Extend within Project Footprint (ha)	Percentage (%)
Freshwater	C2.3 Permanent non-tidal, smooth-flowing watercourses	23.23591084	0.242%
Constructed, industrial and other artificial habitats	J1.2 Residential buildings of villages and urban peripheries	46.10109631	0.481%
	J3.2 Active opencast mineral extraction sites, including quarries	21.17963048	0.221%
Regularly or recently cultivated agricultural, horticultural and domestic habitats	I1.1 Intensive unmixed crops	2655.70158	27.705%
Total		**9585.747784**	

Table 4-3 Habitat Loss on Site Roads

EUNIS	Area (ha)	Percentage
E1.2 Perennial calcareous grassland and basic steppes	1.91	1.5620%
E2.1 Permanent mesotrophic pastures and aftermath-grazed meadows	1.14	4.6552%
F5.2 Maquis	1.66	0.1644%
G1.6 Beech woodland	3.94	0.4561%
G1.7 Termophilus deciduous woodland	9.18	0.2421%
G1.A Meso- and eutrophic Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus and related woodland (Galio-Carpinetum oak-hornbeam forests)	1.10	0.1157%
I1.1 Intensive unmixed crops	8.29	0.3121%
J3.2 Active opencast mineral extraction sites, including quarries	0.19	0.9122%
Total	**27.41**	

Table 4-4 Habitat Loss on Turbine Footprint

EUNIS	Area (ha)	Percentage
E1.2 Perennial calcareous grassland and basic steppes	3.53	2.8956%
E2.1 Permanent mesotrophic pastures and aftermath-grazed meadows	5.49	22.3794%
F5.2 Maquis	2.09	0.2071%
G1.6 Beech woodland	2.04	0.2363%
G1.7 Termophilus deciduous woodland	1.94	0.0513%
G1.A Meso- and eutrophic Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus and related woodland (Galio-Carpinetum oak-hornbeam forests)	1.44	0.1510%
I1.1 Intensive unmixed crops	10.74	0.4046%
J3.2 Active opencast mineral extraction sites, including quarries	0.00	0.0000%
Total	**27.28**	

Table 4-5 Habitat Loss on Switchyard Area

EUNIS	Area (ha)	Percentage
E1.2 Perennial calcareous grassland and basic steppes	0.00	0.0000%
E2.1 Permanent mesotrophic pastures and aftermath-grazed meadows	0.00	0.0000%
F5.2 Maquis	0.11	0.0108%
G1.6 Beech woodland	0.00	0.0000%
G1.7 Termophilus deciduous woodland	0.00	0.0000%
G1.A Meso- and eutrophic Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus and related woodland (Galio-Carpinetum oak-hornbeam forests)	0.00	0.0000%
I1.1 Intensive unmixed crops	2.08	0.0782%
J3.2 Active opencast mineral extraction sites, including quarries	0.00	0.0000%
Total	**2.19**	

Table 4-6 Habitat Loss on ETL

EUNIS	Area (ha)	Percentage
C2.3 Permanent non-tidal, smooth-flowing watercourses	0.198141	0.8527%
F5.2 Maquis	8.572583	0.8510%
G1.3 Mediterranean riparian woodland	0.78615	1.0268%
G1.6 Beech woodland	9.985955	1.1564%
G1.7 Termophilus deciduous woodland	31.65528	0.8347%
G1.A Meso- and eutrophic Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus and related woodland (Galio-Carpinetum oak-hornbeam forests)	2.749124	0.2884%
I1.1 Intensive unmixed crops	18.72308	0.7050%
Total	**72.67**	

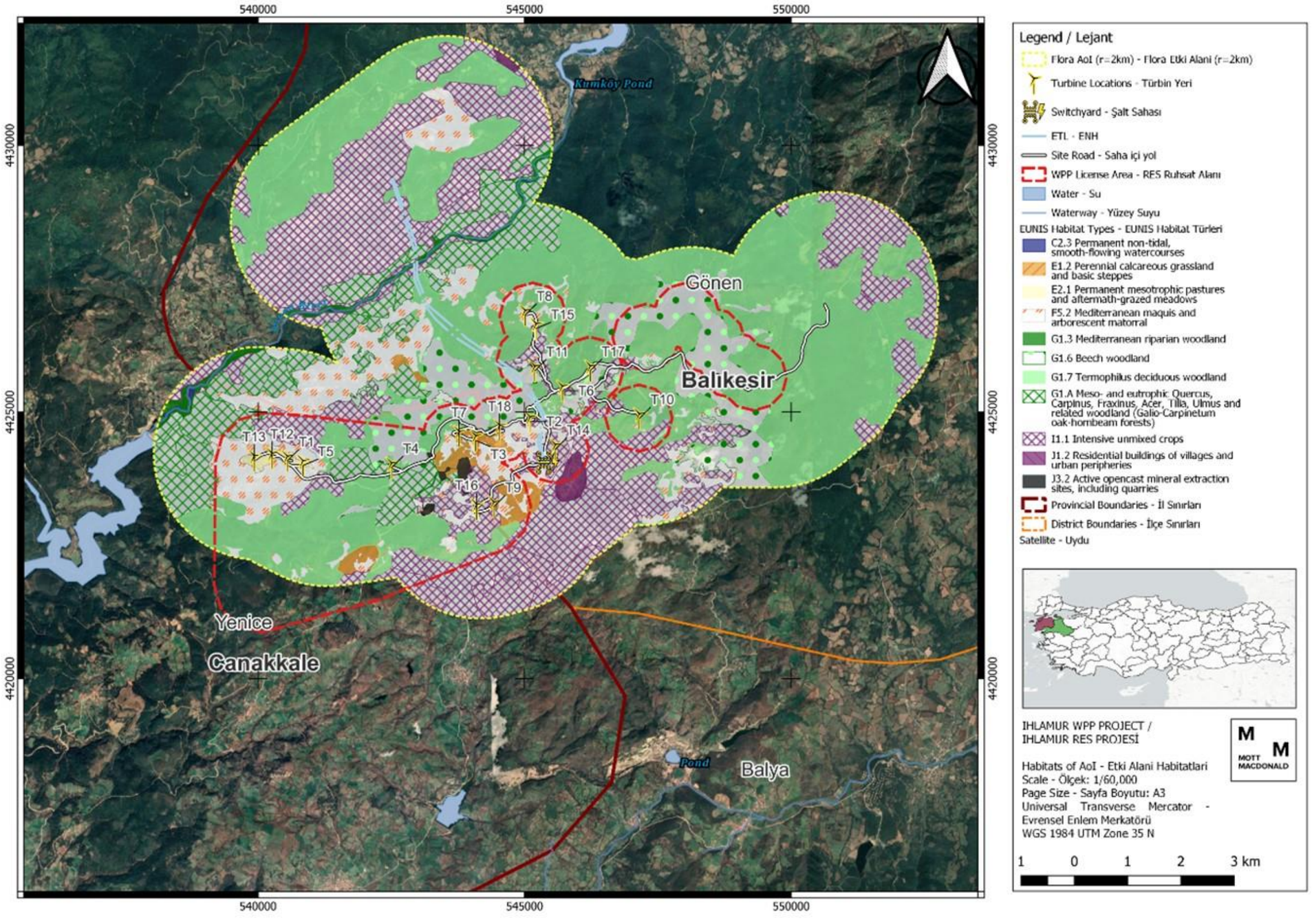


Figure 4-1 EUNIS Habitat Classification of Ihlmaur WPP Area of Influence

4.1.3 Floristic Analyses

As a result of the field studies, 317 plant taxa at the species and subspecies level from 60 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 4-7.

Table 4-7 Plant Taxa and Threatened Categories Identified in the Project Area of Influence

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
ANACARDIACEAE	1	*Pistacia terebinthus* L. subsp. *terebinthus*	Mediterranean											X								
	2	*Rhus coriaria* L.	Widespread												X							
ACERACEAE	3	*Acer campestre* L. subsp. *campestre*	Widespread													X						
APOCYNACEAE	4	*Vinca major* L. subsp. *major*	Mediterranean									X	X									
ARISTOLACHIACEAE	5	*Aristolochia bodamae* Dingler	Euro-Siberia								X											
	6	*Aristolochia pallida* Willd.	Widespread								X			X								
ASPLENIACEAE	7	*Ceterach officinarum* DC.	Widespread									X				X						
	8	*Asplenium adiantum- nigrum* L.	Widespread									X				X						
ASTERACEAE	9	*Achillea coarctata* Poir.	Widespread									X	X									
	10	*Achillea wilhelmsii* C. Koch	Widespread									X	X			X						
	11	*Aetheorhiza bulbosa* (L.) Cass. subsp. *microsepala* Rech. Fil.	Mediterranean								X			X								
	12	*Anthemis austriaca* Jacq.	Widespread									X		X								
	13	*Anthemis chia* L.	Mediterranean									X	X	X	X							
	14	*Anthemis cotula* L.	Widespread									X		X								
	15	*Anthemis cretica* subsp. *leucanthemoides* (Boiss.) Grierson	Widespread								X	X		X					X			
	16	*Anthemis tinctoria* L. *var. tinctoria*	Widespread								X	X	X	X					X			
	17	*Bellis annua* L.	Mediterranean								X		X			X				X		
	18	*Bellis perennis* L.	Mediterranean								X	X	X						X			
	19	*Bellis sylvestris* Cyr.	Widespread								X	X	X							X		
	20	*Carduus nutans* L. sensu lato	Widespread									X	X				X			X		
	21	*Carduus pycnocephalus* L.subsp. *albidus* (bieb.) Kazmi	Widespread									X				X				X		
	22	*Centaurea cyanus* L.	Widespread								X		X	X						X		
	23	*Centaurea iberica* Trev. Ex Sprengel	Widespread									X		X		X			X			
	24	*Centaurea solstitialis* L. subsp. *solstitialis*	Widespread									X		X		X				X		
	25	*Centaurea urvillei* DC. subsp. *stepposa* Wagenitz	Irano-Turanian									X		X						X		
	26	*Centaurea virgata* Lam.	Widespread									X		X					X	X		
	27	*Cichorium intybus* L.	Widespread								X	X		X						X		
	28	*Chondrilla juncea* L. var. *juncea*	Widespread									X		X						X		
	29	***Cirsium balikesirense* Yıldız, Arabacı & Dirmenci**	**Mediterranean**	**X**		**VU**					X									X		
	30	*Cirsium vulgare* (Savi) Ten.	Widespread								X						X	X				

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
	31	*Cnicus benedictus* L. var. *benedictus*	Widespread													X			X			
	32	*Conyza canadensis* (L.) Cronquist	Widespread									X		X		X			X			
	33	*Crepis alpina* L.	Widespread								X	X	X	X					X			
	34	*Crepis foetida* L.	Widespread								X	X	X	X					X			
	35	*Crepis sancta* (L.) Babcock	Widespread								X	X	X	X	X			X				
	36	*Crupina crupinastrum* (Moris) Vis.	Widespread									X	X			X			X			
	37	*Doronicum orientale* Hoffm.	Widespread								X		X					X				
	38	*Echinops viscosus* DC. subsp. *bithynicus* (Boiss.) Rech. Fil.	Widespread									X	X						X			
	39	*Filago pyramidata* L.	Mediterranean									X		X		X	X	X				
	40	*Helminthotheca echioides* (L.) Holub	Widespread								X	X	X	X				X				
	41	*Hyphocoeris radicata* L.	Widespread								X	X	X	X				X				
	42	*Inula heterolepis* Boiss.	Mediterranean											X					X			
	43	*Jurinea mollis* (L.) Reichb	Mediterranean									X	X	X					X			
	44	*Lactuca serriola* L.	Euro-Siberia									X		X				X				
	45	*Lapsana communis* L. subsp. *intermedia* (Bieb.) Hayek	Widespread								X	X	X	X					X			
	46	*Leontodon tuberosus* L.	Mediterranean								X	X	X	X				X				
	47	*Matricaria chamomilla* L. var. *chamomilla*	Widespread													X			X			
	48	*Onopordum illycum* L. var. *carduncul*us Boiss.	Mediterranean									X		X					X			
	49	*Pallenis spinosa* (L.) Cass.	Mediterranean									X				X						
	50	*Picnomon acarna* (L.) Cass.	Mediterranean									X	X	X					X			
	51	*Pilosella hoppeana* (Schultes) C.H.& F.W.Schultz	Widespread								X		X					X				
	52	*Pilosella piloselloides* (Vill.) Sojak subsp. *piloselloides*	Widespread								X	X	X						X			
	53	*Scariola viminea* (L.) F.W. Schmidt	Widespread									X		X		X			X			
	54	*Senecio vernalis* Waldst. et Kit	Widespread									X				X		X				
	55	*Senecio vulgaris* L.	Widespread											X		X		X				
	56	*Sonchus asper* (L.) Hill subsp. *glaucescens* (Jordan) Ball.	Widespread									X		X					X			
	57	*Tragopogon longirostris* Bisch. ex Schultz Bip.	Widespread											X				X				
	58	*Tripleurospermum oreades* (Boiss.) Rech. Fil. Var.*oreades*	Widespread									X		X		X			X			

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
	59	*Tussilago farfara* L.	Euro-Siberia										X					X				
	60	*Xeranthemum annuum* L.	Widespread									X		X		X		X				
BORAGINACEAE	61	*Buglossoides arvensis* (L.) Johnston	Widespread									X		X				X				
	62	*Echium italicum* L.	Mediterranean									X		X		X		X				
	63	*Echium plantagineum* L.	Mediterranean									X		X	X	X	X		X			
	64	*Heliotropium europaeum* L.	Mediterranean									X		X				X				
	65	*Lithospermum purpurocaeruleum* L.	Euro-Siberia								X		X						X			
	66	*Myosotis arvensis* L.	Euro-Siberia								X		X					X				
	67	*Myosotis refracta* Boiss. subsp. *refracta*	Mediterranean								X		X						X			
	68	*Onosma tauricum* Pallas ex Willd. Var. *tauricum*	Widespread											X					X			
BRASSICACEAE	69	*Alyssum minutum* Schlecht. ex DC.	Widespread								X	X	X		X				X			
	70	*Alyssum murale* Waldst. & Kit.	Widespread								X	X	X						X			
	71	*Arabis verna* (L.) DC.	Widespread								X	X	X	X					X			
	72	*Capsella bursa- pastoris* (L.) Medik.	Widespread								X		X						X			
	73	*Cardamine graeca* L.	Widespread								X	X		X					X			
	74	*Cardamine hirsuta* L.	Widespread								X	X		X					X			
	75	*Clypeola jonthlaspi* L.	Widespread												X				X			
	76	*Descurainia sophia* (L.)	Widespread								X	X	X	X					X			
	77	*Erophila verna* (L.) Chevall. subsp. *verna*	Widespread								X	X	X	X					X			
	78	*Erysimum smyrnaeum* Boiss. & Bal.	Widespread									X		X					X			
	79	*Hirschfeldia incana* (L.) Lag.-Foss	Widespread									X							X			
	80	*Iberis attica* Jord.	Mediterranean									X		X				X				
	81	*Lepidium spinosum* Ard.	Widespread								X	X	X		X				X			
	82	*Rapistrum rugosum* (L.) All.	Widespread								X	X	X						X			
	83	*Thlaspi perfolatum* L.	Widespread								X							X				
	84	*Turritis laxa* (Sibth. & Sm.) Hayek	Widespread								X				X				X			
CYPERACEAE	85	*Carex divulsa* Stokes ssp. *divulsa*	Euro-Siberia								X		X					X				
	86	*Carex panicea* L.	Euro-Siberia								X		X						X			
	87	*Carex remota* L.	Euro-Siberia								X		X					X				
CAMPANULACEAE	88	*Legousia pentagonia* (L.) Thellung	Mediterranean								X	X	X						X			
CAPRIFOLIACEAE	89	*Lonicera etrusca* Santi	Mediterranean								X		X						X			

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
	90	*Sambucus ebulus* L.	Euro-Siberia								X								X			
CARYOPHYLLACEAE	91	*Arenaria serpyllifolia* L. var *leptoclados* Reichb.	Widespread								X	X	X					X				
	92	*Cerastium gracile* Duf.	Widespread								X	X	X						X			
	93	*Cerastium illyricum* Ard. subsp. *comatum* (Pesv.) P.D.Seel & Whitehead	Mediterranean								X	X	X	X					X			
	94	*Dianthus calocephalus* Boiss.	Widespread								X	X	X						X			
	95	*Moenchia mantica* (L.) Bartl. Subsp. *mantica*	Widespread									X		X					X			
	96	*Petrorhagia velutina velutina* (Guss.) Ball & Heywood	Mediterranean								X	X	X			X		X				
	97	*Silene dichotoma* Ehrh. Subsp. *dichotoma*	Widespread								X		X						X			
	98	*Silene gallica* L.	Widespread								X		X						X			
	99	*Silene italica* (L.) Pers.var. *incana* Gris.	Mediterranean								X		X					X				
	100	*Silene vulgaris* (Moench) Garcke var. *vulgaris*	Widespread								X		X						X			
	101	*Stellaria holostea* L.	Euro-Siberia								X								X			
	102	*Velezia rigida* L. var. *fasciculata* (Boiss.) Post.	Mediterranean									X		X				X				
CISTACEAE	103	*Cistus creticus* L.	Mediterranean								X			X					X			
	104	*Tuberaria guttata* (L.) Fourr. var. *guttata*	Widespread								X	X		X				X				
	105	*Helianthemum nummularium* (L.) Miller subsp. *nummularium*	Widespread									X	X						X			
	106	*Helianthemum salicifolium* (L.) Miller	Widespread								X	X	X						X			
CONVOLVULACEAE	107	*Convolvulus arvensis* L.	Widespread													X	X	X				
	108	*Convolvulus cantabrica* L.	Widespread												X				X			
CORYLLACEAE	109	*Carpinus betulus* L.	Euro-Siberia								X					X				X		
	110	*Coryllus avellana* L.	Widespread												X				X			
	111	*Ostrya carpinifolia* Scop.	Mediterranean											X		X				X		
CRASSULACEAE	112	*Sedum acre* L.	Widespread									X	X						X			
	113	*Sedum album* L.	Widespread									X						X				
	114	*Sedum confertiflorum* Boiss.	Mediterranean								X	X	X						X			
	115	*Sedum pallidum* Bieb. var. *bithynicum* (Boiss.) Chamberlain	Euro-Siberia								X	X	X						X			
	116	*Umbilicus rupestris* (Salisb.) Dandy	Widespread								X				X				X			
CUPRESSACEAE	117	*Juniperus oxycedrus* L. ssp. *oxycedrus* L.	Mediterranean								X		X	X					X			

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
CUSCUTACEAE	118	*Cuscuta australis* R. *subsp. tinei.*	Mediterranean									X		X				X				
DIOSCOREACEAE	119	*Tamus communis* L. subsp *communis*	Widespread								X			X					X			
DIPSACACEAE	120	*Knautia integrifolia* (L.) Bert var. *bidens* (Sm.) Borbas	Mediterranean									X		X				X				
	121	*Pterocephalus plumosus* (L.) Coulter	Widespread									X		X					X			
	122	*Scabiosa argentea* L.	Widespread									X		X					X			
EPHEDRACEAE	123	*Ephedra major* Host	Widespread											X					X			
ERICACEAE	124	*Arbutus unedo* L.	Widespread												X					X		
	125	*Erica arborea* L.	Mediterranean												X				X			
EUPHORBIACEAE	126	*Euphorbia amygdaloides* L. var. *amygdaloides*	Euro-Siberia								X				X	X			X			
	127	*Euphorbia myrsinites* L.	Widespread								X								X			
	128	*Mercurialis perennis* L.	Euro-Siberia								X		X						X			
FABACEAE	129	*Coronilla parviflora* Willd. var. *luchani* Uhrova	Mediterranean									X		X					X			
	130	*Dorycnium pentaphyllum* Scop. Subsp. *herbaceum* (Vill.) Rouy	Widespread								X				X				X			
	131	*Genista anatolica* Gris.	Widespread									X		X					X			
	132	*Hippocrepis unisiliquosa* L. subsp. *unisiliquosa*	Mediterranean									X		X					X			
	133	*Hymenocarpus circinnatus* (L.) Savi	Mediterranean								X	X	X						X			
	134	*Lathyrus aphaca* L. var. *affinis* (Guss.) Arc.	Mediterranean								X		X						X			
	135	*Lathyrus digitatus* (Bieb.) Fiori	Mediterranean								X				X				X			
	136	*Lathyrus laxiflorus* (Desf.) O. Kuntze	Widespread								X		X						X			
	137	*Lens nigricans* (Bieb.) Godr.	Mediterranean								X		X						X			
	138	*Lotus corniculatus* L.var. *corniculatus*	Widespread									X						X				
	139	*Medicago orbicularis* (L.) All.	Mediterranean									X		X				X				
	140	*Medicago sativa* L. subsp. *sativa*	Widespread								X	X	X	X				X				
	141	*Medicago polymorpha* L. var. *vulgaris* (Benth.) Shinners	Widespread									X	X	X				X				
	142	*Ononis spinosa* subsp. *antiquorum* (L.) Briq.	Mediterranean									X						X				
	143	*Ornithopus compressus* L.	Mediterranean								X		X						X			
	144	*Trifolium angustifolium* L. var.*angustifolium*	Widespread								X		X					X				
	145	*Trifolium arvense* L. var. *arvense*	Widespread								X	X	X	X		X		X				
	146	*Trifolium campestre* Schreb.	Mediterranean								X	X	X	X		X		X				

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
	147	*Trifolium hybridum* L. *var. hybridum*	Widespread								X	X	X					X				
	148	*Trifolium isthmocarpum* Brot.	Widespread								X	X	X					X				
	149	*Trifolium pratense* L. var. *pratense*	Widespread								X	X	X	X		X			X			
	150	*Trifolium repens* L. var. *repens*	Widespread								X	X	X				X		X			
	151	*Trifolium stellatum* L.	Widespread								X	X	X	X		X			X			
	152	*Trifolium uniflorum* L.	Mediterranean								X		X					X				
	153	*Vicia cracca* L. subsp. *stenophylla* Vel.	Widespread								X	X		X		X	X		X			
	154	*Vicia hybrida* L.	Mediterranean								X	X						X				
	155	*Vicia narbonensis* L. var. *narbonensis*	Widespread								X	X	X						X			
FAGACEAE	156	*Fagus orientalis* Lipsky	Euro-Siberia													X						X
	157	*Quercus cerris* L. var. *cerris*	Mediterranean								X					X						X
	158	*Quercus frainnetto* Ten.	Widespread								X					X					X	
	159	*Quercus petrea* (Mattuschka) Liebl. subsp. *iberica* (Steven ex Bieb.) Krassiln	Widespread								X					X					X	
GENTIANACEAE	160	*Centaurium erythraea* Rafn. ssp. *rumelicum* (Velen.) Melderis	Mediterranean									X		X					X			
GERANIACEAE	161	*Erodium ciconium* (L.) L'Herit	Widespread									X							X			
	162	***Erodium somanum* H. Peşmen**	**Mediterranean**	**X**		**EN**						X		X					X			
	163	*Geranium asphodeloides* Burm. Fil. Subsp. *asphodeloides*	Euro-Siberia								X		X						X			
	164	*Geranium lucidum* L.	Widespread								X	X	X					X				
	165	*Geranium purpureum* Vill.	Widespread								X	X	X						X			
	166	*Geranium rotundifolium* L.	Widespread								X		X					X				
HYPERICACEAE	167	*Hypericum calycinum* L.	Euro-Siberia												X				X			
	168	*Hypericum perforatumn* L.	Widespread									X		X				X				
HYPOLEPIDACEAE	169	*Pteridium aquilinum* (L.) Kuhn	Widespread								X							X				
ILLECEBRACEAE	170	*Herniaria incana* Lam.	Widespread									X	X						X			
IRIDACEAE	171	*Crocus pulchellus* Herbert	Mediterranean								X	X	X	X		X			X			
	172	*Crocus cancellatus* Herbert var. *mazziaricus* (Herbert) Mathew	Mediterranean									X		X					X			
	173	*Gladiolus italicus* Miller	Mediterranean									X		X				X				
	174	*Iris suaveolens* Boiss. & Reuter	Mediterranean									X							X			
JUNCACEAE	175	*Luzula forsteri* (Sm.) DC.	Euro-Siberia								X		X						X			
	176	*Juncus gerardi* Loisel subsp. *gerardi*	Widespread								X		X						X			
LAMIACEAE	177	*Acinos rotundifolius* Pers.	Widespread									X							X			

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
	178	*Ajuga chamaepitys* (L.) Schreber subsp. *chia* var. *chia*	Widespread									X	X			X			X			
	179	*Clinopodium vulgare* L. *subsp. arundonum* (Boiss.) Nyman	Widespread								X		X						X			
	180	*Lamium amplexicaule* L.	Euro-Siberia								X		X						X			
	181	*Lamium garganicum* L. subsp. *striatum* (Sm.) Hayek var. *striatum*	Mediterranean								X		X						X			
	182	*Lamium purpureum* L. var. *purpureum*	Euro-Siberia								X		X						X			
	183	*Micromeria juliana* (L.) Bentham ex Reichb.	Mediterranean									X	X						X			
	184	*Micromeria myrtifolia* Boiss. & Hohen.	Mediterranean											X					X			
	185	*Nepeta nuda* L. subsp. *nuda*	Widespread									X	X	X					X			
	186	*Origanum vulgare* L. subsp. *hirtum* (Link) Letswaart	Mediterranean								X		X						X			
	187	*Prunella vulgaris* L. var. *laciniata*	Euro-Siberia								X	X	X					X				
	188	*Salvia tomentosa* Miller	Mediterranean								X		X					X				
	189	*Salvia virgata* Jacq.	Iran-Turan								X	X	X	X				X				
	190	*Sideritis montana* L. subsp. *montana*	Mediterranean									X	X						X			
	191	*Teucrium chamaedrys* L. subsp. *chameedrys*	Euro-Siberia											X					X			
	192	*Teucrium montanum* L.	Widespread									X	X						X			
	193	*Teucrium polium* L.	Widespread									X		X					X			
LILIACEAE	194	*Allium paniculatum* L. subsp.*paniculatum*	Mediterranean								X	X						X				
	195	*Allium scorodoprasum* L. ssp.*rotundum* (L.) Stearn.	Mediterranean								X	X	X					X				
	196	*Asparagus acutifolius* L.	Mediterranean								X			X					X			
	197	*Colchicum boissieri* Orph.	Widespread											X					X			
	198	*Gagea bohemica* (Zauschn.)Schultes& Schultes fil.	Widespread								X		X						X			
	199	*Ornithogalum narbonense* L.	Mediterranean								X		X						X			
	200	*Ornithogalum umbellatum* L.	Widespread								X	X	X						X			
	201	*Muscari neglectum* Guss.	Mediterranean								X	X	X					X				
	202	*Muscari comosum* (L.) Miller	Mediterranean									X		X				X				
	203	*Scilla autumnalis* L.	Widespread									X		X				X				
	204	*Scilla bifolia* L.	Mediterranean								X							X				
LINACEAE	205	*Linum trigynum* L.	Mediterranean									X	X						X			
MALVACEAE	206	*Alcea pallida* Waldst. & Kit.	Widespread									X						X				

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
	207	*Althaea hirsuta* L.	Widespread																X			
	208	*Malva sylvestris* L.	Widespread								X	X						X				
MORACEAE	209	*Ficus carica* L. subs. *carica*	Widespread												X				X			
OLEACEAE	210	*Jasminum fruticans* L.	Mediterranean								X	X	X	X					X			
	211	*Phillyrea latifolia* L.	Mediterranean								X			X						X		
ORCHIDACEAE	212	*Cephalanthera damasonium* (Miller) Druce	Euro-Siberia								X		X					X				
	213	*Limodorum abortivum* (L.) Swartz	Widespread								X		X					X				
PAPAVERACEAE	214	*Fumaria vaillantii* Lois.	Widespread								X	X	X					X				
	215	*Hypecoum imberbe* Sibth. & Sm.	Widespread														X		X			
	216	*Papaver dubium* L.	Widespread								X	X						X				
	217	*Papaver rhoeas* L.	Widespread									X		X				X				
	218	*Roemeria hybrida* (L.) DC.	Widespread									X		X				X				
PINACEAE	219	*Pinus nigra* J.F. Arenold subsp. *nigra* var. *caramanica* (Loudon) Rehder	Widespread												X					X		
PLANTAGINACEAE	220	*Plantago bellardii* All.	Widespread									X		X					X			
	221	*Plantago lanceolata* L.	Widespread									X		X					X			
PLATANACEAE	222	*Platanus orientalis* L.	Widespread												X				X			
POACEAE	223	*Aegilops triuncialis* L. subsp. *triuncialis*	Widespread								X	X		X					X			
	224	*Aegilops umbellulata* Zhuk. subsp. *umbellulata*	Irano-Turanian								X	X		X					X			
	225	*Agropyron cristatum* (L.) Gaertner) subsp. *pectinatum* (Bieb.) Tzvelev var. *pectinatum*	Widespread									X		X					X			
	226	*Agrostis capillaris* L. var. *aristata* (Boiss.) M. Doğan	Euro-Siberia								X	X	X						X			
	227	*Alopecurus myosuroides* Hudson var. *myosuroides*	Euro-Siberia								X		X	X					X			
	228	*Anthoxanthum odoratum L. subsp. odoratum*	Euro-Siberia								*X*		*X*						*X*			
	229	*Avena barbata* Pott ex Link subsp. *barbata*	Mediterranean									*X*	*X*			*X*	*X*		*X*			
	230	*Brachypodium sylvaticum* (Hudson) P. Beauv	Euro-Siberia								X		X						X			
	231	*Briza maxima* L.	Widespread								X	X	X						X			
	232	*Briza media* L.	Widespread								X		X						X			
	233	*Bromus japonicus* Thunb.subsp. *japonicus*	Widespread								X	X	X					X				
	234	*Bromus squamosus* L. subsp. *noëanus* Boiss. ex Pénzes	Widespread								X	X	X						X			
	235	*Bromus sterilis* L.	Widespread								X	X	X					X				

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
	236	*Bromus tectorum* L.	Widespread								X	X	X					X				
	237	*Cynodon dactylon* (L.) Pers.var. *dactylon*	Widespread									X		X					X			
	238	*Cynosurus cristatus* L.	Euro-Siberia								X		X					X				
	239	*Dactylis glomerata* L. subsp. *hispanica* (Roth) Nyman	Mediterranean								X	X	X	X					X			
	240	*Festuca valesiaca* Schleicher ex Gaudin	Widespread								X	X	X						X			
	241	*Hordeum bulbosum* L.	Widespread								X	X	X	X				X				
	242	*Hordeum murinum* L. subsp. *leporinum* (Link) Arc.	Mediterranean								X	X	X	X				X				
	243	*Koeleria cristata* (L.) Pers.	Widespread									X	X			X	X		X			
	244	*Lolium rigidum* Gaudin var. *rigidum*	Mediterranean								X	X	X	X	X			X				
	245	*Milium vernale* Bieb. Subsp. *vernale*	Mediterranean								X			X	X			X				
	246	*Phleum montanum* C. Koch subsp. *montanum*	Widespread								X	X							X			
	247	*Piptatherum coerulescens* (Desv.) P. Beauv.	Widespread								X	X	X	X	X				X			
	248	*Poa annua* L.	Widespread									X							X			
	249	*Poa bulbosa* L.subsp. *timeolontis* (Boiss.) Hayek	Widespread								X	X	X	X	X				X			
	250	*Secale cereale* L. var. *cereale*	Widespread									X	X		X				X			
	251	*Stipa capensis* Thunb.	Mediterranean									X	X			X			X			
	252	*Taeniatherum caput- medusae* (L.) Nevski subsp.*crinitum* (Schreber) Melderis	Irano-Turanian									X		X				X				
	253	*Trachynia distachya* (L.) Link	Mediterranean									X		X					X			
	254	*Vulpia ciliata* Dumort subsp. *ciliata*	Widespread									X	X	X				X				
POLYGONACEAE	255	*Rumex pulcher* L.	Widespread									X	X						X			
	256	*Rumex tuberosus* L. subsp. *tuberosus*	Widespread								X		X						X			
POLYPODIACEAE	257	*Polypodium vulgare* L.subsp. *vulgare*	Widespread									X							X			
PRIMULACEAE	258	*Anagallis arvensis L.var. arvensis*	Widespread									X		X				X				
	259	*Androsace maxima* L.	Widespread									X		X				X				
	260	***Cyclamen hederifolium* Aiton**	Mediterranean			**VU**			**X**		**X**	**X**	**X**		**X**	**X**			**X**			
RANUNCULACEAE	261	*Anemone blanda* Schott & Kotschy	Widespread								X		X						X			
	262	*Ceratocephalus falcatus* (L.) Pers.	Widespread									X		X				X				
	263	*Clematis vitalba* L.	Widespread										X	X				X				

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
	264	*Helleborus orientalis* Lam.	Euro-Siberia								X					X			X			
	265	*Nigella arvensis L. var. involucrata Boiss.*	Widespread									X		X				X				
	266	*Ranunculus arvensis* L.	Mediterranean								X	X		X				X				
	267	*Ranunculus constantinopolitanus* (DC.) d'Urv.	Widespread								X								X			
	268	*Ranunculus ficaria* L. subsp. *ficariiformis* Rouy & Fouc.	Widespread								X		X					X				
	269	*Ranunculus gracilis* Clarke	Widespread								X		X						X			
	270	*Ranunculus marginatus* d'Urv. subsp. *trachycarpos* (Fisch. & Mey.) Azn.	Widespread								X	X		X	X			X				
RESEDACEAE	271	*Reseda lutea* L. var. *lutea*	Widespread								X	X						X				
ROSACEAE	272	*Agrimonia eupatoria* L.	Widespread								X			X					X			
	273	*Crataegus monogyna* Jacq. Subsp. *monogyna*	Widespread								X					X			X			
	274	*Geum urbanum* L.	Euro-Siberia								X	X	X						X			
	275	*Mespilus germanica* L.	Euro-Siberia												X				X			
	276	*Potentilla micrantha* Ramond ex DC	Widespread								X		X						X			
	277	*Potentilla recta* L.	Widespread								X	X	X						X			
	278	*Potentilla reptans* L.	Widespread								X	X	X						X			
	279	*Prunus divaricata* Ledeb. subsp. *divaricata*	Widespread								X	X							X			
	280	*Pyrus elaeagnifolia* Pallas subsp. *elaeagnifolia*	Widespread								X	X							X			
	281	*Rosa canina* L.	Widespread								X	X	X						X			
	282	*Rubus idaeus* L.	Widespread								X	X	X						X			
	283	*Rubus sanctus* Schreber	Mediterranean								X	X	X					X				
	284	*Sanguisorba minor* Scop. subsp. *muricata* (Spach)Brig	Widespread								X	X						X				
	285	*Sorbus torminalis* (L.) Crantz.var. *torminalis*	Euro-Siberia								X				X				X			
RUBIACEAE	286	*Asperula involucrata* Wahlenb	Euro-Siberia								X		X					X				
	287	*Crucianella angustifolia* L.	Mediterranean								X		X					X				
	288	*Cruciata taurica* (Pallas ex Willd.) Ehrend.	Irano-Turanian								X		X					X				
	289	*Galium spurium* L. subsp. *spurium*	Euro-Siberia								X	X		X				X				
SANTALACEAE	290	*Osyris alba* L.	Mediterranean								X	X	X						X			
SALICACEAE	291	*Populus tremula* L.	Euro-Siberia								X				X				X			
SCROPHULARIACEAE	292	*Digitalis ferruginea* L.	Widespread								X								X			

Family	No	Species	Phytogeographic Region	Endemism		TRDB	Bern	CITES			Habitat							Relative Abundance				
				R	W		App 1	App 1	App 2	App 3	1	2	3	4	5	6	7	1	2	3	4	5
	293	*Euphrasia pectinata* Ten.	Euro-Siberia										X						X			
	294	*Linaria pelisseriana* (L.) Miller	Mediterranean								X	X		X				X				
	295	*Parentucellia latifolia* (L.) Caruel subsp. *latifolia*	Mediterranean									X	X						X			
	296	*Verbascum xanthophoeniceum* Griseb.	Mediterranean								X		X						X			
	297	*Veronica pectinata* L. var. *pectinata*	Widespread								X	X	X					X				
	298	*Veronica cymbalaria* Bodard	Mediterranean								X		X	X					X			
	299	*Veronica hederifolia* L. *subsp. triloba (Opiz)* Celak	Widespread								X	X						X				
TAXACEAE	300	*Taxus baccata* L.	Widespread													X	X					
TILIACEAE	301	*Tilia argentea* DC.	Euro-Siberia												X				X			
UMBELLIFERAE	302	*Anthriscus nemorosa* (Bieb.) Sprengel	Widespread								X							X				
	303	*Conium maculatum* L.	Widespread								X	X	X					X				
	304	*Daucus carota* L.	Widespread									X						X				
	305	*Eryngium campestre* L. var. *campestre*	Widespread								X	X							X			
	306	*Eryngium creticum* Lam.	Mediterranean										X						X			
	307	*Malabaila secacul* Banks & Sol.	Widespread									X	X						X			
	308	*Myrrhoides nodosa* (L.) Cannon	Widespread								X		X						X			
	309	*Oenanthe pimpinelloides* L.	Widespread								X		X						X			
	310	*Oenanthe silaifolia* Bieb.	Widespread								X		X						X			
	311	*Scandix australis* subsp. *grandiflora* (L.) Thell.	Widespread									X		X				X				
	312	*Torilis arvensis* (Huds.) Link subsp. *elongata* (Hoffmanns. & Link) Cannon	Mediterranean								X	X						X				
URTICACEAE	313	*Urtica dioica* L.	Widespread								X	X	X					X				
VALERIANACEAE	314	*Valerianella carinata* Lois.	Widespread								X	X						X				
	315	*Valeriana dioscoridis* Sm	Mediterranean								X		X						X			
VIOLACEAE	316	*Viola sieheana* Becker	Widespread								X		X					X				
	317	*Viola occulta* Lehm.	Widespread								X	X		X				X				

Relative abundance: 1: Very Rare, 2: Rare, 3: Moderately Abundant 4: Abundant 5: Very Abundant

Endemism: **R**: Regional **W**: Widespread

TRDB: Turkish Red Data Book: Cr: Critically Endangered, En: Endangered, VU: Vulnerable, NT: Near Threatened, LC: Least Concern

Habitat Classification:

1: E1.2: Perennial calcareous grassland and basic steppes

2: E2.1: Permanent mesotrophic pastures and aftermath-grazed meadows

3: F5.2: Maquis

4: G1.6: Fagus woodland

5: G1.7: Thermophilous deciduous woodland

6: G1.A: Meso- and eutrophic Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus and related woodland

7: I1.1: Intensive unmixed crops

4.1.4 Status of Plants in Terms of Threatened Category and Endemism

As a result of the field study, a total of 2 regional endemic (*Erodium somanum* and *Cirsium balikesirense*) and 1 rare distribution but not endemic (*Cyclamen hederifolium)* plant species were identified. There is no data different from which was identified in the local EIA process for the ETL and access road. (See Table 4-8)

Erodium somanum is a regional endemic plant species, occurring in the provinces of Manisa and district of Soma within Türkiye. The species is classified under the TRDB Threatened category as "EN: Endangered."

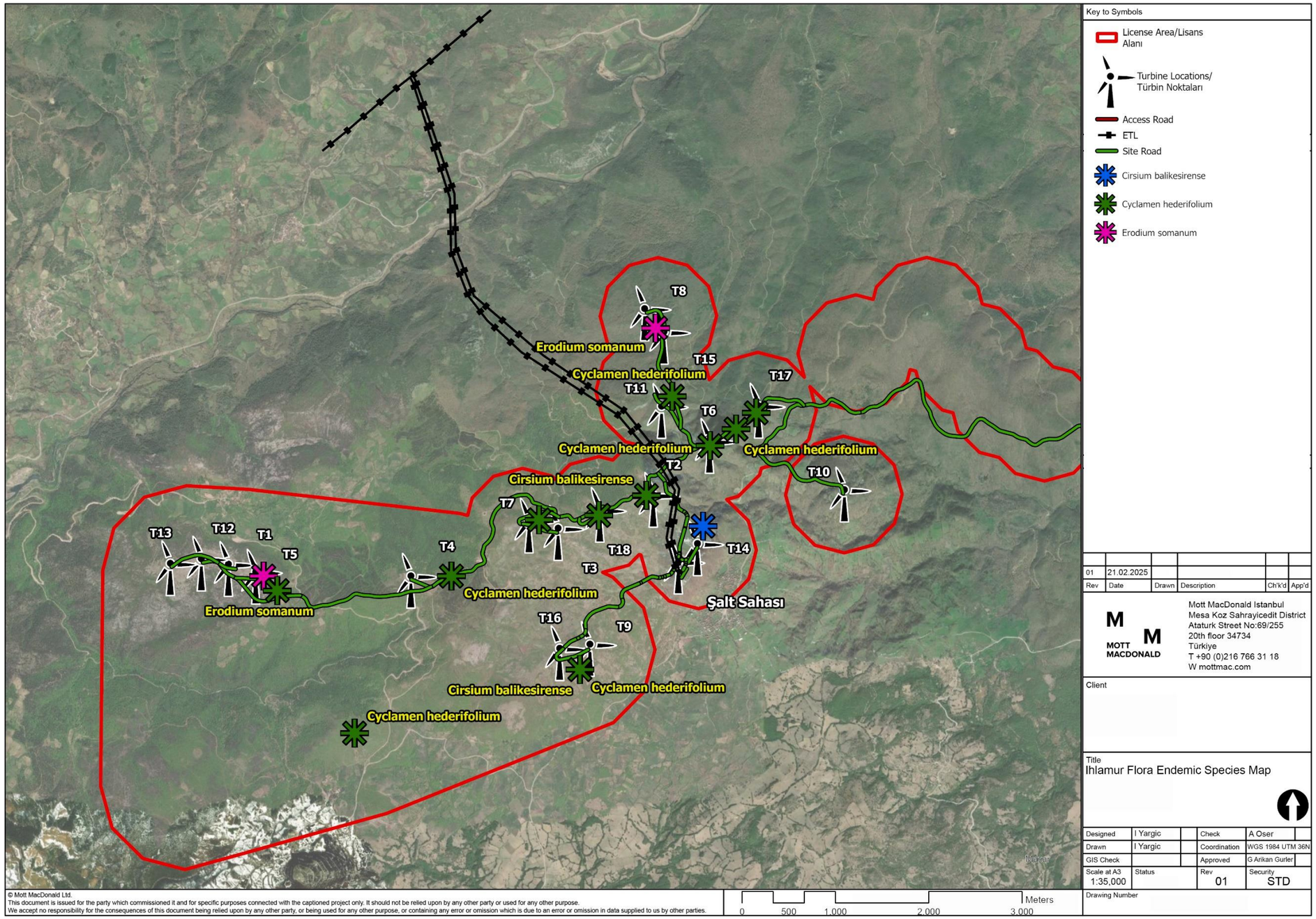
Cirsium balikesirense is a regional endemic plant species, occurring in the provinces of Çanakkale and Balıkesir within Türkiye. As the population status within its distribution areas remains relatively stable, the species is classified under the TRDB Threatened category as "VU: Vulnerable."

Cyclamen hederifolium is a rare distribution but not endemic plant species, occurring in the provinces of Çanakkale, İzmir, Muğla and İstanbul within Türkiye. As the population status within its distribution areas remains relatively stable, the species is classified under the TRDB Threatened category as "VU: Vulnerable." *Cyclamen hederifolium* is also listed in CITES Annex II.

The target plant species have been recorded in areas such as turbine locations and site roads. Due to habitat similarities, their presence in the access road and ETL areas is also considered likely, despite the absence of direct observations. (See Figure 4-2)

Table 4-8 The endemic species in the Project area of Influence and their coordinates

Taxon	TRDB	Bern	Coordinates
		Regional Endemic Species	
Erodium somanum	EN	-	35 S 541072 N 4423858 D 35 S 540926 N 4424014 D 35 S 545127 N 4426669 D
Cirsium balikesirense	VU	-	35 S 544316 N 4423013 D 35 S 545636 N 4424549 D 35 S 545029 N 4424878 D
		Non-Endemic Rare Species	
Cyclamen hederifolium	VU	-	35 S 541901 N 4422332 D 35 S 541072 N 4423858 D 35 S 542939 N 4424014 D 35 S 543878N 4424616 D 35 S 544518 N 4424664 D 35 S 544316 N 4423013 D 35 S 546206 N 4425762 D 35 S 545990 N 4425588 D 35 S 545711 N 4425411 D 35 S 545306 N 4425939 D 35 S 545029 N 4424878 D



Key to Symbols

- License Area/Lisans Alanı
- Turbine Locations/ Türbin Noktaları
- Access Road
- ETL
- Site Road
- Cirsium balikesirense
- Cyclamen hederifolium
- Erodium somanum

Rev	Date	Drawn	Description	Ch'k'd	App'd
01	21.02.2025				

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Client

Title
Ihlamur Flora Endemic Species Map

Designed	I Yargic		Check	A Oser	
Drawn	I Yargic		Coordination	WGS 1984 UTM 36N	
GIS Check			Approved	G Arikan Gurler	
Scale at A3	1:35,000	Status	Rev	01	Security STD

Drawing Number

Figure 4-2 Endemic Flora Species Location Map

4.2 Terrestrial Mammal

4.2.1 Kaz Mountains and Manyas Lake Key Biodiversity Area

The Key Biodiversity Are reports for the Kaz Mountains and Manyas Lake, along with the online databases and resources reviewed, does not provide specific information regarding the presence of terrestrial mammal species relevant to the KBA in the region.

4.2.2 Terrestrial Mammals Surveys

The same data as provided in the ESIA regarding terrestrial mammals has been obtained. A total of 29 mammal species from 13 families were identified within the Project Area of Influence through a combination of field studies, and literature reviews. Among these species, 7 were directly observed during fieldwork, and 22 were identified through a review of existing literature (Table 4-9). There is no endemic mammal species among the identified species.

Among the mammal species identified in the Project Area of Influence, 6 species are listed in Annex II of the Bern Convention, 9 species in Annex III, and 3 species in Annex III, 2 species in Annex III and 1 species in Annes I of CITES. According to the IUCN Red List, no species in the area is classified as endangered, with 2 species categorized as Vulnerable (VU). The remaining species are classified as Least Concern (LC), indicating they are not currently at significant risk of extinction.

Roe deer (*Capreolus capreolus)* (LC), which is distributed in very few places in the Mediterranean and Aegean Regio. It has been recorded as literature data in field and survey studies. This species is under immense hunting pressure in the Canakkale province. Although its status is Least Concern, this species is considered to have national importance.

Mouse-tailed dormouse (*Myomimus roachi*) (VU) was not observed in the field, it was identified as a species which would use the habitat at the Project area (especially the old trees) by the local mammal expert. Mouse-tailed dormouse has been recorded as literature data.

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 (forest and forest clearings) but it could be a rare occurrence here. Marbled polecat has been recorded as literature data.

Brown bear (*Ursus arctos*) is Least Concern (LC) globally and in Europe, but Vulnerable in the Mediterranean. According to local mammal expert the species would be expected to occur at the site sporadically. Brown bear has been recorded as literature data.

Table 4-9 Terrestrial Mammals 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*	Iberian Water Shrew	-	LC	Ann -III	-	-	L
Soricidae	*Crocidura suaveolens*	Lesser White-toothed Shrew	-	LC	Ann -III	-	-	L
Soricidae	*Crocidura leucodon*	Bicolored Shrew	-	LC	Ann -III	-	-	L
Talpidae	*Talpa levantis*	Levantine Mole	-	LC	-	-	-	L / O
Leporidae	*Lepus europaeus*	European Hare	-	LC	-	-	-	L / O
Sciuridae	*Sciurus anomalus*	Caucasian Squirrel	-	LC	Ann -II	-	-	L
Muridae	*Microtus hartingi*	Harting's Vole	-	LC	-	-	-	L
Muridae	*Microtus mystacinus*	East European Vole	-	LC	-	-	-	L
Muridae	*Nothocricetulus migratorius*	Grey Dwarf Hamster	-	LC	-	-	-	L
Muridae	*Apodemus mystacinus*	Eastern Broad-toothed Field Mouse	-	LC	-	-	-	L
Muridae	*Apodemus flavicollis*	Yellow-necked Field Mouse	-	LC	-	-	-	L
Muridae	*Apodemus witherbyi*	Steppe Field Mouse	-	LC	-	-	-	L
Muridae	*Mus musculus*	House Mouse	-	LC	-	-	-	L / O
Muridae	*Mus macedonicus*	Macedonian Mouse	-	LC	-	-	-	L
Muridae	*Rattus rattus*	House Rat	-	LC	-	-	-	L
Gliridae	*Dryomys nitedula*	Forest Dormouse	-	LC	Ann -III	-	-	L
Gliridae	*Myomimus roachi*	Roach's Mouse-tailed Dormouse	-	VU	Ann -II	-	-	L
Canidae	*Canis aureus*	Golden Jackal	-	LC	-	Ann -III	-	L
Canidae	*Canis lupus*	Grey Wolf	-	LC	Ann -II	Ann -I	-	L
Canidae	*Vulpes vulpes*	Red Fox	-	LC	-	Ann -III	-	L / O
Ursidae	*Ursus arctos*	Brown Bear	-	LC	Ann -II	Ann -II	-	L
Mustelidae	*Mustela nivalis*	Least Weasel	-	LC	Ann -III	-	-	L / O

Mustelidae	*Martes foina*	Beech Marten	-	LC	Ann -III	Ann -III	-	L
Mustelidae	*Vormela peregusna*	Marbled Polecat	-	VU	Ann -II	-	-	L
Mustelidae	*Meles meles*	European Badger	-	LC	Ann -III	-	-	L
Felidae	*Felis silvestris*	European Wildcat	-	LC	Ann -II	Ann -II	-	L
Suidae	*Sus scrofa*	Wild Boar	-	LC	Ann -III	-	-	L / O
Cervidae	*Capreolus capreolus*	European Roe Deer	-	LC	Ann -III	-	-	L

4.3 Herpetofauna

4.3.1 Kaz Mountains and Manyas Lake Key Biodiversity Area

The Key Biodiversity Are reports for the Kaz Mountains and Manyas Lake, along with the online databases and resources reviewed, does not provide specific information regarding the presence of herpetofauna 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 9 herpetofauna 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, 2 were directly observed during fieldwork, and 7 were identified through a thorough review of existing literature. (See Table 4-10).

There is no endemic amphibia species among the identified species.

Among the amphibia species identified in the Project Area of Influence, 2 species are listed in Annex II of the Bern Convention, 7 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.

Field surveys conducted within the project area did not reveal the presence of any permanent aquatic habitats, such as ponds. However, in the surrounding agricultural zones, irrigation channels generated by excessive watering practices were observed. These temporary water bodies appeared to support the occurrence of the recorded species.

4.3.3 Reptilia

The similar data as provided in the ESIA regarding Reptilia has been obtained. A total of 25 Reptilia species from 10 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 19 were identified through a thorough review of existing literature. (See Table 4-11)

There is no endemic reptile species among the identified species.

Among the Reptilia species identified in the Project Area of Influence, 10 species are listed in Annex II of the Bern Convention, 15 species in Annex III. According to the IUCN Red List, no species in the area are classified as endangered.

With the exception of one species, the remaining species are categorized as Least Concern (LC) by the IUCN, signifying that they are not presently at a significant risk of extinction. One species, *Testudo graeca*, is classified as Vulnerable (VU) under IUCN criteria and is also listed in CITES Annex II. According to the CITES Convention, only two (Javelin Sand Boa and Common Tortoise) of the 25 species is included in its annexes.

Table 4-10 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	*Lissotriton schmidtleri*	Schmidtler's smooth newt	-	LC	Ann -III	-	-	L
Salamandridae	*Triturus ivanbureschi*	Buresch's Crested New	-	LC	Ann -III	-	-	L
Salamandridae	*Ommatotriton nesterov*	Anatolian Banded Newt	-	LC	Ann -III	-	-	L
Bufonidae	*Bufo bufo*	Common Toad	-	LC	Ann -III	-	-	L / O
Bufonidae	*Bufotes viridis*	Green Toad	-	LC	Ann -III	-	-	L / O
Hylidae	*Hyla orientalis*	Shelkovnikov's Tree Frog	-	LC	Ann -III	-	-	L
Pelobatidae	*Pelobates syriacus*	Syrian Spadefoot	-	LC	Ann -II	-	-	L
Ranidae	*Pelophylax bedriagae*	Bedriaga's Frog	-	LC	Ann -III	-	-	L
Ranidae	*Rana dalmatina*	Agile Frog	-	LC	Ann -II	-	-	L

Table 4-11 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*	Common Tortoise	-	VU	Ann -II	Ann -II	X	O / L
Gekkonidae	*Hemidactylus turcicus*	Turkish Gecko	-	LC	Ann -III	-	-	L
Agamidae	*Laudakia stellio*	Starred Agama	-	LC	Ann -II	-	-	O / L
Anguidae	*Pseudopus apodus*	Sheltopusik	-	LC	Ann -II	-	-	O / L
Anguidae	*Anguis colchica*	Eastern Slow Worm	-	LC	Ann -III	-	-	L
Scincidae	*Ablepharus kitaibelii*	Juniper Skink	-	LC	Ann -II	-	-	L
Scincidae	*Heremites auratus*	Levant skink	-	LC	Ann -III	-	-	L
Lacertidae	*Lacerta diplochondrodes*	Rhodos Green Lizard	-	LC	Ann -III	-	-	L
Lacertidae	*Lacerta viridis*	The European green lizard	-	LC	Ann -II	-	-	O / L
Lacertidae	*Ophisops elegans*	Snake-eyed Lizard	-	LC	Ann -II	-	-	O / L
Lacertidae	*Podarcis muralis*	Common Wall Lizard	-	LC	Ann -II	-	-	L
Boidae	*Eryx jaculus*	Javelin Sand Boa	-	LC	Ann -III	Ann -II	-	L
Colubridae	*Coronella austriaca*	Smooth Snake	-	LC	Ann -II	-	-	L
Colubridae	*Dolichophis caspius*	Large Whip Snake	-	LC	Ann -III	-	-	L
Colubridae	*Eirenis modestus*	Ring-Headed Dwarf Snake	-	LC	Ann -III	-	-	L
Colubridae	*Elaphe sauromates*	Eastern Four-Lined Ratsnake	-	LC	Ann -III	-	-	L
Colubridae	*Hemorrhois nummifer*	Coin-marked Snake	-	LC	Ann -III	-	-	L
Colubridae	*Malpolon insignitus*	Eastern Montpellier Snake	-	LC	Ann -III	-	-	L
Colubridae	*Platyceps najadum*	Dahl's Whip Snake	-	LC	Ann -III	-	-	L
Colubridae	*Platyceps collaris*	Collared Dwarf Racer	-	LC	Ann -III	-	-	L
Colubridae	*Telescopus fallax*	Cat Snake	-	LC	Ann -II	-	-	L
Colubridae	*Zamenis situla*	European Ratsnake	-	LC	Ann -III	-	-	L
Natricidae	*Natrix natrix*	Grass Snake	-	LC	Ann -III	-	-	O / L
Typhlopidae	*Xerotyphlops vermicularis*	Eurasian Blind 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 283 birds were detected at the site (Table 4-12). The most frequently encountered species was the Dalmatian Pelican (*Pelecanus crispus*), with 96 contacts observed, all of which were residents. Other notable observations included the Common Buzzard (*Buteo buteo*), with 74 contacts, all residents, and the Short-toed Snake-Eagle (*Circaetus gallicus*) with 47 contacts, comprised of 2 migrants and 45 residents. Despite the variety of species, no threatened species were recorded during the survey. Dalmatian Pelican (*Pelecanus crispus*) is listed as ‘NT-Near Threatened’ in IUCN Red List.

Table 4-12 Total number of soaring migratory and resident bird species observed in spring 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Unknown	Total
Dalmatian Pelican	*Pelecanus crispus*	NT	-	96	-	96
Common Buzzard	*Buteo buteo*	LC	-	74	-	74
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	2	45	-	47
Black Stork	*Ciconia nigra*	LC	4	13	-	17
Peregrine Falcon	*Falco peregrinus*	LC	-	10	-	10
Eurasian Kestrel	*Falco tinnunculus*	LC	-	10	-	10
Eleonora's Falcon	*Falco eleonorae*	LC	-	7	-	7
Eurasian Hobby	*Falco subbuteo*	LC	-	7	-	7
unidentified Raptor	*Accipitridae spp.*	-	-	-	7	7
Eurasian Sparrowhawk	*Accipiter nisus*	LC	-	4	-	4
European Honey-buzzard	*Pernis apivorus*	LC	-	2	-	2
Booted Eagle	*Hieraaetus pennatus*	LC	-	1	-	1
unidentified Falcon	*Falco sp..*	-	-	-	1	1
Total	-	-	6	269	8	283

During the spring of 2024, an extensive survey totalling 138 hours and 32 minutes was conducted, averaging approximately 46 hr/VP. Over this period, 6 birds were identified as migrants. The migration rate was determined as 0.13 birds/hr for the spring migratory season.

Among the birds observed, 111 (about 39% of all observed birds) were reported to fly at risk height (at rotor height and below and 500 m buffer of the project site) (Table 4-13). Majority of birds that entered the risk zone were resident. 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 4-13 Resident and migrant bird occurrences at risk zone in spring 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Unknown	Total
Common Buzzard	*Buteo buteo*	LC	-	60	-	60
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	1	20	-	21
Eurasian Kestrel	*Falco tinnunculus*	LC	-	8	-	8
Eleonora's Falcon	*Falco eleonorae*	LC	-	4	-	4

Common Name	Scientific Name	IUCN	Migrant	Resident	Unknown	Total
Eurasian Sparrowhawk	*Accipiter nisus*	LC	-	4	-	4
Eurasian Hobby	*Falco subbuteo*	LC	-	4	-	4
Black Stork	*Ciconia nigra*	LC	-	4	-	4
Peregrine Falcon	*Falco peregrinus*	LC	-	2	-	2
unidentified Raptor	*Accipitridae spp.*	-	-	-	2	2
European Honey-buzzard	*Pernis apivorus*	LC	-	1	-	1
unidentified Falcon	*Falco sp.*	-	-	-	1	1
Total	-	-	1	107	3	111

Summer

During summer VP surveys, a total of 274 birds were detected at the site (Table 4-14). The most frequently encountered species was the the Eurasian Kestrel (*Falco tinnunculus*), with 86 contacts observed, all of which were residents. Other notable observations included the Eleonora's Falcon (*Falco eleonorae*) and Short-toed Snake-Eagle (*Circaetus gallicus*) with 68 and 46 contacs, respectively. Despite the variety of species, no threatened species were recorded during the survey.

Table 4-14 Total number of soaring migratory and resident bird species observed in summer 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Unknown	Total
Eurasian Kestrel	*Falco tinnunculus*	LC	-	86	-	86
Eleonora's Falcon	*Falco eleonorae*	LC	7	61	-	68
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	6	40	-	46
Common Buzzard	*Buteo buteo*	LC	2	28	1	31
European Honey-buzzard	*Pernis apivorus*	LC	6	9	-	15
Black Stork	*Ciconia nigra*	LC	-	8	-	8
Eurasian Sparrowhawk	*Accipiter nisus*	LC	-	7	-	7
Peregrine Falcon	*Falco peregrinus*	LC	-	4	-	4
Booted Eagle	*Hieraaetus pennatus*	LC	2	1	-	3
unidentified Raptor	*Accipitridae spp.*	-	-	2	-	2
Eurasian Hobby	*Falco subbuteo*	LC	-	1	-	1
Golden Eagle	*Aquila chrysaetos*	LC	-	1	-	1
Eurasian Marsh-Harrier	*Circus aeruginosus*	LC	1	-	-	1
unidentified Falcon	*Falco sp.*	-	-	-	1	1
Total	-	-	24	248	2	274

During the summer of 2024, a survey averaging approximately 41 hours and 56 minutes was conducted per vantage point. Over this period, 24 birds were identified as migrants. The migration rate was determined to be 0.57 birds per hour for the summer migratory season.

Among the birds observed, 228 (about 83% of all observed birds) were reported to fly at risk height (at rotor height and below and 500 m buffer of the project site) (Table 4-15). 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 4-15 Resident and migrant bird occurrences at risk zone in summer 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Unknown	Total
Eurasian Kestrel	*Falco tinnunculus*	LC	-	85	-	85
Eleonora's Falcon	*Falco eleonorae*	LC	7	61	-	68
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	5	28	-	33
Common Buzzard	*Buteo buteo*	LC	2	20	1	23
European Honey-buzzard	*Pernis apivorus*	LC	1	7	-	8
Eurasian Sparrowhawk	*Accipiter nisus*	LC	-	5	-	5
Black Stork	*Ciconia nigra*	LC	-	2	-	2
Eurasian Hobby	*Falco subbuteo*	LC	-	1	-	1
Booted Eagle	*Hieraaetus pennatus*	LC	1	-	-	1
Eurasian Marsh-Harrier	*Circus aeruginosus*	LC	1	-	-	1
unidentified Raptor	*Accipitridae sp.*	-	-	1	-	1
Total	-	-	17	210	1	228

Autumn

During autumn VP surveys, a total of 87 birds were detected at the site (Table 4-16). The most frequently encountered species was the Common Buzzard (*Buteo buteo*), with 37 contacts observed. Other notable observations included the Short-toed Snake-Eagle (*Circaetus gallicus*) and Eurasian Sparrowhawk (*Accipiter nisus*) with 18 and 15 contacts, respectively. Red-footed Falcon, listed VU-Vulnerable in IUCN Red List, was observed one time during autumn VP surveys (BirdLife International 2021).

Table 4-16 Total number of soaring migratory and resident bird species observed in autumn 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Unknown	Total
Common Buzzard	*Buteo buteo*	LC	20	17	-	37
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	-	17	1	18
Eurasian Sparrowhawk	*Accipiter nisus*	LC	7	6	2	15
Eurasian Kestrel	*Falco tinnunculus*	LC	-	5	-	5
European Honey-buzzard	*Pernis apivorus*	LC	3	-	-	3
Black Stork	*Ciconia nigra*	LC	-	2	-	2
unidentified Raptor	*Accipitridae spp.*	-	-	-	2	2
Red-footed falcon	*Falco vespertinus*	VU	1	-	-	1
Hen Harrier	*Circus cyaneus*	LC	1	-	-	1
Eurasian Marsh-Harrier	*Circus aeruginosus*	LC	1	-	-	1
unidentified Falcon	*Falco sp.*	-	-	-	1	1
unidentified Buzzard	*Buteo sp.*	-	1	-	-	1
Total	-	-	34	47	6	87

During the autumn of 2024, an extensive survey totalling 38 hours and 6 minutes was conducted per vantage point. Over this period, 34 birds were identified as migrants. The migration rate was determined to be 0.89 birds per hour for the autumn migratory season.

Among the birds observed, 63 (about 72% of all observed birds) were reported to fly at risk height (at rotor height and below and 500 m buffer of the project site) (Table 4-17). 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 4-17 Resident and migrant bird occurrences at risk zone in autumn 2024.

Common Name	Scientific Name	IUCN	Migrant	Resident	Unknown	Total
Common Buzzard	*Buteo buteo*	LC	14	12	-	26
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	-	13	-	13
Eurasian Sparrowhawk	*Accipiter nisus*	LC	5	6	2	13
Eurasian Kestrel	*Falco tinnunculus*	LC	-	5	-	5
European Honey-buzzard	*Pernis apivorus*	LC	2	-	-	2
Red-footed falcon	*Falco vespertinus*	VU	1	-	-	1
Hen Harrier	*Circus cyaneus*	LC	1	-	-	1
unidentified Raptor	*Accipitridae sp.*	-	-	-	1	1
unidentified Buzzard	*Buteo sp.*	-	1	-	-	1
Total	-	-	24	36	3	63

4.4.2 ETL Observations

Spring

During the spring 2024 surveys at TL points, a total of 257 birds were detected across various species (Table 4-18). Out of these, 55 birds, which account for approximately 21% 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 Dalmatian Pelican (*Pelecanus crispus*), with 116 contacts detected and 14 of them flying at risk height. Other notable species include the Common Buzzard (*Buteo buteo*) with 58 contacts observed, 17 of which were at risk height, and the Short-toed Snake-Eagle (*Circaetus gallicus*) with 33 contacts, 7 of which were at risk height.

Table 4-18 Total number of bird species observed at TL points at risk height in spring 2024.

Common Name	Scientific Name	IUCN	VP ETL1	VP ETL2	VP ETL3	Total
Common Buzzard	*Buteo buteo*	LC	-	5	12	17
Dalmatian Pelican	*Pelecanus crispus*	NT	4	-	10	14
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	1	6	-	7
Peregrine Falcon	*Falco peregrinus*	LC	6	-	-	6
Eurasian Sparrowhawk	*Accipiter nisus*	LC	-	1	3	4
European Honey-buzzard	*Pernis apivorus*	LC	-	-	3	3
Eurasian Hobby	*Falco subbuteo*	LC	-	1	1	2
Great White Pelican	*Pelecanus onocrotalus*	LC	-	-	1	1
Eurasian Kestrel	*Falco tinnunculus*	LC	-	1	-	1
Total	-	-	11	14	30	55

Most bird passages have been observed near VP ETL3, encompassing the northern side of the ETL route. The particular presence of over 10 Dalmatian Pelicans at risk height is noted. Overall total number of birds are also highest at VP ETL3.

Summer

During the Summer 2024 surveys at VP ETL points, a total of 167 birds were detected across various species (Table 4-19). Out of these, 62 birds, which account for approximately 37% 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 Short-toed Common Buzzard (*Buteo buteo*), with 44 contacts detected and 21 of them flying at risk height. Another notable

species includes the European Honey-buzzard (*Pernis apivorus*) with 33 contacts observed, 20 of which were at risk height.

Table 4-19 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	1	8	12	21
European Honey-buzzard	*Pernis apivorus*	Migrant	LC	-	1	19	20
Short-toed Snake-Eagle	*Circaetus gallicus*	Resident	LC	-	1	8	9
Eurasian Sparrowhawk	*Accipiter nisus*	Resident	LC	1	1	4	6
Peregrine Falcon	*Falco peregrinus*	Resident	LC	4	-	1	5
Eurasian Hobby	*Falco subbuteo*	Resident	LC	-	1	-	1
Total	-		-	6	12	44	62

It is observed from the available data that bird passages are not fairly uniform along the route of the transmission line and are predominantly localised in the VP ETL3 segment.

Autumn

During the Autumn 2024 surveys at VP ETL points, a total of 94 birds were detected across various species (Table 4-20). Out of these, 51 birds, which account for approximately 54% 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 61 contacts detected and 34 of them flying at risk height. Another notable species includes the Eurasian Sparrowhawk (*Accipiter nisus*) with 16 contacts detected and 11 of which were at risk height.

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

Common Name	Scientific Name	Status	IUCN	VP ETL1	VP ETL2	VP ETL3	Total
Common Buzzard	*Buteo buteo*	Resident	LC	-	8	26	34
Eurasian Sparrowhawk	*Accipiter nisus*	Resident	LC	2	3	6	11
Peregrine Falcon	*Falco peregrinus*	Resident	LC	-	-	5	5
Unidentified Raptor	*Accipiter sp*	Resident	-	-	1	-	1
Total	-		-	2	12	37	51

It is observed from the available data that bird passages are not fairly uniform along the route of the transmission line and are predominantly localised in the VP ETL3 segment.

Summary

Based on the surveys conducted in spring, summer, and autumn 2024 at the transmission line points (ETL1, ETL2 and ETL3), the overall risk of bird collision with the Energy Transmission Lines remains low (Figure 4-3). Across all seasons, a total of 518 birds were detected, with 168 birds (approximately 32%) observed flying at the height of the transmission lines, placing them at potential risk of collision.

Table 4-21: Total number of bird species observed across all VP ETL points.

Common Name	Scientific Name	Status	IUCN	VP ETL1	VP ETL2	VP ETL3	Total	Total Risk
Common Buzzard	*Buteo buteo*	LC	Resident	26	50	87	163	72
Dalmatian Pelican	*Pelecanus crispus*	NT	Resident	89	-	27	116	14
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	Resident	22	27	33	82	16
European Honey-buzzard	*Pernis apivorus*	LC	Migrant	2	5	37	44	23
Eurasian Sparrowhawk	*Accipiter nisus*	LC	Resident	5	12	16	33	21
Peregrine Falcon	*Falco peregrinus*	LC	Resident	14	-	6	20	16
Black Stork	*Ciconia nigra*	LC	Resident	15	1	4	20	-
Eleonora's Falcon	*Falco eleonorae*	LC	Resident	3	7	8	18	-
Eurasian Hobby	*Falco subbuteo*	LC	Resident	1	4	1	6	3
Unidentified Raptor	*Accipiter xx*	-	Resident	1	1	3	5	1
Eurasian Kestrel	*Falco tinnunculus*	LC	Resident	2	2	-	4	1
Booted Eagle	*Hieraaetus pennatus*	LC	Resident	-	2	1	3	-
Golden Eagle	*Aquila chrysaetos*	LC	Resident	-	-	2	2	-
Great White Pelican	*Pelecanus onocrotalus*	LC	Resident	-	-	1	1	1
Long-legged Buzzard	*Buteo rufinus*	LC	Resident	-	-	1	1	-
Total	-	-		180	111	227	518	168

VP ETL3 was characterised as the segment with the highest risk of bird collisions between VP ETL1, VP ETL2 and VP ETL3, mainly due to the presence of Dalmatian Pelicans (*Pelecanus crispus*), a Near Threatened species. In spring 2024, 30 of the 55 birds at risk were recorded in TL3, 10 of which were Dalmatian Pelicans. This highlights the need for targeted mitigation measures to protect sensitive and other species.

Table 4-22: Risk quantification values of each TL point based on passage rates.

Season	VP ETL1	VP ETL2	VP ETL3
Spring	0.29	0.28	1.66
Summer	0.14	0.29	0.90
Autumn	0.05	0.31	1.01
Average	0.16	0.29	1.19

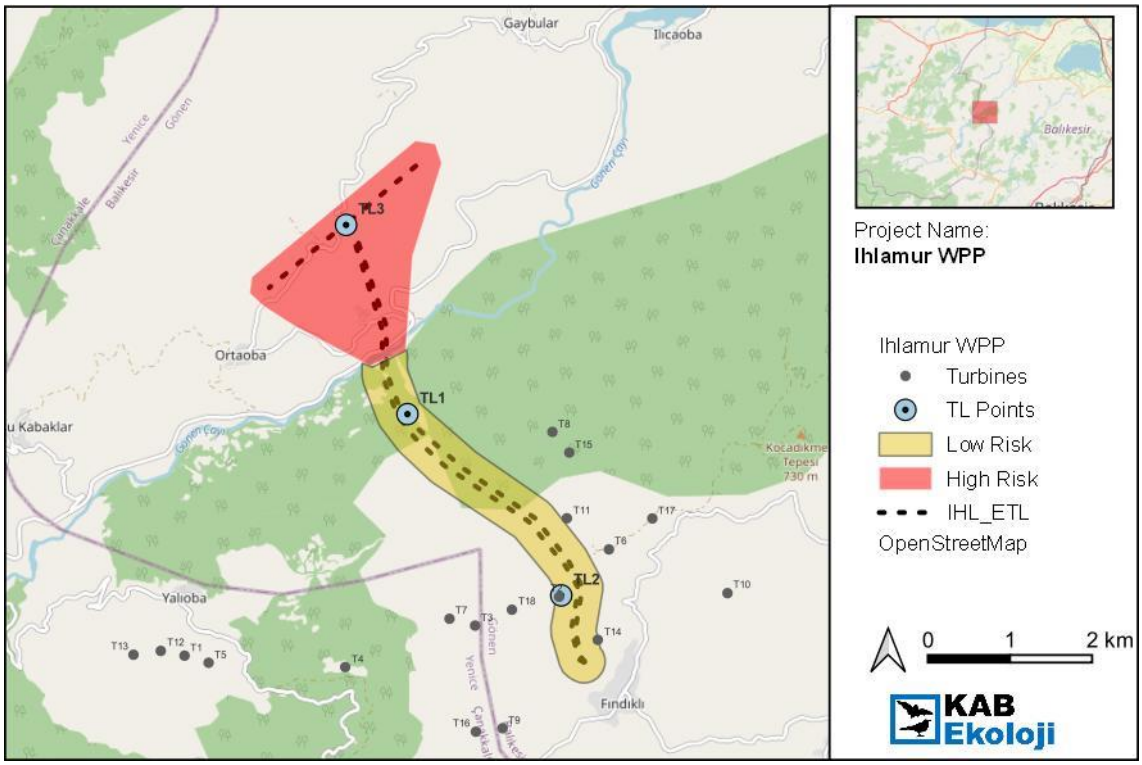

Figure 4-3 ETL segment risk assessment.

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.

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.[4][5][6]

Spring

Sample collision risk calculation for migrant species is shown in Table 4-23. Since only 1 migrant was observed in the risk zone, risk for other species is not calculated.

The data indicates that the collision risk for migrant species during the spring period is negligible.

Table 4-23 Mortality rate calculation for migrant species in detail.

Variable	Value	Unit
Species	Short-toed Snake-Eagle	
Recorded number of birds at risk height/zone	1	birds
Duration of observation	46.18	hr/VP
Study Period	2024-03-01	
	2024-06-15	
Total migration hours	1070	hr
Estimated number of birds at risk height/zone (n)	23.17	birds
N	18	
width	8268	m
height	180	m
W	1488240	m2
A	271574.4	m2
A/W	0.18	%
n x (A/W)	4.23	birds
P. Probability of bird being hit when flying through the rotor	0.09	
Mortality rate without avoidance	0.37	birds
(1 - avoidance rate)	0.02	
Mortality estimation per year	0.01	birds

Table 4-24 The estimated mortality rates of migrant species in summer 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.
Short-toed Snake-Eagle	1	23.17	4.23	0.37	0.01
Total	1	23.17	4.23	0.37	0.01

[4] 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.

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

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

Sample collision risk calculation for resident species is shown in Table 4-25. Calculation for all species with risk above 0,01 is shown on Table 4-26. The species with the highest collision risk are the Common Buzzard (*Buteo buteo*) and the Short-toed Snake-Eagle (*Circaetus gallicus*).

Table 4-25 Mortality rate calculation for resident species in detail.

Variable	Value	Unit
Species	Common Buzzard	
Total duration of individual bird observations	4517.23	sec
Total duration of observations	46.18	hr/VP
Study Period	2024-03-01	
	2024-06-15	
Total migration hours	1284	hr
Estimated total birds x seconds	125604.2	bird x sec
N	18	
Area	10071486	m2
height	180	m
Vw	1812867480	m3
Sweeping Area	271574.4	m2
r	69.3	m
d	4	m
L	0.58	m
Vr = N x πR2 x (d + l)	1242453	m3
n	125604.2	sec
n x (Vr / Vw)	86.08	sec
v	11.6	m/s
t = (d + l) / v	0.39	sec
n x (Vr / Vw) / t	218.27	birds
Probability of bird being hit when flying through the rotor	0.09	
Mortality rate without avoidance	20.52	birds
(1 - avoidance rate)	0.02	
Mortality estimation for study period	0.41	birds

Table 4-26 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.
Common Buzzard	4517	125604	86	218	20.52	0.41
Short-toed Snake-Eagle	1566	43532	30	87	7.6	0.15
Eurasian Hobby	758	21089	14	36	2.96	0.06
Eurasian Kestrel	572	15911	10	24	2.24	0.04
Black Stork	146	4068	3	10	0.84	0.02
Others	183	5101	3	9	0.75	0.01
Total	7743	215304	147	384	34.91	0.70

Summer

Sample collision risk calculation for migrant species is shown in Table 4-27. Calculation for all species with risk above 0 is shown on Table 4-28.

Table 4-27 Mortality rate calculation for migrant species in detail (summer).

Variable	Value	Unit
Species	Eleonora's Falcon	
Recorded number of birds at risk height/zone	7	birds
Duration of observation	42	hr/VP
Study Period	2024-06-16	
	2024-08-31	
Total migration hours	770	hr
Estimated number of birds at risk height/zone (n)	128.33	birds
N	18	
width	8268	m
height	180	m
W	1488240	m2
A	271574.4	m2
A/W	0.18	%
n x (A/W)	23.42	birds
P. Probability of bird being hit when flying through the rotor	0.08	
Mortality rate without avoidance	1.80	birds
(1 - avoidance rate)	0.02	
Mortality estimation per year	0.04	birds

Table 4-28 The estimated mortality rates of migrant species in summer 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.
Eleonora's Falcon	7	128.33	23.42	1.8	0.04
Short-toed Snake-Eagle	5	91.67	16.73	1.46	0.03
Common Buzzard	2	36.67	6.69	0.63	0.01
Booted Eagle	1	18.33	3.35	0.3	0.01
Eurasian Marsh-Harrier	1	18.33	3.35	0.31	0.01
Others	1	18.33	3.35	0.29	0.01
Total	17	311.67	56.87	4.79	0.10

The mortality rate for resident species during the summer of 2024 is based on a prediction of 986 bird passages, with a calculated mortality rate of 1.68 birds per summer period, and the species with the highest collision risk being the Eurasian Kestrel (*Falco tinnunculus*) and the Eleonora's Falcon (*Falco eleonorae*).

Sample collision risk calculation for resident species is shown in Table 4-29. Calculation for all species with risk above 0 is shown on Table 4-30.

Table 4-29 Mortality rate calculation for resident species in detail (summer).

Variable	Value	Unit
Species	Eurasian Kestrel	
Total duration of individual bird observations	11264.11	sec
Total duration of observations	42	hr/VP
Study Period	2024-06-16	
	2024-08-31	

Variable	Value	Unit
Total migration hours	924	hr
Estimated total birds x seconds	247810.33	bird x sec
N	18	
Area	10071486	m2
height	180	m
Vw	1812867480	m3
Sweeping Area	271574.4	m2
r	69.3	m
d	4	m
L	0.34	m
Vr = N x πR2 x (d + l)	1178633	m3
n	247810.33	sec
n x (Vr / Vw)	161.11	sec
v	10.1	m/s
t = (d + l) / v	0.43	sec
n x (Vr / Vw) / t	374.94	birds
Probability of bird being hit when flying through the rotor	0.09	
Mortality rate without avoidance	34.87	birds
(1 - avoidance rate)	0.02	
Mortality estimation for study period	0.70	birds

Table 4-30: 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.
Eurasian Kestrel	11264	247810	161	375	34.87	0.70
Eleonora's Falcon	10043	220942	145	424	32.62	0.65
Short-toed Snake-Eagle	2509	55195	38	111	9.64	0.19
European Honey-buzzard	799	17569	12	33	2.86	0.06
Common Buzzard	639	14056	10	24	2.3	0.05
Others	492	10835	7	19	1.63	0.03
Total	25746	566408	374	986	83.91	1.68

Autumn

Sample collision risk calculation for migrant species is shown in Table 4-31. Calculation for all species with risk above 0 is shown on Table 4-32.

Table 4-31 Mortality rate calculation for migrant species in detail (autumn).

Variable	Value	Unit
Species	Common Buzzard	
Recorded number of birds at risk height/zone	14	birds
Duration of observation	38.11	hr/VP
Study Period	2024-09-01	
	2024-11-15	
Total migration hours	760	hr
Estimated number of birds at risk height/zone (n)	279.22	birds

Variable	Value	Unit
N	18	
width	8268	m
height	180	m
W	1488240	m2
A	271574.4	m2
A/W	0.18	%
n x (A/W)	50.95	birds
P. Probability of bird being hit when flying through the rotor	0.09	
Mortality rate without avoidance	4.79	birds
(1 - avoidance rate)	0.02	
Mortality estimation per year	0.10	birds

Table 4-32: 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.
Common Buzzard	14	279.22	50.95	4.79	0.10
Eurasian Sparrowhawk	5	99.72	18.2	1.53	0.03
European Honey-buzzard	2	39.89	7.28	0.63	0.01
Hen Harrier	1	19.94	3.64	0.41	0.01
Red-footed Falcon	1	19.94	3.64	0.27	0.01
Others	1	19.94	3.64	0.34	0.01
Total	24	478.67	87.35	7.97	0.17

Sample collision risk calculation for resident species is shown in Table 4-33. Calculation for all species with risk above 0 is shown on Table 4-34. The species with the highest collision risk are the Short-toed Snake-Eagle (*Circaetus gallicus*) and Common Buzzard (*Buteo buteo*).

Table 4-33: Mortality rate calculation for resident species in detail (autumn).

Variable	Value	Unit
Species	Short-toed Snake-Eagle	
Total duration of individual bird observations	1439.12	sec
Total duration of observations	38.11	hr/VP
Study Period	2024-09-01	
	2024-11-15	
Total migration hours	912	hr
Estimated total birds x seconds	34443.18	bird x sec
N	18	
Area	10071486	m2
height	180	m
Vw	1812867480	m3
Sweeping Area	271574.4	m2
r	69.3	m
d	4	m
L	0.66	m

Variable	Value	Unit
Vr = N x πR2 x (d + l)	1264179	m3
n	34443.18	sec
n x (Vr / Vw)	24.02	sec
v	13.4	m/s
t = (d + l) / v	0.35	sec
n x (Vr / Vw) / t	69.14	birds
Probability of bird being hit when flying through the rotor	0.09	
Mortality rate without avoidance	6.02	birds
(1 - avoidance rate)	0.02	
Mortality estimation for study period	0.12	birds

Table 4-34: 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.
Short-toed Snake-Eagle	1439	34443	24	69	6.02	0.12
Common Buzzard	543	12994	9	23	2.12	0.04
Eurasian Sparrowhawk	274	6563	4	11	0.93	0.02
Eurasian Kestrel	71	1703	1	3	0.24	0.00
Total	2327	55705	38	105	9.31	0.18

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[7] 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 4-35. The results demonstrate that baseline risk over the study period was

[7] 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 4-35 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 is presented in Table 4-36.

Table 4-36 Additive Collision Risk Assessment summary for the 9 WPP Project

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

The survey recorded a total of 75 bird species. Among these, 57 species have a breeding code higher than 0, indicating active breeding. Notably, the vulnerable European Turtle-Dove (*Streptopelia turtur*). The most common species observed were the Common Wood-Pigeon (*Columba palumbus*), Common Chiffchaff (*Phylloscopus collybita*), and Eurasian Blackcap (*Sylvia atricapilla*). The possible nest location of Peregrine Falcon was observed at 600 m south of VP1, at the coordinate 35N 543104 4426408. A pair was observed multiple times of to cliff, indicating a possible nest. However, nest could not be observed from the road. Additionally, species observed during breeding bird surveys which are not breeding were included (denoted -) All species are listed in Table 4-37.

Table 4-37 List of species encountered during breeding bird surveys and highest number recorded each month (X: observed but not counted)

Common Name	Scientific Name	IUCN	Breeding Code	Apr	May	Jun	Jul
Common Wood-Pigeon	*Columba palumbus*	LC	B3	-	1	3	-
European Turtle-Dove	*Streptopelia turtur*	VU	A2	-	1	2	2
Eurasian Collared-Dove	*Streptopelia decaocto*	LC	-	-	X	-	-
Common Cuckoo	*Cuculus canorus*	LC	A2	-	1	-	-
Alpine Swift	*Tachymarptis melba*	LC	-	-	-	-	4
Common Swift	*Apus apus*	LC	-	-	3	-	2
Yellow-legged Gull	*Larus michahellis*	LC	-	-	6	-	-
Black Stork	*Ciconia nigra*	LC	-	X	1	X	1
Great Cormorant	*Phalacrocorax carbo*	LC	-	-	52	-	1
Great White Pelican	*Pelecanus onocrotalus*	LC	-	-	1	-	-
Dalmatian Pelican	*Pelecanus crispus*	NT	-	-	14	-	-
European Honey-buzzard	*Pernis apivorus*	LC	A1	-	2	-	2
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	B3	X	3	X	3
Booted Eagle	*Hieraaetus pennatus*	LC	-	-	1	-	1
Golden Eagle	*Aquila chrysaetos*	LC	-	-	-	-	1
Eurasian Sparrowhawk	*Accipiter nisus*	LC	-	-	2	X	2
Common Buzzard	*Buteo buteo*	LC	C12	X	4	1	4
Eurasian Hoopoe	*Upupa epops*	LC	A1	-	1	-	1
European Bee-eater	*Merops apiaster*	LC	A2	-	75	-	6
Syrian Woodpecker	*Dendrocopos syriacus*	LC	B3	-	-	2	-
Lesser Spotted Woodpecker	*Dryobates minor*	LC	A2	-	1	1	-
Eurasian Green Woodpecker	*Picus viridis*	LC	A2	-	2	-	1
Eurasian Kestrel	*Falco tinnunculus*	LC	B3	-	2	2	3
Eleonora's Falcon	*Falco eleonorae*	LC	B3	-	2	X	4
Eurasian Hobby	*Falco subbuteo*	LC	-	-	1	-	-
Peregrine Falcon	*Falco peregrinus*	LC	C13	-	2	-	2
Eurasian Golden Oriole	*Oriolus oriolus*	LC	A2	-	2	2	2
Red-backed Shrike	*Lanius collurio*	LC	A1	-	1	-	-
Eurasian Jay	*Garrulus glandarius*	LC	C12	-	3	3	4
Hooded Crow	*Corvus cornix*	LC	B3	-	3	-	-
Common Raven	*Corvus corax*	LC	A2	X	2	2	5
Coal Tit	*Periparus ater*	LC	-	-	2	-	-

Common Name	Scientific Name	IUCN	Breeding Code	Apr	May	Jun	Jul
Sombre Tit	*Poecile lugubris*	LC	B3	-	4	-	1
Marsh Tit	*Poecile palustris*	LC	A1	-	1	-	-
Eurasian Blue Tit	*Cyanistes caeruleus*	LC	C14	-	3	7	-
Great Tit	*Parus major*	LC	C12	-	7	5	-
Wood Lark	*Lullula arborea*	LC	C12	X	12	10	6
Eurasian Skylark	*Alauda arvensis*	LC	-	-	X	-	-
Greater Short-toed Lark	*Calandrella brachydactyla*	LC	A1	X	3	-	-
Eastern Olivaceous Warbler	*Iduna pallida*	LC	-	-	1	-	-
Barn Swallow	*Hirundo rustica*	LC	A2	-	10	-	10
Common House-Martin	*Delichon urbicum*	LC	-	-	-	-	3
European red-rumped swallow	*Cecropis rufula*	LC	B3	X	3	-	-
Common Chiffchaff	*Phylloscopus collybita*	LC	A2	-	7	6	-
Long-tailed Tit	*Aegithalos caudatus*	LC	C12	-	6	-	6
Eurasian Blackcap	*Sylvia atricapilla*	LC	A2	-	1	2	-
Lesser Whitethroat	*Curruca curruca*	LC	A2	-	-	3	-
Sardinian Warbler	*Curruca melanocephala*	LC	B3	X	4	3	1
Eastern Subalpine Warbler	*Curruca cantillans*	LC	B3	-	2	3	2
Greater Whitethroat	*Curruca communis*	LC	A2	X	2	-	2
Eurasian Nuthatch	*Sitta europaea*	LC	B3	-	2	2	-
Short-toed Treecreeper	*Certhia brachydactyla*	LC	A2	-	1	3	1
Eurasian Wren	*Troglodytes troglodytes*	LC	A2	-	5	7	2
Mistle Thrush	*Turdus viscivorus*	LC	A2	-	1	-	-
Song Thrush	*Turdus philomelos*	LC	A2	-	1	-	-
Eurasian Blackbird	*Turdus merula*	LC	C14	X	5	5	2
European Robin	*Erithacus rubecula*	LC	A2	X	5	6	1
Common Nightingale	*Luscinia megarhynchos*	LC	A2	-	1	-	-
Red-breasted Flycatcher	*Ficedula parva*	LC	A1	-	1	-	-
Common Redstart	*Phoenicurus phoenicurus*	LC	-	-	-	-	1
Whinchat	*Saxicola rubetra*	LC	A1	-	1	-	-
Northern Wheatear	*Oenanthe oenanthe*	LC	A1	X	1	-	X
Eastern Black-eared Wheatear	*Oenanthe melanoleuca*	LC	A1	-	1	-	1
House Sparrow	*Passer domesticus*	LC	A1	-	-	-	10
Gray Wagtail	*Motacilla cinerea*	LC	-	-	X	-	-
Tawny Pipit	*Anthus campestris*	LC	B3	-	2	-	-
Common Chaffinch	*Fringilla coelebs*	LC	C12	X	12	9	7
European Greenfinch	*Chloris chloris*	LC	A2	-	1	-	-
Eurasian Linnet	*Linaria cannabina*	LC	C12	X	4	3	5
European Goldfinch	*Carduelis carduelis*	LC	C12	-	2	5	4
European Serin	*Serinus serinus*	LC	B3	-	3	2	1
Corn Bunting	*Emberiza calandra*	LC	B3	-	5	2	X
Cirl Bunting	*Emberiza cirlus*	LC	B3	-	2	2	2
Ortolan Bunting	*Emberiza hortulana*	LC	A2	X	1	X	-
Cretzschmar's Bunting	*Emberiza caesia*	LC	A2	-	1	-	-
Common Wood-Pigeon	*Columba palumbus*	LC	B3	-	1	3	-

4.5 Bat

Spring

Based on Auto-ID results, a total of 127,178 recordings were made. 17,011 recordings, or 13.37%, were identified as bat recordings in spring. Noise accounted for the majority of the recordings (86.62%), with an average nightly noise percentage ranging from 80.37% to 100.00%. Nights 3, 4, 5, and 6 were selected for manual species identification. A summary is shown on Table 4-38.

Table 4-38 Number of bat recordings and noise recorded each night based on Auto-ID in spring

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
1	12	2765	15383	18148	84.76%	
2	12	2047	20316	22363	90.85%	
3	12	3205	19354	22559	85.79%	Manual_ID
4	12	3382	17478	20860	83.79%	Manual_ID
5	12	1780	14183	15963	88.85%	Manual_ID
6	12	2370	9705	12075	80.37%	Manual_ID
7	12	610	5824	6434	90.52%	
8	12	226	1073	1299	82.60%	
9	12	351	2557	2908	87.93%	
10	12	189	2681	2870	93.41%	
11	12	86	1521	1607	94.65%	
12	12	0	92	92	100.00%	
Total	-	17011	110167	127178	86.62%	-

Table 4-39 presents the distribution of bat recordings across twelve SPs based on Auto-ID results. SP04 had the highest average recordings, followed by SP05 and SP11. Night 4 recorded the highest bat activity (3,382 recordings), showing the highest potential of the site. Failures of the recorders are indicated by blank cells in the table.

Table 4-40 and Table 4-41 summarizes the results of the Manual-ID analysis of bat recordings for the selected nights (3, 4, 5, and 6), yielding a total of 2,301 recordings across 12 SPs over these nights. Particularly for this proejct site and season, in most 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 33.8% (2301 / 6807) of the total results from Auto-ID for spring. This issue did not recur in other seasons.

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

Night	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP11	SP12	Total
1	186	102	170	634	758	53	10	21	56	469	306	0	2765
2	61	36	363	761	85	148	22	9	9	489	51	13	2047
3	74	47	153	1164	780	321	7	19	35	408	132	65	3205
4	159	256	211	455	870	299	47	50	83	336	483	133	3382
5	84	139	156	347	17	155	25	28	112	136	539	42	1780
6	56		72			261	411	364	242		717	247	2370
7	249					200	50	1	42			68	610
8	34					159						33	226
9						297						54	351
10						124						65	189
11												86	86
Average	113	116	188	672	502	202	82	70	83	368	371	81	237
Ave_corrected	38	39	64	227	170	68	28	24	28	124	125	27	80

Table 4-40 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	Total
3	Auto ID	74	47	0	1164	780	321	0	19	35	408	132	0	2980
4	Auto ID	159	256	211	455	870	299	47	50	83	336	483	133	3382
5	Auto ID	0	0	156	0	0	0	0	0	0	0	0	42	198
6	Auto ID	0	0	0	0	0	0	0	0	0	0	0	247	247
Total	Auto ID	233	303	367	1619	1650	620	47	69	118	744	615	422	6807

Table 4-41 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	Total
3	Manual ID	67	5	0	582	8	110	0	9	36	32	38	0	887
4	Manual ID	113	33	92	237	46	169	7	40	78	77	312	43	1247
5	Manual ID	0	0	97	0	0	0	0	0	0	0	0	23	120
6	Manual ID	0	0	0	0	0	0	0	0	0	0	0	47	47
Total	Manual ID	180	38	189	819	54	279	7	49	114	109	350	113	2301

The Auto-ID of the sounds across all nights shows the most common species was Common Pipistrelle (*Pipistrellus pipistrellus*) with 27.59% of the recordings and 64.06% of the recordings when non-id species were distributed evenly. The second most common species was Soprano Pipistrelle (*Pipistrellus pygmaeus*) with 3.60% of the recordings and 8.37% when non-id species were distributed evenly (Table 4-42).

Conservation priority is highlighted for species such as Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), classified as Vulnerable (VU) on the IUCN Red List. This species accounted for 2.83% of the total recordings and 6.58% when non-id species were distributed evenly. Additionally, *Nyctalus lasiopterus*, another Vulnerable species, was detected in 0.29% of the recordings (0.67% when unidentified species were distributed). However, the software failed to identify more than 56.93% of the recordings, classified as "NoID," demonstrating the need for manual analysis to refine species identification.

The comparison of the species identification results of Manual-ID, the total of 2301 recordings, and Auto-ID has several key differences shown in Table 4-43.Common Pipistrelle (*Pipistrellus pipistrellus*) remains the most common species across both methods. However, its relative abundance differs: Manual-ID shows 58.76% of recordings compared to 27.59% in Auto-ID. This indicates that Manual-ID attributed a much larger proportion of calls to this species. Soprano Pipistrelle (*Pipistrellus pygmaeus*) is the second most common species in Auto-ID (3.60%) but has a much lower presence in Manual-ID, where Soprano Pipistrelle is 1.69 %. This discrepancy highlights potential challenges in distinguishing these species manually or via Auto-ID. Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) is the third most common species in Auto-ID, but its representation is higher in Manual-ID (13.30%) compared to Auto-ID (2.83%). This suggests that Schreiber's Bent-winged Bat calls may have been underestimated by Auto-ID software.

Table 4-42 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	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	513	74	169	1482	171	655	170	135	124	331	810	60	4694	27.59%	64.06%
Pipistrelloid	PIPPYG	LC	7	4	10	69	359	27	3	28	22	69	12	3	613	3.60%	8.37%
Pipistrelloid	MINSCH	VU	4	11	40	110	10	101	11	59	47	25	52	12	482	2.83%	6.58%
Pipistrelloid	PIPKUH	LC	1	15	13	62	5	74	0	6	6	85	39	33	339	1.99%	4.63%
Pipistrelloid	HYPSAV	LC	1	0	1	4	0	7	3	2	4	18	49	13	102	0.60%	1.39%
Pipistrelloid	PIPNAT	LC	1	0	7	4	0	17	0	1	2	0	7	2	41	0.24%	0.56%
Nyctaloid	EPTSER	LC	23	10	27	9	14	89	11	31	61	20	47	53	395	2.32%	5.39%
Nyctaloid	NYCLEI	LC	33	5	16	1	2	70	1	11	45	2	10	20	216	1.27%	2.95%
Nyctaloid	NYCNOC	LC	6	1	5	8	2	4	40	0	1	1	9	13	90	0.53%	1.23%
Nyctaloid	NYCLAS	VU	12	2	2	5	0	12	5	0	2	1	0	8	49	0.29%	0.67%
Nyctaloid	VESMUR	LC	2	2	14	0	0	9	1	1	4	2	2	7	44	0.26%	0.60%
Tadarida	TADTEN	LC	23	3	0	0	0	19	7	1	4	1	10	16	84	0.49%	1.15%
Plecotus	PLESPE	NA	0	0	0	4	0	4	0	0	3	3	0	4	18	0.11%	0.25%
Myotis	MYOSPE	NA	12	3	35	20	4	4	0	0	3	14	8	2	105	0.62%	1.43%
Rhinolophus	RHIHIP	NT (E,M)	7	1	0	1	1	0	0	9	6	12	7	0	44	0.26%	0.60%
Rhinolophus	RHIFER	NT (E,M)	0	0	0	1	0	7	0	1	0	0	0	0	9	0.05%	0.12%
Rhinolophus	RHIEUR	VU (E,M)	0	0	0	0	0	0	0	0	2	0	0	0	2	0.01%	0.03%
-	NoID	-	258	449	786	1581	1942	918	320	207	243	1254	1166	560	9684	56.93%	
Total	-	-	903	580	1125	3361	2510	2017	572	492	579	1838	2228	806	17011	-	-

Table 4-43 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	Total	Percent
Pipistrelloid	PIPPIP	LC	132	17	78	677	40	71	5	17	23	40	213	39	1352	58.76%
Pipistrelloid	MINSCH	VU	3	3	31	130	5	7	2	6	14	24	69	12	306	13.30%
Pipistrelloid	PIPPYG	LC	0	2	12	2	1	1	0	5	1	1	13	1	39	1.69%
Pipistrelloid	PIPKUH/PIPNAT	-	1	1	0	5	1	9	0	1	1	0	12	7	38	1.65%
Pipistrelloid	HYPSAV	LC	0	0	0	0	0	1	0	1	0	0	4	2	8	0.35%
Nyctaloid	NYCLEI	LC	24	6	32	0	0	105	0	5	38	2	15	34	261	11.34%
Nyctaloid	EPTSER	LC	9	4	13	1	3	58	0	7	29	20	6	9	159	6.91%
Nyctaloid	NYCNOC	LC	3	0	0	0	0	1	0	0	0	0	3	2	9	0.39%
Nyctaloid	NYCLAS	VU	0	0	0	0	0	3	0	0	0	0	0	3	6	0.26%
Tadarida	TADTEN	LC	0	0	0	0	0	1	0	1	1	0	3	0	6	0.26%
Plecotus	PLESPE	NA	0	0	3	0	0	3	0	1	3	2	0	3	15	0.65%
Myotis	MYOSPE	NA	6	4	20	2	4	8	0	4	0	5	7	1	61	2.65%
Rhinolophus	RHIHIP	NT (E,M)	2	0	0	0	0	0	0	1	2	13	5	0	23	1.00%
Rhinolophus	RHIFER	NT (E,M)	0	1	0	2	0	7	0	0	2	1	0	0	13	0.56%
Rhinolophus	RHIBLA	VU (E)	0	0	0	0	0	0	0	0	0	1	0	0	1	0.04%
#N/A		#N/A	0	0	0	0	0	4	0	0	0	0	0	0	4	0.17%
Total	-	-	180	38	189	819	54	279	7	49	114	109	350	113	2301	-

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 05:00.

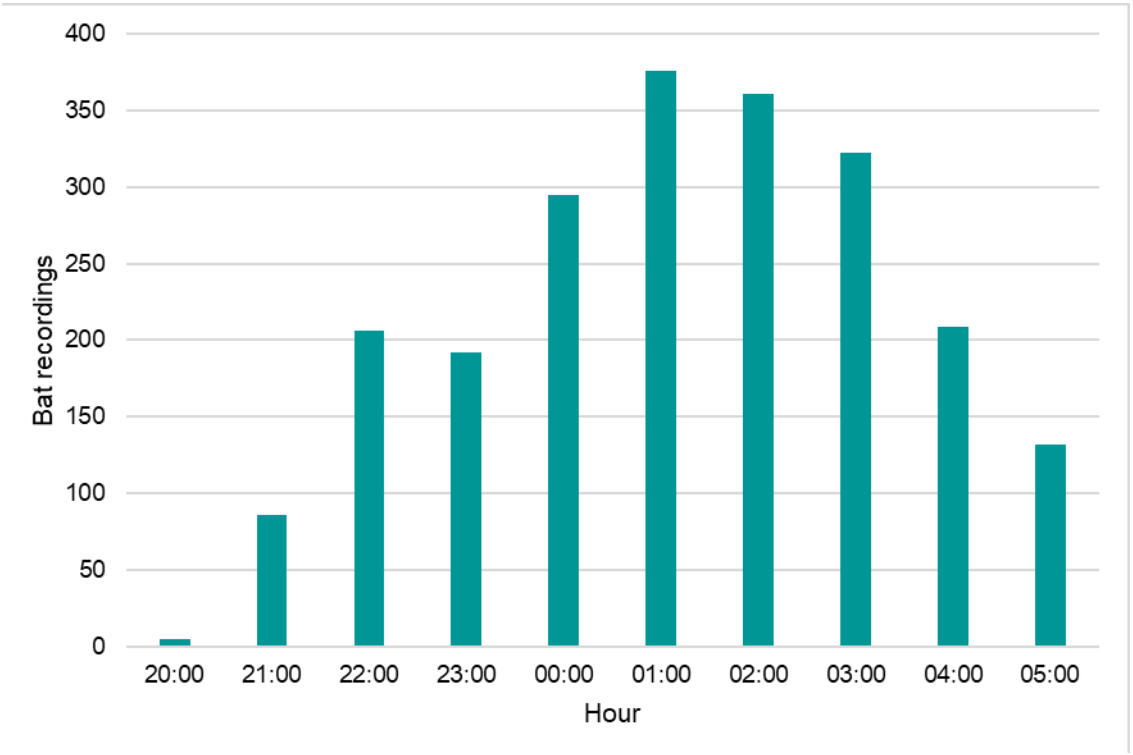

Figure 4-4 Hourly distribution of bat recordings through the night in spring

Summer

Based on Auto-ID results, a total of 102,792 recordings were made (Table 4-44). 25,453 recordings, or 24.75%, identified as bat recordings in summer. Noise accounted for the majority of the recordings 75.24%, with an average nightly noise percentage ranging from 36.50% to 88.67%. Nights 6, 7, 9, 10, 11, and 12 were selected for manual species identification.

Table 4-44 Number of bat recordings and noise recorded each night based on Auto-ID in summer

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
1	12	2721	9809	12530	78.28%	
2	12	2231	7207	9438	76.36%	
3	12	2356	10435	12791	81.58%	
4	12	1693	12630	14323	88.18%	
5	12	1536	5366	6902	77.75%	
6	12	1064	8331	9395	88.67%	Manual_ID
7	12	1261	8009	9270	86.40%	Manual_ID
8	12	2445	3146	5591	56.27%	
9	12	5382	3093	8475	36.50%	Manual_ID
10	12	2411	4355	6766	64.37%	Manual_ID
11	12	1843	3077	4920	62.54%	Manual_ID

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
12	12	510	1881	2391	78.67%	Manual_ID
Total	-	25453	77339	102792	75.24%	-

Table 4-45 presents the distribution of bat recordings across eleven SPs based on Auto-ID results. SP04 had the highest average recordings, accounting average for 447 of all detections, followed by SP05 (378) and SP10 (304). Night 9 recorded the highest bat activity with 5382 recordings, showing the highest potential of the site.

Due to a better location closer to the turbines SP12 was established as a new and SP11 was cancelled.

Table 4-45 Distribution of bat recordings across SPs by night based on Auto-ID results in summer

Night	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP12	Total
1		119	132	821	774	426	20	56	177	125	71	2721
2		63	133	393	626	358	21	44	105	446	42	2231
3		158	284	445	342	441	39	60	192	302	93	2356
4		50	34	801	387	165	9	7	69	55	116	1693
5		37	72	530	450	175	7	18	179	32	36	1536
6		64	52	548	108	116	7	11	47	82	29	1064
7		277	110	438		129	14	14	28	222	29	1261
8		257	236	383		212	24	48	172	1039	74	2445
9	140	338	623	750		929	184	356	550	1264	248	5382
10	207	216	356	667		482	67	145	62	37	172	2411
11	155	416	204	466		358	32	84			128	1843
12	97	10	45	104		154	18	33			49	510
Average	150	167	190	529	448	329	37	73	158	360	91	230
Ave_cor.	127	141	160	447	378	278	31	62	133	304	77	194

Table 4-46 and Table 4-47 summarizes the results of the Manual-ID analysis of bat recordings for the selected nights, yielding a total of 2,470 recordings across 11 SPs over 6 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 84.5% of the total results from Auto-ID for the season.

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

Night	Method	SP01	02	03	04	05	06	07	08	09	10	12	Total
6	Manual ID	0	40	53	626	47	121	7	11	40	25	22	992
7	Manual ID	0	22	107	453	0	141	12	14	28	23	11	811
9	Manual ID	146	0	0	0	0	0	0	0	0	0	0	146
10	Manual ID	221	0	0	0	0	0	0	0	0	0	0	221
11	Manual ID	190	0	0	0	0	0	0	0	0	0	0	190
12	Manual ID	110	0	0	0	0	0	0	0	0	0	0	110
Total	Manual ID	667	62	160	1079	47	262	19	25	68	48	33	2470

Table 4-47 Distribution of bat recordings across SPs by selected nights based on Auto-ID results in summer

Night	Method	SP01	02	03	04	05	06	07	08	09	10	12	Total
6	Auto ID	0	64	52	548	108	116	7	11	47	82	29	1064
7	Auto ID	0	277	110	438	0	129	14	14	28	222	29	1261
9	Auto ID	140	0	0	0	0	0	0	0	0	0	0	140
10	Auto ID	207	0	0	0	0	0	0	0	0	0	0	207
11	Auto ID	155	0	0	0	0	0	0	0	0	0	0	155
12	Auto ID	97	0	0	0	0	0	0	0	0	0	0	97
Total	Auto ID	599	341	162	986	108	245	21	25	75	304	58	2924

The Auto ID of the sounds at all nights shows the most common species was Common Pipistrelle (*Pipistrellus pipistrellus*) with 46.81% recordings and with 72.34% recordings when non-id species are distributed evenly. Remarkably, the second most common species is Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), Vulnerable (VU), with 3.25% recordings and with 5.01% recordings when non-id species are distributed evenly (Table 4-48).

When checking the Manual-ID species of the total 2470 records, we can see some differences compared to the Auto-ID results (Table 4-49). In the Auto-ID results, Common Pipistrelle (*Pipistrellus pipistrellus*) accounted for 46.81% of the recordings, whereas in the Manual-ID results, it accounted for 60.97%. This indicates that Manual-ID identified this species more frequently, suggesting more accurate identification of the most common bat species. The second most common species in the manual ID dataset is *Plecotus spp*., which makes up 11.62% of the records. This is considerably higher than in the Auto ID dataset, where Plecotus spec. has only 3.76%. This highlights a larger presence of Plecotus spec. in the Manual ID.

Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), classified as "Vulnerable" (VU), constitutes 4.90% of the manual identification dataset. In contrast, it represents 3.25% of the automated identification dataset, or 5.01% when non-identified species are evenly distributed. Although the discrepancy is not substantial, the manual identification dataset indicates a marginally higher presence of this species.

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

Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP12	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	372	612	1340	3731	386	2114	250	555	668	1541	346	11915	46.81%	72.34%
Pipistrelloid	MINSCH	VU	4	35	55	279	102	233	16	15	40	30	17	826	3.25%	5.01%
Pipistrelloid	PIPPYG	LC	13	48	116	111	31	105	12	23	47	196	46	748	2.94%	4.54%
Pipistrelloid	PIPKUH	LC	1	8	10	9	49	48	18	16	20	86	22	287	1.13%	1.74%
Pipistrelloid	HYPSAV	LC	4	61	25	18	8	47	9	9	13	7	24	225	0.88%	1.37%
Pipistrelloid	PIPNAT	LC	5	10	28	27	2	12	7	11	2	3	6	113	0.44%	0.69%
Nyctaloid	NYCLEI	LC	22	41	50	32	6	77	14	23	63	9	38	375	1.47%	2.28%
Nyctaloid	EPTSER	LC	5	4	37	16	17	51	15	19	35	20	57	276	1.08%	1.68%
Nyctaloid	NYCLAS	VU	4	4	14	27	7	42	2	2	2	9	16	129	0.51%	0.78%
Nyctaloid	NYCNOC	LC	1	6	6	23	4	6	1	3	12	7	7	76	0.30%	0.46%
Nyctaloid	VESMUR	LC	3	6	7	2	1	15	3	5	5	6	14	67	0.26%	0.41%
Tadarida	TADTEN	LC	4	11	10	24	3	37	8	1	2	12	14	126	0.50%	0.76%
Plecotus	PLESPE	NA	9	6	51	577	154	146	0	2	0	4	9	958	3.76%	5.82%
Myotis	MYOSPE	NA	9	32	29	15	68	17	2	7	13	71	4	267	1.05%	1.62%
Rhinolophus	RHIHIP	NT (E,M)	3	4	2	4	1	1	1	2	3	9	0	30	0.12%	0.18%
Rhinolophus	RHIEUR	VU (E,M)	2	0	0	1	0	0	0	0	1	0	0	4	0.02%	0.02%
Rhinolophus	RHIFER	NT (E,M)	0	1	0	0	0	0	0	1	0	0	0	2	0.01%	0.01%
Barbastella	BARBAR	VU (E)	0	10	4	4	9	2	0	1	12	5	0	47	0.18%	0.29%
-	NoID	-	138	1106	497	1446	1839	992	84	181	643	1589	467	8982	35.29%	
Total	-	-	599	2005	2281	6346	2687	3945	442	876	1581	3604	1087	25453	-	-

Table 4-49 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	SP12	Total	Percent
Pipistrelloid	PIPPIP	LC	426	18	93	777	32	103	8	11	10	27	1	1506	60.97%
Pipistrelloid	MINSCH	VU	6	5	8	64	2	30	2	0	2	1	1	121	4.90%
Pipistrelloid	PIPPYG	LC	13	5	11	6	0	12	1	5	5	6	4	68	2.75%
Pipistrelloid	PIPKUH/PIPNAT	-	6	0	3	5	2	9	0	0	3	3	1	32	1.30%
Pipistrelloid	HYPSAV	LC	4	0	0	2	0	3	2	1	0	0	1	13	0.53%
Nyctaloid	NYCLEI	LC	67	27	22	30	6	46	5	4	18	2	5	232	9.39%
Nyctaloid	EPTSER	LC	18	2	6	5	4	21	1	1	11	5	17	91	3.68%
Nyctaloid	NYCLAS	VU	13	1	2	5	0	8	0	0	9	0	0	38	1.54%
Nyctaloid	NYCNOC	LC	0	1	0	3	0	0	0	0	7	0	0	11	0.45%
Tadarida	TADTEN	LC	2	0	0	0	0	0	0	0	0	0	0	2	0.08%
Plecotus	PLESPE	NA	87	0	2	172	0	23	0	0	0	0	3	287	11.62%
Myotis	MYOSPE	NA	15	1	8	7	0	6	0	2	3	4	0	46	1.86%
Rhinolophus	RHIHIP	NT (E,M)	3	1	0	0	1	0	0	0	0	0	0	5	0.20%
Rhinolophus	RHIFER	NT (E,M)	3	1	0	0	0	0	0	0	0	0	0	4	0.16%
Rhinolophus	RHIEUR	VU (E,M)	2	0	0	0	0	0	0	0	0	0	0	2	0.08%
Rhinolophus	RHIBLA	VU (E)	1	0	0	0	0	0	0	0	0	0	0	1	0.04%
Barbastella	BARBAR	VU (E)	1	0	5	2	0	1	0	1	0	0	0	10	0.40%
Total	-	-	667	62	160	1079	47	262	19	25	68	48	33	2470	-

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 4-5 represents the activity patterns of these selected species throughout the night during the summer season, spanning from 20:00 to 06:00.

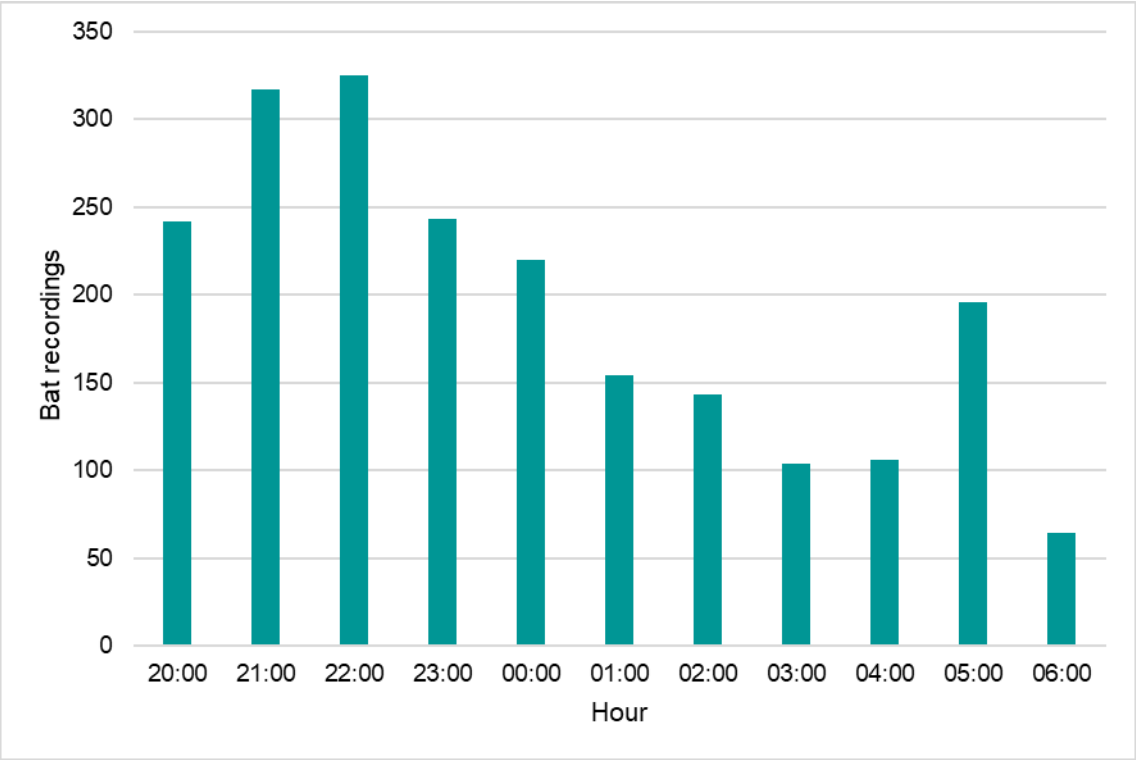

Figure 4-5 Hourly distribution of bat recordings through the night in summer

Autumn

Based on Auto-ID results, a total of 84,748 recordings were made. Of these, 34,117 recordings, or 40.26%, were identified as bat recordings in autumn. Noise accounted for the majority of the recordings, with 50,631 noise recordings, making up 59.74% of the total. The average nightly noise percentage ranged from 40.91% to 75.35%. A summary is shown on Table 4-50.

Nights 1 and 4 were selected for manual species identification.

Table 4-50 Number of bat recordings and noise recorded each night based on Auto-ID in autumn

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
1	12	6182	7805	13987	55.80%	Manual_ID
2	12	6298	6230	12528	49.73%	
3	12	2329	2846	5175	55.00%	
4	12	2174	2114	4288	49.30%	Manual_ID
5	12	1311	3933	5244	75.00%	
6	12	2065	4202	6267	67.05%	
7	12	4217	6157	10374	59.35%	
8	12	2113	6017	8130	74.01%	
9	12	2130	2603	4733	55.00%	

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
10	12	1572	2820	4392	64.21%	
11	12	1525	1997	3522	56.70%	
12	12	1193	826	2019	40.91%	
13	12	1008	3081	4089	75.35%	
Total	-	34117	50631	84748	59.74%	-

Table 4-51 presents the distribution of bat recordings across 11 SPs based on Auto-ID results. SP06 had the highest average recordings, accounting for approximately 15.3% of all detections, followed by SP04 and SP05. Night 2 recorded the highest bat activity, with 6,298 recordings, which is approximately 10.9 times the average value of 579 recordings per SP per night, highlighting the site's potential for high bat activity.

Due to a better location closer to the turbines SP12 was established as a new and SP11 was cancelled.

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

Night	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10	SP12	Total
1	115	208	348	620	1609	2133	88	193	206	379	283	6182
2	177	243	544	733	1087	1828	220	352	363	639	112	6298
3	305	111	271	459	195	312	40	137	189	214	96	2329
4	132	118	228	521	212	255	50	92	183	248	135	2174
5	58	68	180	393	171	149	29	61	71	87	44	1311
6	90	83	258	393	352	454	31	63	111	189	41	2065
7	167	130	400	468	146	1945	173	173	174	394	47	4217
8	134	99	413	549	56	273	51	250	96	169	23	2113
9	169	136	440		275	659	74	181	149		47	2130
10	277	133	413		163		81	157	260		88	1572
11	349	131	507		171		39	80	174		74	1525
12	125	88	342		342		56	87	123		30	1193
13	192	102	335		31		123	93	113		19	1008
Average	176	127	360	517	370	890	81	148	170	290	80	292
Ave_corr.	190	137	390	560	400	963	88	160	184	314	87	579

*Failures of the recorders are indicated by blank cells in the table.

Table 4-52 and Table 4-53 summarizes the results of the Manual-ID analysis of bat recordings for the selected nights (1 and 4), yielding a total of 9,043 recordings across 11 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 cases, noise was misclassified as bat calls by one detector, which contributed to minor discrepancies. Ultimately, the total number of bat recordings identified through Manual-ID corresponds to 108.2% of the total results from Auto-ID, indicating a slightly higher detection rate with manual analysis for the autumn season.

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

Night	Method	SP01	02	03	04	05	06	07	08	09	10	12	Total
1	Manual ID	88	159	316	697	1808	2770	93	219	222	358	147	6877
4	Manual ID	93	115	203	551	224	272	53	101	184	227	143	2166
Total	Manual ID	181	274	519	1248	2032	3042	146	320	406	585	290	9043

Table 4-53 Distribution of bat recordings across SPs by selected nights based on Auto-ID results in autumn

Night	Method	SP01	02	03	04	05	06	07	08	09	10	12	Total
1	Auto ID	115	208	348	620	1609	2133	88	193	206	379	283	6182
4	Auto ID	132	118	228	521	212	255	50	92	183	248	135	2174
Total	Auto ID	247	326	576	1141	1821	2388	138	285	389	627	418	8356

The Auto-ID analysis of all nights indicates that the most common species was Common Pipistrelle (*Pipistrellus pipistrellus*), accounting for 48.34% of the total recordings and 70.22% when unidentified species were evenly distributed. Again, the second most common species was Schreiber's Bat (*Miniopterus schreibersii*), Vulnerable (VU), with 4.92% of the total recordings and 7.14% when unidentified species were distributed. The software failed to identify 31.15% of the recordings (Table 4-54)

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

Group	Species	IUCN	SP01	02	03	04	05	06	07	08	09	10	12	Total	Precent	Percent_2
Pipistrelloid	PIPPIP	LC	972	785	2211	1938	2620	4586	423	953	972	833	200	16493	48.34%	70.22%
Pipistrelloid	MINSCH	VU	30	57	147	221	308	557	25	122	119	60	32	1678	4.92%	7.14%
Pipistrelloid	PIPNAT	LC	55	62	292	178	106	96	51	63	83	34	34	1054	3.09%	4.49%
Pipistrelloid	PIPPYG	LC	23	48	89	96	73	233	20	28	43	78	8	739	2.17%	3.15%
Pipistrelloid	PIPKUH	LC	23	19	95	58	37	29	16	29	38	17	20	381	1.12%	1.62%
Pipistrelloid	HYPSAV	LC	3	9	16	6	8	6	8	35	31	1	24	147	0.43%	0.63%
Nyctaloid	NYCLEI	LC	28	66	146	41	35	54	44	50	104	32	97	697	2.04%	2.97%
Nyctaloid	EPTSER	LC	2	11	60	30	5	19	25	27	25	7	23	234	0.69%	1.00%
Nyctaloid	NYCNOC	LC	21	15	19	21	31	8	39	7	28	14	13	216	0.63%	0.92%
Nyctaloid	NYCLAS	VU	21	22	29	57	20	22	9	6	6	8	11	211	0.62%	0.90%
Nyctaloid	VESMUR	LC	6	12	27	10	9	13	13	9	19	7	51	176	0.52%	0.75%
Tadarida	TADTEN	LC	138	42	54	55	36	53	12	12	14	50	6	472	1.38%	2.01%
Plecotus	PLESPE	NA	247	15	285	94	70	17	2	5	7	58	3	803	2.35%	3.42%
Myotis	MYOSPE	NA	14	10	21	6	3	2	2	11	1	10	7	87	0.26%	0.37%
Rhinolophus	RHIHIP	NT (E,M)	11	4	0	7	0	5	0	3	1	1	0	32	0.09%	0.14%
Rhinolophus	RHIFER	NT (E,M)	0	0	0	1	0	0	0	2	4	4	1	12	0.04%	0.05%
Rhinolophus	RHIEUR	VU (E,M)	4	0	0	0	0	0	2	0	0	0	0	6	0.02%	0.03%
Barbastella	BARBAR	VU (E)	3	6	13	22	2	1	0	4	0	0	0	51	0.15%	0.22%
-	NoID	-	689	467	1175	1295	1447	2307	364	553	717	1105	509	10628	31.15%	
Total	-	-	2290	1650	4679	4136	4810	8008	1055	1919	2212	2319	1039	34117	-	-

When comparing the Manual-ID results with the Auto-ID results for the total of 9,043 records, notable differences are observed for the most common species (Table 4-55). Manual-ID identifies 63.47% of all recordings as Common Pipistrelle (*Pipistrellus pipistrellus*), amounting to 5,740 recordings, which is significantly higher than Auto-ID's 48.34% (16,493 recordings). This suggests that Manual-ID consolidates *P. pipistrellus* recordings more confidently, potentially reclassifying calls initially attributed to other species by Auto-ID. For Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), Manual-ID attributes 7.15% (647 recordings), slightly higher than Auto-ID's 4.92% (1,678 recordings), reflecting closer inspection and correction of ambiguous recordings. Additionally, Manual-ID combines Kuhl's Pipistrelle and Nathusius' Pipistrelle (*Pipistrellus kuhlii/Pipistrellus nathusii*) into a single category, accounting for 10.86% (982 recordings), while Auto-ID lists these species separately with lower percentages (*P. kuhlii* 1.12% and *P. nathusii* 3.09%).

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 4-6 representes the activity patterns of these selected species throughout the night during the autumn season, spanning from 18:00 to 06:00.

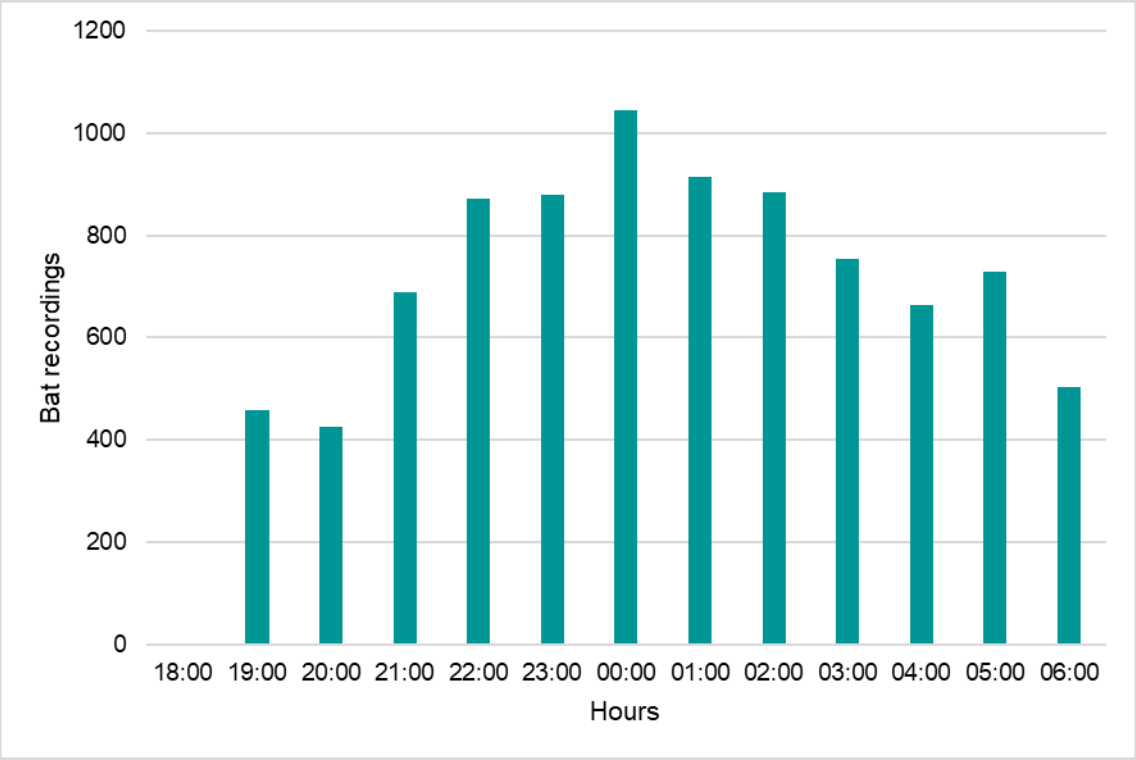

Figure 4-6 Hourly distribution of bat recordings through the night in autumn

Table 4-55 Bat groups and species recorded during selected nights at each SP based on Manual ID in autumn

Group	Species	IUCN	SP01	02	03	04	05	06	07	08	09	10	12	Total	Precent.
Pipistrelloid	PIPPIP	LC	102	120	229	771	1592	2025	67	182	188	390	74	5740	63.47%
Pipistrelloid	PIPKUH/PIPNAT	-	13	29	97	152	84	462	28	26	36	34	21	982	10.86%
Pipistrelloid	MINSCH	VU	18	12	22	56	223	231	3	21	36	19	6	647	7.15%
Pipistrelloid	PIPPYG	LC	2	0	3	48	21	61	3	4	3	9	3	157	1.74%
Pipistrelloid	HYPSAV	LC	0	7	2	3	4	13	1	6	5	1	10	52	0.58%
Nyctaloid	NYCLEI	LC	36	64	104	161	84	187	23	45	106	85	148	1043	11.53%
Nyctaloid	EPTSER	LC	0	1	23	17	8	11	15	17	10	10	10	122	1.25%
Nyctaloid	NYCNOC	LC	1	2	9	3	4	3	1	0	4	10	9	46	0.51%
Nyctaloid	NYCLAS	VU	0	5	1	3	1	9	0	1	2	1	2	25	0.28%
Tadarida	TADTEN	LC	1	5	3	20	4	32	2	2	4	2	0	75	0.83%
Plecotus	PLESPE	NA	0	3	7	1	0	1	0	2	1	1	1	17	0.19%
Myotis	MYOSPE	NA	3	4	13	8	2	5	1	3	1	4	4	48	0.53%
Rhinolophus	RHIFER	NT (E,M)	1	7	5	2	3	1	2	1	9	14	2	47	0.52%
Rhinolophus	RHIBLA	VU (E)	1	5	1	0	0	1	0	8	0	1	0	17	0.19%
Rhinolophus	RHIHIP	NT (E,M)	3	10	0	0	2	0	0	1	1	0	0	17	0.19%
Rhinolophus	RHIEUR	VU (E,M)	0	0	0	3	0	0	0	1	0	4	0	8	0.09%
Total	-	-	181	274	519	1248	2032	3042	146	320	406	585	290	9043	-

Transect Surveys

Based on the transect surveys, a total of 4,569 recordings were made. 2,313 recordings, or 50.61%, were identified as bat recordings in spring, summer and autumn. Noise accounted for the majority of the recordings, with 2,256 noise recordings, or 49.38%. The average nightly noise percentage ranged from 25.84% to 77.41% (Table 4-56).

Table 4-56 Number of bat recordings and noise recorded each night during transect surveys

Date	Bat	Noise	Total	Noise Ratio
2024-06-28	218	747	965	77.41%
2024-07-08	384	637	1021	62.39%
2024-08-12	334	365	699	52.22%
2024-08-22	545	196	741	26.45%
2024-10-02	367	149	516	28.88%
2024-10-03	465	162	627	25.84%
Total	2313	2256	4569	49.38%

The Auto-ID analysis of all recordings during transect surveys reveals that the most common species was Common Pipistrelle (*Pipistrellus pipistrellus*), accounting for 42.41% of all recordings and 58.19% when non-identified species were distributed evenly. Notably, the second most common species was Noctule (*Nyctalus noctula*), with 11.72% of all recordings and 16.07% when non-identified species were evenly distributed (Table 4-57).

Table 4-57 Bat groups and species recorded during transect surveys based on Auto-ID results

Group	Species	IUCN	06_M1a	06_M1b	08_M1a	08_M1b	09_M1a	09_M1b	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	92	165	120	267	131	206	981	42.41%	58.19%
Pipistrelloid	MINSCH	VU	4	55	66	90	25	30	270	11.67%	16.01%
Pipistrelloid	PIPPYG	LC	2	2	3	7	2	8	24	1.04%	1.42%
Pipistrelloid	PIPKUH	LC	5	10	2	1	3	1	22	0.95%	1.30%
Pipistrelloid	HYPSAV	LC	0	0	0	4	6	2	12	0.52%	0.71%
Pipistrelloid	PIPNAT	LC	0	0	1	1	1	0	3	0.13%	0.18%
Nyctaloid	NYCNOC	LC	17	21	42	25	100	66	271	11.72%	16.07%
Nyctaloid	NYCLEI	LC	6	6	7	21	10	12	62	2.68%	3.68%
Nyctaloid	EPTSER	LC	2	3	0	4	0	0	9	0.39%	0.53%
Nyctaloid	VESMUR	LC	2	1	0	0	0	6	9	0.39%	0.53%
Nyctaloid	NYCLAS	VU	0	0	1	4	1	1	7	0.30%	0.42%
Tadarida	TADTEN	LC	0	1	1	1	1	1	5	0.22%	0.30%
Plecotus	PLESPE	NA	0	0	2	0	4	1	7	0.30%	0.42%
Myotis	MYOSPE	NA	0	1	0	1	1	0	3	0.13%	0.18%
Barbastella	BARBAR	VU (E)	0	0	1	0	0	0	1	0.04%	0.06%
-	NoID	-	88	119	88	119	82	131	627	27.11%	
Total	-	-	218	384	334	545	367	465	2313	-	-

When comparing the results of the Manual-ID analysis with those of the Auto-ID analysis , several significant differences in the most common species are evident (Table 4-58). For

Common Pipistrelle (*Pipistrellus pipistrellus*), Manual-ID records a significantly higher percentage of 61.50%, compared to Auto-ID's 42.41%. This suggests that Manual-ID may have identified more of this species accurately or that Auto-ID possibly overestimated other species. For Soprano Pipistrelle (*Pipistrellus pygmaeus*), Manual-ID shows 2.13%, while Auto-ID only recorded 1.04%, indicating that Manual-ID may have correctly identified more of this species. Additionally, Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) accounted for 24.71% of the recordings in the Manual-ID analysis, compared to 11.67% in Auto-ID, suggesting that Manual-ID was more accurate in identifying this species.

Table 4-58 Bat groups and species recorded during transect surveys based on Manual ID results

Group	Species	IUCN	06_M1a	06_M1b	08_M1a	08_M1b	09_M1a	09_M1b	Total	Percent
Pipistrelloid	PIPPIP	LC	86	174	141	316	172	293	1182	61.50%
Pipistrelloid	MINSCH	VU	16	75	101	168	56	59	475	24.71%
Pipistrelloid	PIPPYG	LC	0	3	4	5	2	27	41	2.13%
Pipistrelloid	HYPSAV	LC	0	0	0	9	1	30	40	2.08%
Pipistrelloid	PIPKUH/PIPNAT	-	0	2	3	4	11	9	29	1.51%
Nyctaloid	NYCLEI	LC	2	1	5	35	14	20	77	4.01%
Nyctaloid	NYCLAS	VU	0	0	0	18	0	0	18	0.94%
Nyctaloid	EPTSER	LC	1	2	1	6	1	4	15	0.78%
Nyctaloid	NYCNOC	LC	2	0	0	2	0	0	4	0.21%
Tadarida	TADTEN	LC	0	0	0	2	1	0	3	0.16%
Plecotus	PLESPE	NA	0	0	2	20	0	0	22	1.09%
Myotis	MYOSPE	NA	3	4	1	4	1	0	13	0.68%
Rhinolophus	RHIBLA	VU (E)	0	2	0	0	0	0	2	0.10%
Barbastella	BARBAR	VU (E)	0	0	1	0	0	0	1	0.05%
Total	-	-	110	263	259	589	259	442	1922	-

Heat maps of summer and autumn seasons are given in Figure 4-7.

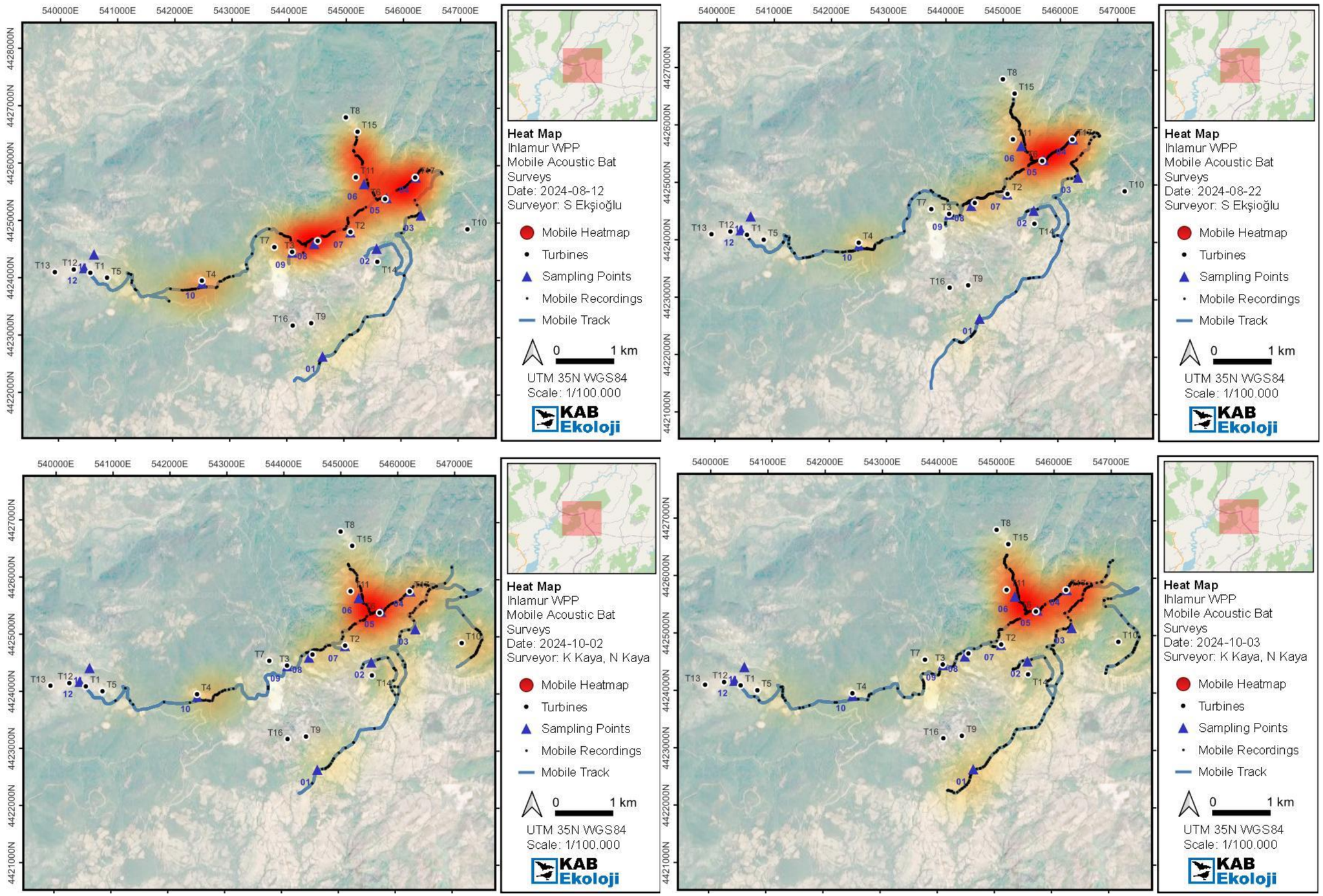

Figure 4-7 Heat maps from transect surveys

5 Discussion

5.1 Flora

- Field studies identified a total of 2 regional endemic (*Erodium somanum* and *Cirsium balikesirense*) and 1 rare distribution but not endemic (*Cyclamen hederifolium*) plant species.
- The seed of *Erodium somanum* and *Cirsium balikesirense* are collected and delivered to Ankara Seed-Gen Bank. The population of *Cycalamen hederifolium* in the region is at a very good level. Therefore, no additional action is deemed necessary in 2024. It is recommended to re-evaluate future actions with population monitoring during the operation period. No translocation activity was conducted due to the current favorable population status of the species within the survey area.
- The plant species have been recorded in areas such as turbine locations and site roads. Due to habitat similarities, their presence in the access road and ETL areas is also considered likely, despite the absence of direct observations.

5.2 Terrestrial 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.
- Two mammal species that may potentially be found in the area and are classified as VU (Vulnerable) by the IUCN, namely *Myomimus roachi*, *Vormela peregusna*,. *Capreolus capreolus,* is one of the important mammal species. Although its status is Least Concern, this species is considered to have national importance. *Ursus arctos* is Least Concern (LC) globally and in Europe, but Vulnerable in the Mediterranean. All these species have been recorded as literature.
- 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 herpetofauna 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 46 hours has been spent at three vantage points for bird surveys. A total of 283 birds were counted during the observations, comprising 6 migrant birds and 269 resident birds. Among these observed birds, only 115 passed through the risk zone of the wind farm. The collision risk modelling for spring indicated a medium rate of 0.01 and 0.76 birds for migrant and resident birds, respectively. The bird survey indicates minimal spring migration movement in the area, with only limited activity observed.

For summer VP surveys, an average of 41 hours has been spent at three vantage points for bird surveys. A total of 274 birds were counted during the observations, comprising 24 migrant birds and 248 resident birds. Migrant activity (at a rate of 0.57 birds/hr) was not expected and was driven by a diverse group of migrants (24 contacts of 6 species) at the very last few days of August. Among these observed birds, only 228 passed through the risk zone of the wind farm. The collision risk modelling for summer indicated a rate of 0.10 and 1.68 for migrants and resident birds, respectively. The risk for resident birds is considered medium-high, as the site provides ideal breeding and hunting habitats for some local raptors. The collision risk assessment suggests that the estimated rate of fatalities might exceed one bird per year. Risk with the collision of the energy transmission line also seems to be at medium level.

For autumn VP surveys, an average of 38 hours has been spent at three vantage points for bird surveys. A total of 87 birds were counted during the observations, comprising 34 migrant birds (0.89 birds/hr) and 47 resident birds. Considered in the context of late August migratory activity, the rates at Ihlamur are considered moderate, again hosting a diverse array of species indicating minor pathway utilization. Among these observed birds, only 63 passed through the risk zone of the wind farm. The collision risk modelling for autumn indicated a rate of 0.17 and 0.18 collisions for migrant and resident birds, respectively.

The risk assessment for resident birds indicates a moderate-high risk level due to the Project's suitability for breeding and hunting by local raptor species. The estimated annual fatality rate may exceed one bird per year, primarily affecting the Eurasian Kestrel (Falco tinnunculus), Eleonora's Falcon (*Falco eleonorae*), Common Buzzard (Buteo buteo), and Short-toed Snake-Eagle (*Circaetus gallicus*). Though these species are common and widespread, their hovering flight behaviour and tendency to forage near hilltops increase their susceptibility to collisions, necessitating population monitoring.

The Red-footed hawk (*Falco vespertinus*), a globally threatened species, was observed during the observation point surveys. This migratory species is typically found in low numbers across Turkey and is not concentrated in bottleneck areas. The low number of sightings suggests that the species is occasional, and the lack of suitable roosting or feeding habitats on site minimises its potential impact.

In the site, both during Vantage Point surveys, and also during ETL surveys, significant numbers of Dalmatian Pelican (*Pelecanus crispus*) was noted. Flocks with a maximum count of 26 contacts were observed. This is a globally a Near-threatened and nationally a conservation dependent and possibly threatened species, with only four breeding colonies in Türkiye. Bird observations along the transect line indicate that bird passages are highest at the segment of the transmission line marked in the results section between VP ETL1 and especially near VP ETL3. Besides the flight line analysis, field surveyors also verbally confirmed that most bird passages occurred at this particular section, which corresponds to the area crossing Gönen Stream. This segment is of the highest risk relative to the entire ETL.

These birds regularly visit other wetlands for feeding. The one colony is located at Lake Manyas, on the National Park land near Eskisığırcı Village about 55 km NE from the project site. Small dams, such as the dam lake on Gönen Stream, are probably their feeding areas. Satellite-tagged birds show that Dalmatian Pelicans in Turkey often move along streams and visit various natural and artificial wetlands and lakes between breeding colonies. The Dalmatian Pelican (Pelecanus crispus) is largely a resident species in Turkey, with known movements between wetlands such as Lake Manyas, Gediz Delta, Ayvalık Wetlands, Lake Bafa, and Büyük Menderes Delta. The precise movement corridors between these wetlands are not well understood. However, it appears that the project may be located on one of these corridors, potentially impacting the Dalmatian Pelican's movements. Further research and monitoring are required to better understand these movement patterns and to mitigate any potential risks posed by the wind farm to this species.

Being large birds with low manoeuvring capacity, Dalmatian Pelicans are vulnerable to collision with transmission lines. Their huge wingspan, up to 3 meters, also increases the risk of electrocution. In the past, Dalmatian Pelican fatalities were documented due to transmission lines around wetlands. To mitigate this risk, specific segments of the transmission line where bird activity is concentrated must be prioritized for mitigation actions. Recommended measures include installing bird diverters, rerouting the line, or lowering its height closer to the ground in high-risk areas.

The main threats to the Dalmatian Pelican population in Turkey include water pollution, destruction of breeding islands, human disturbances, stray dogs, insufficient fish stocks, excessive salinity in the Dalyan water, wind power plants, energy transmission lines, low genetic diversity, and viral, bacterial, and parasitic diseases.

By study design, this baseline collection methodology did not account for winter surveys. However, 2024 baseline and anecdotal information indicates a definite need to elucidate winter activity. Initially significant target species activity was not expected during the winter months. However, during 2024 baseline it became clear that year-round movement of wetland associated species might become a concern. It is also worth noting that during their site visit in December, the Project Company’s Corporate Biodiversity Specialist and the Lender’s Advisor encountered activity of White-tailed Eagle (Haliaeetus albicilla). This species is also closely associated with wetlands and coastlines, and the one observed at the project is likely moving from or to Manyas Lake.

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 Türkiye and is known for its fast and low flight, which reduces its susceptibility to turbine collisions, as supported by carcass search data in Türkiye.

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, it was observed that some detectors failed or stopped recording on certain nights. During spring, SP02 and SP04 functioned for 4 days, SP09 and SP10 for 5 days, and SP06, SP07, SP08, and SP12 for 7 days, reflecting a generally low level of operation. During summer, data were recorded by SP01 for only 3 nights, SP12 and SP07 for 4 nights, SP06 for 6 nights, and SP08 and SP09 for 7 nights, indicating moderate activity. In autumn, all equipment functioned for at least 8 days. To

overcome the issues related to the missing nights at certain Sampling Points, the average bat passes for each Sampling Point were calculated.

The highest bat activity was recorded particularly at the following stationary stations:

- Particularly SP4, also SP5 and SP6 in spring
- Particularly SP6 in autumn, also sustained activity in SP3, SP4 and SP5

The activity levels suggest elevated activity on the eastern side of the project which is sustained over different seasons. Some of the uptick in activity in autumn seem possibly attributable to migratory bat species, but since *P. kuhlii/nathusii* distinction could not be made from acoustic analysis, it is not a certain conclusion. Depending on long-term monitoring outcomes, finding of high-flying migratory species might be noteworthy and depending on activity levels, may warrant additional techniques to ascertain species distinctions (mist netting or DNA species identifications from operation phase carcass samples).

Transect surveys conducted were also found to confirm the findings of static ground acoustic surveys. Seasonal changes in activity levels were also observed.

In Turkey, assessing the risk level of a wind turbine is challenging due to the lack of comprehensive 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 100-200 recordings / night / turbine for the Project in the spring season, 150-250 recordings / night / turbine in summer, and 200-300 recordings / night / turbine in autumn. SP4 maximum activity clocked in at approximately 1000 recordings / night in spring and SP6 in autumn at 2100 recordings / night.

During spring, the bat activity during the survey period was dominated by the Common Pipistrelle (*Pipistrellus pipistrellus*), accounting for 59% of the recorded calls. The Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), a globally vulnerable species, contributed 13%, highlighting its ecological significance. The Lesser Noctule (*Nyctalus leisleri*) was the third most frequently recorded species, representing 11%, followed by the Serotine Bat (*Eptesicus serotinus*) at 7%.

During the summer survey, bat activity was primarily dominated by the Common Pipistrelle (*Pipistrellus pipistrellus*), which accounted for 61% of the recorded calls. The unidentified Long-eared Bat (*Plecotus* species) followed with 12%, indicating its notable presence in the area. The Lesser Noctule (*Nyctalus leisleri*) contributed 9%, while the Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), a globally vulnerable species, represented 5% of the activity. The Serotine Bat (*Eptesicus serotinus*) accounted for 4%, and the Soprano Pipistrelle (*Pipistrellus pygmaeus*) made up 3%.

During the autumn survey, bat activity was predominantly characterized by the Common Pipistrelle (*Pipistrellus pipistrellus*), which accounted for 63% of the recorded calls. The undistinguished P. nathusii/kuhlii accounted for about 11%. The Lesser Noctule (*Nyctalus leisleri*) followed with 12%. The Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), a globally vulnerable species, represented 7% of the activity. The Soprano Pipistrelle (*Pipistrellus pygmaeus*) accounted for 2%, and the Serotine Bat (*Eptesicus serotinus*) made up 1%.

The presence of Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), a globally threatened species, requires monitoring. A remarkable diversity of bat species is exhibited in the area, with activity peaking in spring and summer and declining in autumn. The forest ecosystem is highly healthy, and substantial populations of the Lesser Noctule (*Nyctalus leisleri*), typically found in humid forests of northwestern Turkey, are supported. The presence of Schreiber's Bent-winged

Bat (*Miniopterus schreibersii*) suggests the existence of cave roosts in the area. This biodiversity underscores the ecological richness and importance of the region.

5.6 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, and the current status should be presented and evaluated in progress reports.
- Habitats: All natural habitats, including access roads and ETL areas should be monitored for disturbances, with BMP actions implemented and progress evaluated in reports.
- Bird species:
    - The project is one of the projects in 9 WPPs where a shutdown on demand program during migration and breeding periods is recommended due to long term impact potential on the minor migratory route integrity at Southern Marmara in addition to resident activity, including those species associated with Manyas Lake. Observer initiated shutdown protocol may be more suitable since consistently high activity does not appear to be a factor. It would be beneficial to have the protocol in place for an if-needed basis.
    - Surveys highlighted activity corridors of Pelican species, especially that of Dalmatian Pelican (NT) at the Project AoI. Moving forward, the Project bird monitoring programme should include a minimum of 36 hr/VP coverage in winter to account for wintering activity of Pelican species, and other species such as the White-tailed Eagle which might be undertaking regular or irregular movements between wetlands. Future monitoring should continue to account for Manyas Lake interactions.
    - Weekly carcass search effort under the ETL during operation phase should be designed to focus more on the northern side of the ETL which was covered by VP ETL3.
    - For higher-risk section of the ETL, the local expert suggested installing additional bird diverters or rerouting the transmission line. Undergrounding this section can be considered.
- Bat species:
    - Since the eastern side of the project was identified as a focus area for bat activity, when the roads became accessible, additional ground static acoustic device coverage at T8 and T15 should be ascertained moving forward.
    - The population of the Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), a globally threatened species, should be closely monitored to ensure its conservation.
    - The cave location near SP11 may require attention and additional survey methods beyond ground static acoustic may be developed for better understanding of this area.
- Fauna: The monitoring actions outlined in the BMP should be implemented, with progress reports evaluating the status vulnerable mammal species and national importance.
- Herpetofauna: The monitoring actions outlined in the BMP should be implemented, with progress reports evaluating the status of *Testudo graeca*, a potentially present vulnerable reptile species.

6 Appendix

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6.6 Bird Survey Conditions

Spring

Date	Surveyor	VP	Cloud %	WindDir	WindSp (m/s)	Prec(mm)	Temp (°)	Vis (km)
18/04	MÜ	VP3	70	SW	6	0	19	10
18/04	NY, YÖG	VP1	90	W	5	0	20	10
18/04	YÖG	VP2	70	SW	6	0	19	10
19/04	NY, YÖG, MÜ	VP2	100	NE	7	06:00	13	0,5
20/04	NY, YÖG, MÜ	VP2	100	NE	8	02:55	12	0,5
17/05	MÜ	VP3	50	N	2	-	21	20
17/05	YÖG	VP2	60	E	1	-	21	10
17/05	NY	VP1	60	E	2	-	20	15
18/05	MÜ	VP3	0	NE	2	-	22	20
18/05	YÖG	VP2	40	NE	2	-	24	20
18/05	NY	VP1	40	NE	2	-	21	20
27/05	KK	VP2	80	NE	15	0	18	4
27/05	NK	VP3	80	NE	15	0	16	4
28/05	KK	VP1	40	N	8	0	20	5
29/05	NK	VP2	40	S	7	10	23	5
29/05	KK	VP3	40	S	7	2	23	6
30/05	NK	VP1	40	W	9	90	24	2
10/06	MÜ	VP3	0	NE	2	-	31	20
10/06	YÖG	VP2	0	NE	2	-	31	12
10/06	NY	VP1	0	NE	2	-	30	10
11/06	MÜ	VP3	10	SW	2	-	34	15
11/06	YÖG	VP2	0	SW	2	-	34	13
11/06	NY	VP1	0	SW	4	-	35	10

Summer

Date	Surveyor	VP	Cloud %	WindDir	WindSp (m/s)	Prec(mm)	Temp (°)	Vis (km)
15/07	KK	VP1	10	NE	19	0	30	5
16/07	NK	VP1	10	NE	19	0	30	5
19/07	MÜ	VP3	0	NE	6	-	32	20
19/07	YÖG	VP2	0	NE	6	-	31	20
19/07	NY	VP1	0	NE	6	-	32	20
20/07	NY	VP1	20	NE	6	-	30	20
20/07	YÖG	VP2	30	NE	5	-	30	10
20/07	MÜ	VP3	10	NE	6	-	30	20
27/07	NK	VP2	10	NE	19	0	30	5
28/07	KK	VP3	10	NE	19	0	30	5
29/07	KK	VP3	10	NE	19	0	30	5
09/08	NK	VP2	10	NE	19	0	30	5
09/08	KK	VP3	10	NE	19	0	30	5
10/08	KK	VP2	10	NE	19	0	30	5
11/08	NK	VP1	10	NE	19	0	30	5
12/08	KK	VP1	10	NE	19	0	30	5

28/08	Sİ	VP1	40	NW	8	-	28	15
28/08	MÜ	VP2	30	NE	4	-	28	20
28/08	CÖ	VP3	40	NE	4	-	27	10
29/08	Sİ	VP1	30	N	8	-	28	10
29/08	MÜ, CÖ	VP2	70	N	2	-	26	10

Autumn

Date	Surveyor	VP	Cloud %	WindDir	WindSp (m/s)	Prec(mm)	Temp (°)	Vis (km)
12/09	MÜ	VP3	80	SW	2	-	27	20
12/09	NY	VP1	80	SW	2	-	27	20
12/09	YÖG	VP2	80	SW	2	-	27	20
13/09	NY	VP1	30	SW	4	-	28	15
13/09	YÖG	VP2	30	SW	4	-	28	15
13/09	MÜ	VP3	30	SW	4	-	28	20
12/10	NY	VP1	60	NE	2	-	25	10
12/10	YÖG	VP2	60	NE	2	-	23	10
12/10	MÜ	VP3	30	NE	2	-	25	15
13/10	NY, YÖG, MÜ	VP2	100	NE	4	10	18	0,1
13/10	NY, YÖG, MÜ	VP3	80	NE	4	-	19	4
27/10	KK	VP3	60	NE	7	0	18	5
28/10	NK	VP3	10	NE	8	0	18	5
09/11	KK	VP2	100	NE	15	0	14	5
10/11	NK	VP1	100	NE	12	10	8	0,5
11/11	KK	VP1	100	N	8	2	10	0,5
11/11	NK	VP2	100	N	8	2	10	0,1
12/11	KK	VP1	100	NE	6	-	14	0,7

6.7 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*).

Spring

Date	VP	Time	Spec*	Number	Dur (sec)	Flight_Height	Behaviour	Status
18/04	VP3	10:15	Cirga	1	240	ccccccccccccccc----	other	Migrant
18/04	VP3	10:15	Accxx	5	60	cccc----------	soaring	U
18/04	VP3	10:32	Falsp	1	15	a----------	soaring	U
18/04	VP3	16:28	Cirga	1	60	cbbb----------	hunting/foraging	Migrant
18/04	VP1	16:01	Cicni	2	300	cccccccccccccccccc	patrolling	Migrant
18/04	VP1	16:02	Cirga	1	60	cccc----------	other	Resident
18/04	VP1	16:27	Cicni	2	150	ccccccccc----------	patrolling	Migrant
18/04	VP1	16:28	Cirga	1	90	cccccc----------	other	Resident
18/04	VP1	16:44	Butbu	2	150	cccbbbabcc----------	patrolling	Resident
18/04	VP1	16:46	Cirga	2	45	ccc----------	patrolling	Resident
18/04	VP1	16:47	Accxx	2	60	bbcc----------	patrolling	U
18/04	VP1	16:53	Butbu	1	30	ba----------	patrolling	Resident
18/04	VP2	12:29	Butbu	1	30	ba----------	soaring	Resident
17/05	VP3	14:53	Cicni	2	45	ccc----------	soaring	Resident
17/05	VP3	15:46	Butbu	1	45	bbb----------	soaring	Resident
18/05	VP3	12:49	Butbu	1	15	b----------	soaring	Resident
18/05	VP3	14:41	Cicni	1	90	bbcccb----------	soaring	Resident
18/05	VP3	15:19	Perap	1	300	bccccccccccccccccccc	soaring	Resident
17/05	VP2	12:07	Cirga	1	30	ab----------	soaring	Resident
17/05	VP2	12:58	Butbu	1	15	c----------	soaring	Resident
17/05	VP2	13:01	Cirga	1	45	bab----------	other	Resident
…								

Summer

Date	VP	Time	Spec*	Number	Dur (sec)	Flight_Height	Behaviour	Status
19/07	VP3	12:56	Cicni	1	30	ba----------	soaring	Resident
19/07	VP3	13:04	Cirga	1	15	c----------	soaring	Resident
19/07	VP3	13:43	Falti	1	15	v----------	hunting/foraging	Resident
19/07	VP3	14:34	Falti	1	30	ba----------	hunting/foraging	Resident
19/07	VP3	15:13	Cirga	1	270	ccccccccccccccccc--	hunting/foraging	Resident
19/07	VP3	15:38	Falti	1	90	bcbaba----------	hunting/foraging	Resident
19/07	VP3	16:13	Falti	1	30	ba----------	hunting/foraging	Resident
19/07	VP2	16:07	Butbu	3	45	bca----------	other	Resident
19/07	VP1	11:23	Butbu	1	60	bbbb----------	patrolling	Resident
19/07	VP1	11:54	Cicni	1	90	cccccc----------	patrolling	Resident
19/07	VP1	14:40	Butbu	1	90	ccccbb----------	patrolling	Resident
19/07	VP1	15:14	Cirga	1	60	cccc----------	patrolling	Resident
19/07	VP1	15:41	Cicni	2	120	cccccccc----------	patrolling	Resident

20/07	VP1	11:28	Cicni	1	120	cccccccc----------	patrolling	Resident
20/07	VP1	13:27	Butbu	1	75	ccbbb----------	patrolling	Resident
20/07	VP1	14:54	Cicni	1	180	ccccccccccc--------	patrolling	Resident
20/07	VP2	12:11	Falel	2	15	b----------	other	Resident
20/07	VP2	12:33	Butbu	1	180	abcabcabcacb--------	soaring	Resident
20/07	VP2	14:41	Butbu	1	180	abcabcbcabcb--------	soaring	Resident
20/07	VP2	14:58	Accxx	1	90	bcabca----------	soaring	Resident
20/07	VP2	15:06	Butbu	1	15	b----------	soaring	Resident
…								

Autumn

Date	VP	Time	Spec*	Number	Dur (sec)	Flight_Height	Behaviour	Status
12/09	VP3	09:16	Falti	1	15	a----------	patrolling	Resident
12/09	VP3	10:13	Cirga	1	2400	cbbbbbbbbbbbbbbbbbb	hunting/foraging	Resident
12/09	VP3	10:20	Cirga	1	15	b----------	patrolling	Resident
12/09	VP3	11:58	Cirga	1	240	cbbbbbbbbbbbbcc----	patrolling	Resident
12/09	VP3	12:50	Cirga	1	30	aa----------	hunting/foraging	Resident
12/09	VP3	13:32	Cirga	1	60	babb----------	patrolling	Resident
12/09	VP3	17:04	Falti	1	15	a----------	patrolling	Resident
12/09	VP1	10:14	Cicni	2	180	ccccccccccc--------	patrolling	Resident
12/09	VP1	13:41	Cirga	1	90	cccccc----------	other	Resident
12/09	VP1	14:50	Cirga	1	60	cccc----------	migrating	U
12/09	VP1	16:07	Butbu	1	90	bbbccc----------	patrolling	Resident
12/09	VP2	10:23	Perap	1	60	cccc----------	migrating	Migrant
12/09	VP2	10:44	Accni	1	30	bb----------	other	Migrant
12/09	VP2	13:16	Cirga	1	300	ccccccccccccccccccc	other	Resident
12/09	VP2	14:26	Accni	1	15	a----------	other	U
12/09	VP2	15:41	Perap	2	150	bccccccccc----------	migrating	Migrant
13/09	VP1	11:28	Butbu	1	75	ccccc----------	patrolling	Resident
13/09	VP1	14:51	Cirga	1	90	cccccc----------	patrolling	Resident
13/09	VP2	12:47	Cirga	1	300	bccccccccccccccccccc	other	Resident
13/09	VP3	09:05	Falti	1	15	a----------	patrolling	Resident
13/09	VP3	09:35	Cirga	1	1500	cbbbbbbbbbbbbbbbbbb	hunting/foraging	Resident
…								

6.8 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

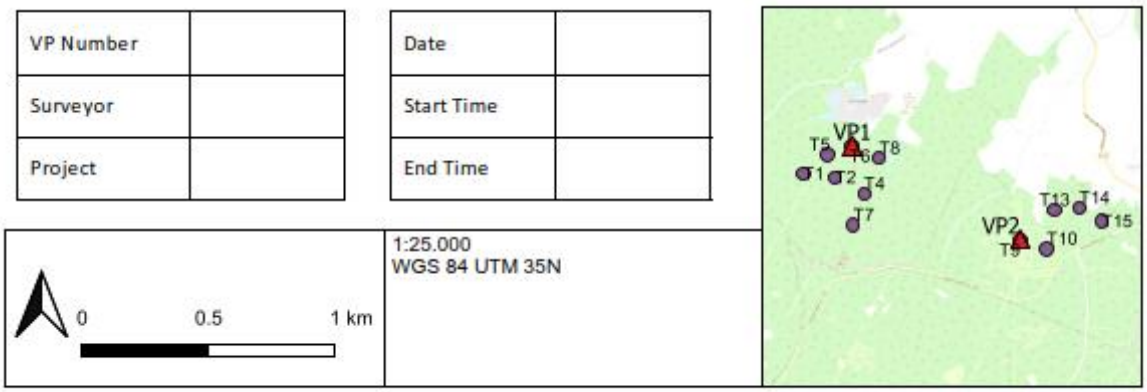
Calculation of alpha and p(collision) as a function of radius

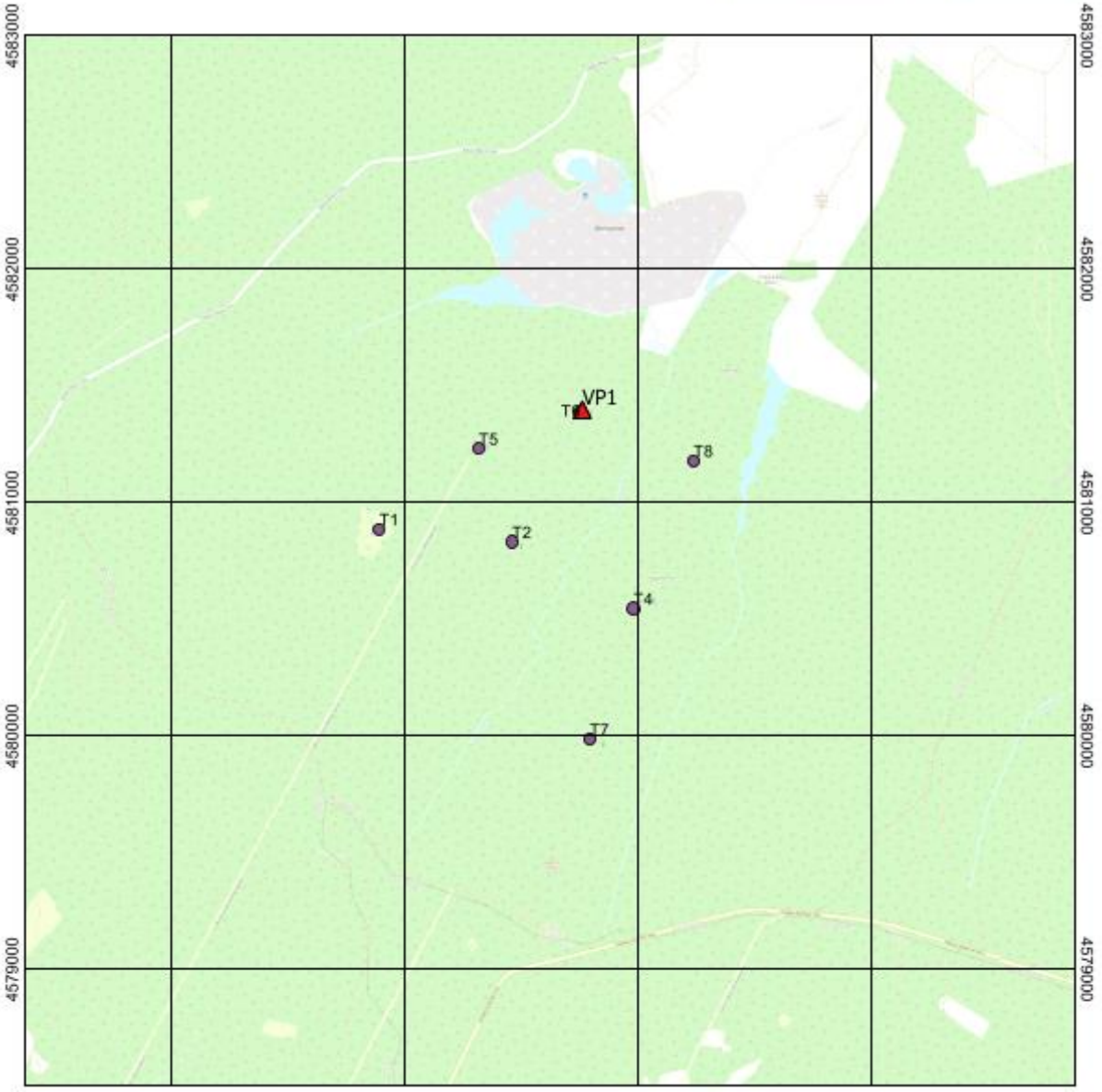
			Upwind:			Downwind:		
r/R	c/C	a	collide		contribution	collide		contribution
radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r
0,025	0,575	5,35	17,07	0,88	0,00110	14,65	0,76	0,00095
0,075	0,575	1,78	6,49	0,34	0,00252	4,08	0,21	0,00158
0,125	0,702	1,07	5,14	0,27	0,00332	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%			

6.9 Sample Field Recording Sheets

6.9.1 VP Map and Sheet

VP Number		Date	
Surveyor		Start Time	
Project		End Time	





Project		VP			Cloud cover	%	Precipitation	mm
Date		Start1-Finish1-			Wind Direction		Temp. (max)	°C
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																				

6.9.2 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

6.9.3 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
☐	☐	☐	__/__/__	__:__					☐	☐	
☐	☐	☐	__/__/__	__:__					☐	☐	
☐	☐	☐	__/__/__	__:__					☐	☐	
☐	☐	☐	__/__/__	__:__					☐	☐	
☐	☐	☐	__/__/__	__:__					☐	☐	

6.10 Flight Line Maps

[Maps were provided in a separate document.]