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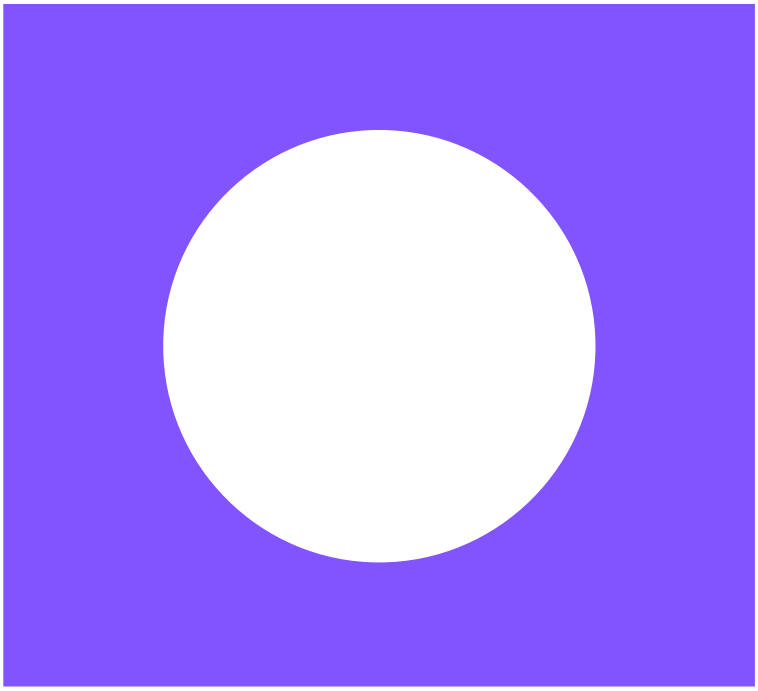

Harmancık Wind Power Plant (WPP) Project

Supplementary Biodiversity Baseline Final Report

March 2025

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Harmancık Wind Power Plant (WPP) Project

Supplementary Biodiversity Baseline Final Report

March 2025

Issue and Revision Record

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A	February 2025	Esra Demirhan Anıl Öser Berkay Şahin	Gizem Arıkan Gürler	Hande Hatipoğlu	Draft Final Supplementary Baseline Report for 2024
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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
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

Harmancık Wind Power Plant (WPP) Project (“the Project”) with 10 turbines and 42 MW_m/42 MW_e total installed power, is planned to be established by Enerjisa Üretim. 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.

Surveys was carried out in 2024 during the vegetation period. The field study identified a total of 10 endemic plant species. 6 regional endemics (*Crocus candidus, Digitalis trojana, Verbascum hasbenlii, Verbascum lydium var. heterandrum, Feulago trojana, Cirsium balikesirense) and 4* widespread endemics (*Centaurea olympica, Campanula lyrata subsp. lyrata, Stachys tmolea, Thymus zygioides var. lycaonicus*). As the widespread endemics are distributed over a large area, particularly in the Aegean and Marmara regions, no specific measures are required within the scope of the project. However, six regional endemic species should be monitored on an annual basis.

For the baseline collection of terrestrial mammal species during the spring and summer seasons of 2024, a total of 20 fieldwork days were conducted. In the Project Area of Influence, 6 species are listed in Annex II of the Bern Convention, 9 in Annex III, and 3 in Annex II of CITES. According to the IUCN Red List, no species are classified as endangered, with 2 species categorized as Vulnerable (VU) and the remaining species classified as Least Concern (LC). Four mammal species, namely *Myomimus roachi*, *Vormela peregusna*, *Capreolus capreolus*, and *Ursus arctos* should be monitored due to their classification under the IUCN Categories and their national significance.

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

For the baseline collection of 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, including increased survey effort of 72 hr/VP for migration seasons. Surveys revealed lower than expected migratory rates for 2024 survey period, and low overall collision risk estimations based on this year’s results. ETL segment with higher collision hazard was not identified. There are no additional recommendations than the previously identified mitigation and monitoring requirements for the subproject.

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 revealed moderate levels of bat activity including threatened species *M. schreibersii,* whose activity was linked with the presence of a cave near T6. 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 Çanakkale Connection Region was transferred to Enerjisa Enerji Üretim Anonim Şirketi (“Enerjisa Üretim” or “the Project Company”) with the transfer agreements signed on 03 June 2021.

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

The Enerjisa YEKA Nine Wind Power Plants (WPPs) projects have undergone Environmental and Social Impact Assessment (ESIA) and Critical Habitat Assessment (CHA) studies, conducted by Mott MacDonald Türkiye (“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. Detailed 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 the 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 baseline 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, and (3) provide clarifications with regards to implementation of mitigation hierarchy. The supplementary biodiversity surveys cover the period between end of March and November 2024, which represents three seasons, spring, summer, and autumn.

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

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

1.3 Limitations

The following limitations regarding field scheduling, data collection, analysis and interpretation of the results are presented:

- During the bat survey, some data loss occurred in summer due to unforeseen circumstances, resulting from the theft of three devices during the study. Devices recording for SP01, SP02, and SP03 during summer was stolen by unknown parties and were not recovered, resulting in total data loss. Compensatory surveys could not be scheduled due to short-notice timing and logistical planning difficulties.

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 area, with research and seed collection efforts directed towards the target plant species found within this designated areas.

Desktop Studies:

- Station selection and literature surveys were carried out using geographic information systems.
- Within the scope of geographic information systems studies, stations for point and transect observations were tried to be established as a preliminary preparation on satellite images.
- 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 including turbine locations..
- For flora, firstly, satellite maps were analysed within the scope of field study preparations As part of the initial preparations, fieldwork was conducted to survey the land and habitats. The habitats were then reassessed, and the research stations were clearly delineated.
- 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 Biga Mountain 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.
- 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.

Commented [AO1]: The flora field surveys were carried out in areas where field studies could not be conducted during the previous seasons.

- The field studies were primarily conducted along 500-meter transect lines, representing different habitats within the Project's footprint and area of influence.
- During the field studies, the third-level EUNIS habitat types of the study area along each transect line were also identified.

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

- During the identification of plant specimens, various sources were used, First of all Flora of Turkey and the East Aegean Islands, as well as the digital version of the Flora of Turkey (Tübives) andother 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[3] to the Flora of Turkey have also been reviewed, and the study Important Plant Areas of Turkey has been referenced as well.
- References have also been made to The Plant List, Plants of the World Online, and the International Plant Name Index (IPNI), and Bizimbitkiler.org.
- When determining the national IUCN threat categories of the identified species and subspecies, both endemic and non-endemic rare taxa, the primary reference used was the Red Data Book of Turkish Plants. For determining the global IUCN threat categories, the official website of the IUCN Red List was used as the main reference.

3.1.2 Field Schedule

Survey was conducted in May, June, July, and August. In July and August, the fieldwork focused on seed collection.

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 Transect)

Transect No	Transect Start Location	Transect End Location	Nearest Project Element
1	40°10'19.81"N - 26°38'51.71"E	40°10'11.07"N - 26°38'58.42"E	ETL
2	40°10'3.60"N - 26°39'12.63"E	40° 9'59.86"N - 26°39'27.51"E	ETL
3	40° 9'5.90"N- 26°40'45.64"E	40° 8'56.71"N - 26°41'0.64"E	ETL
4	40° 9'30.84"N- 26°40'14.23"E	40° 9'14.40"N- 26°40'24.71"E	ETL
5	40°11'58.34"N- 26°32'50.14"E	40°11'41.78"N - 26°32'44.96"E	Access Road
6	40°10'27.45"N - 26°36'36.81"E	40°10'33.08"N - 26°36'46.43"E	Access Road

[3] Aytaç, Z., Duman, H. 2012. Verbascum hasbenlii (Scrophulariaceae), a new species from Turkey. Turk J Bot 36: 322 327.

7	40°10'39.54"N - 26°37'27.55"E	40°10'37.23"N - 26°37'40.18"E	Site Road, T2- T3
8	40°10'31.65"N- 26°37'53.87"E	40°10'26.31"N - 26°38'2.34"E	Site Road, T2- T3
9	40°10'17.52"N- 26°38'54.43"E	40°10'14.68"N- 26°39'6.48"E	Site Road
10	40°10'57.32"N - 26°35'53.01"E	40°10'58.14"N - 6°35'57.98"E	Access Road
11	40°11'40.81"N- 26°33'50.46"E	40°11'37.99"N - 26°33'58.30"E	Access Road
12	40°10'40.30"N - 26°35'33.91"E	40°10'37.01"N - 26°35'18.62"E	Access Road
13	40°10'28.00"N - 26°41'12.82"E	40°10'9.63"N - 26°41'12.21"E	T6 - T7
14	40° 8'57.85"N - 26°41'37.71"E	40° 9'3.32"N - 26°41'13.61"E	T9 – T10 Site Road
15	40°10'14.01"N- 26°38'16.41"E	40°10'30.26"N - 26°38'1.50"E	T3 – T4
16	40° 9'46.68"N - 26°41'12.49"E	40° 9'33.59"N - 26°41'6.34"E	T8 – T9

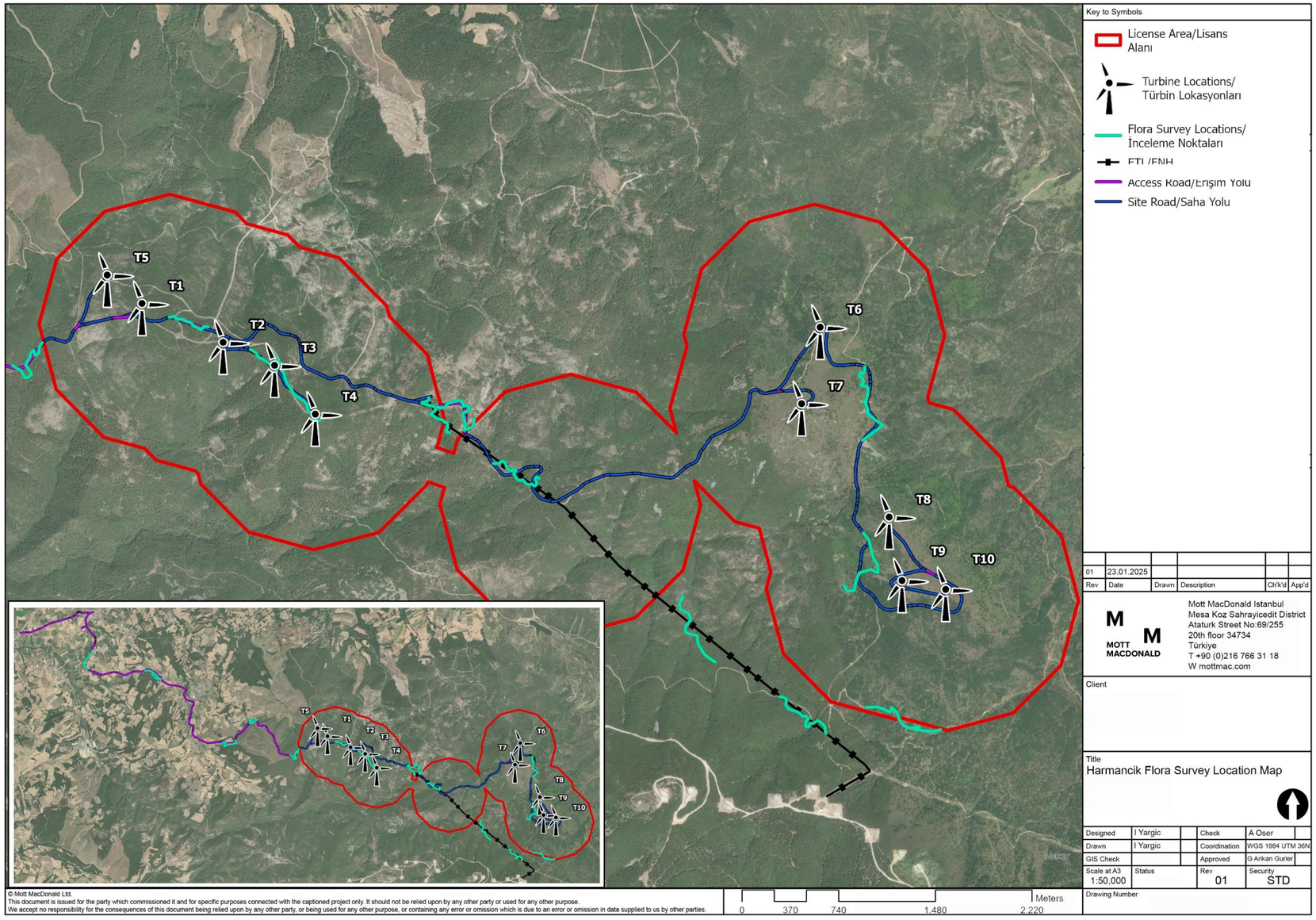

Figure 3-1 Flora Survey Location Map

Commented [AF2]: these locations look good and important to see that access road through KBA was surveyed too

Commented [AO3R2]: Noted.

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 searches were carried out using geographic information systems.
- Within the scope of geographic information systems studies, stations for point and transect observations were tried to be established as a preliminary preparation on satellite images.
- Previous mammals studies near the study area were examined within the scope of literature research.
- For mammals, firstly, satellite maps were analysed within the scope of field preparation studies.
- As part of the initial preparations, fieldwork was conducted to survey the land and habitats. The habitats were then reassessed, and the research stations were clearly delineated.
- Information on the distribution of species was obtained from literature sources and this information was used as a base. For mammal species, 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 studies, 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 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.
- Terrestrial 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.
- A preliminary survey was conducted to determine the areas where camera traps would be placed at the locations identified by desktop studies.
- 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.

Commented [AO4]: The terrestrial mammal field surveys were carried out in areas where field studies could not be conducted during the previous seasons.

- Indirect observation was made on the existing roads and footpaths within the Area of Influence.
- Camera traps remained in the field for 15 consecutive days at each survey point in April 2024 and 5 consecutive days in June 2024.

3.2.2 Field Schedule

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

3.2.3 Survey Locations

For the purpose of evaluating terrestrial 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

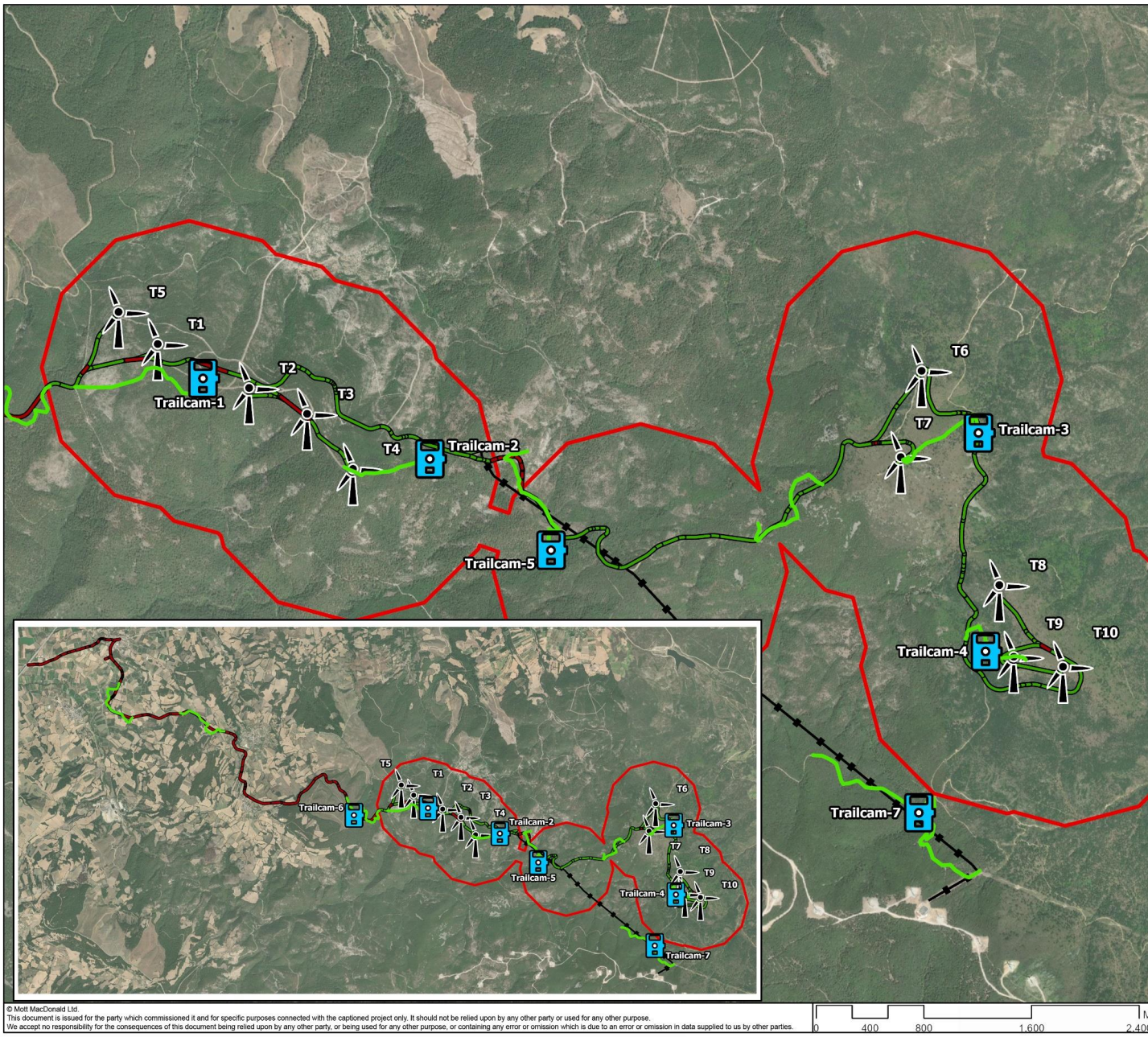

Figure 3-2)

Table 3-2 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°10'35.42"N - 26°37'31.75"E	T1- T2	1	40° 9'34.18"N - 26°41'28.59"E	40° 9'38.75"N - 26°41'11.14"E	T9 – T10
2	40°10'17.91"N - 26°38'37.04"E	T4- Switch Yard	2	40°10'18.69"N - 26°40'54.60"E	40°10'23.68"N - 26°41'14.70"E	T7 – T6
3	40°10'24.08"N - 26°41'14.72"	T7- T6	3	40°10'12.61"N - 26°40'29.90"E	40°10'3.98"N - 26°40'11.38"	Site Road
4	40° 9'35.98"N - 26°41'16.97"E	T9	4	40° 9'57.79"N - 26°39'11.69"E	40°10'19.68"N - 26°39'5.02"E	ETL
5	40° 9'57.91"N - 26°39'11.97"E	Switch Yard- ETL - Access Road	5	40°10'19.83"N - 26°38'39.32"E	40°10'15.98"N - 26°38'12.44"E	T4 - Site Road
6	40°10'30.21"N - 26°36'24.55"E	Accesss Road	6	40°10'34.54"N - 26°37'32.01"E	26°37'32.01"E - 26°36'55.06"E	T1 - T5
7	40° 9'0.43"N - 26°40'57.96"E	ETL	7	40° 9'12.19"N - 26°40'27.15"E	40° 8'47.21"N - 26°41'15.15"E	ETL
			8	40°10'41.76"N - 26°36'18.23"E	40°10'33.03"N - 26°36'47.66"E	Access Road
			9	40°12'0.76"N - 26°32'50.95"E	40°11'37.19"N - 26°33'3.21"E	Access Road
			10	40°11'40.51"N - 26°33'46.54"E	40°11'27.73"N - 26°34'26.36"E	Access Road

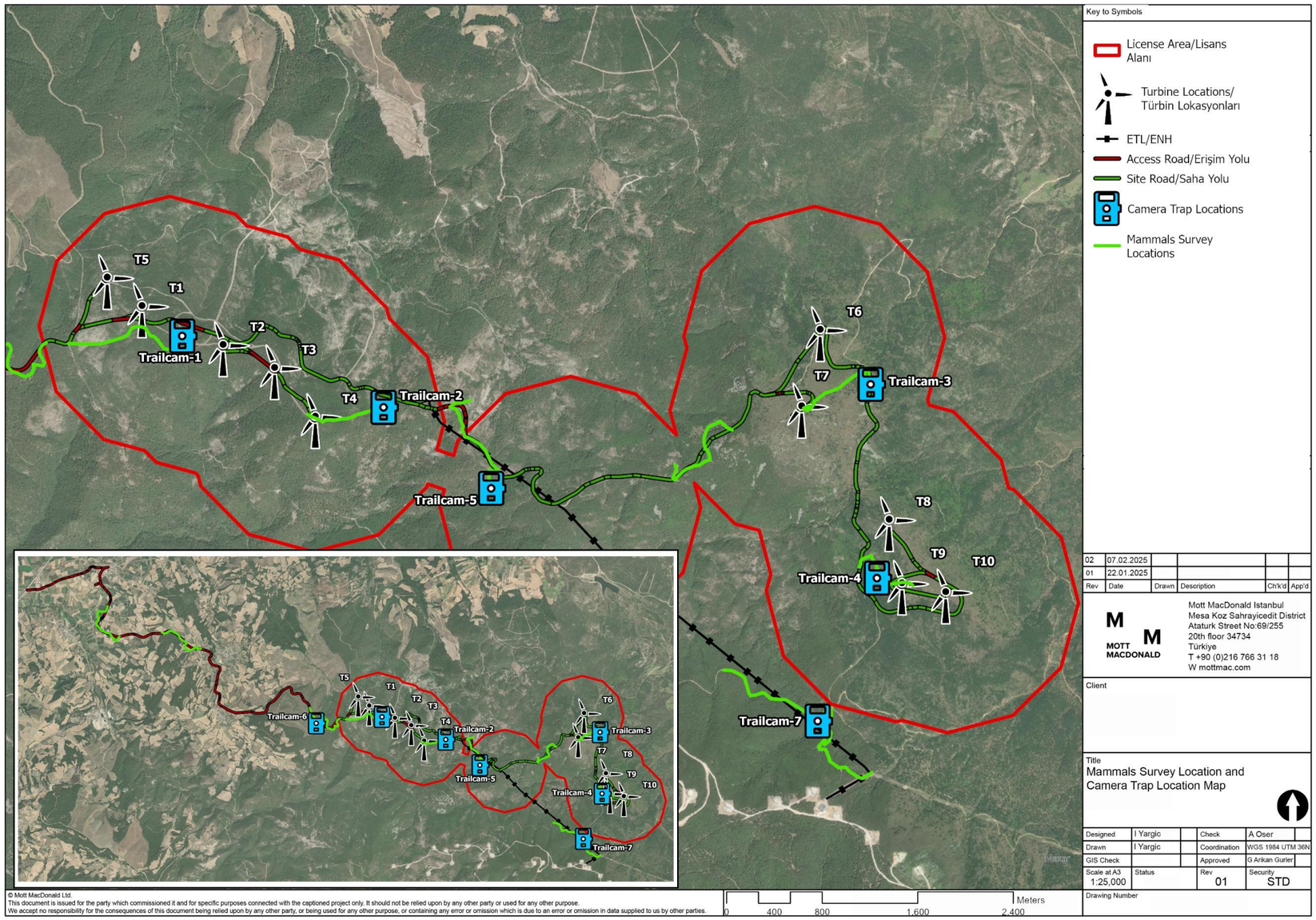

Figure 3-2 Mammalia Camera Trap and Transect Survey Locations

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 road 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

Desktop Studies:

- Station selection and literature searches were carried out using geographic information systems.
- Within the scope of geographic information systems studies, stations for point and transect observations were tried to be established as a preliminary preparation on satellite images.
- Previous herpetofauna studies near the study area were examined within the scope of literature research.
- For herpetofauna, firstly, satellite maps were analysed within the scope of field preparation. As part of the initial preparations, fieldwork was conducted to survey the land and habitats. The habitats were then reassessed, and the research stations were clearly delineated. Information on the distribution of species was obtained from literature sources and this information was used as a base. For herpetofauna species, 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 studies, 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 fieldwork was carried out primarily to verify the quality of the stations identified in the office 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.
- 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.
- Suitable habitat for amphibians and reptiles were identified and observations were conducted at total 4 stations and 11 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 Project area.
- During the observations, ‘Visual Encounter Survey (VES)’ and Call Survey were used to determine the presence of frogs and reptile species.

Commented [AO5]: The herpetofauna field surveys were carried out in areas where field studies could not be conducted during the previous seasons.

3.3.2 Survey Locations

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

distances of any emissions (See Table 3-3 and

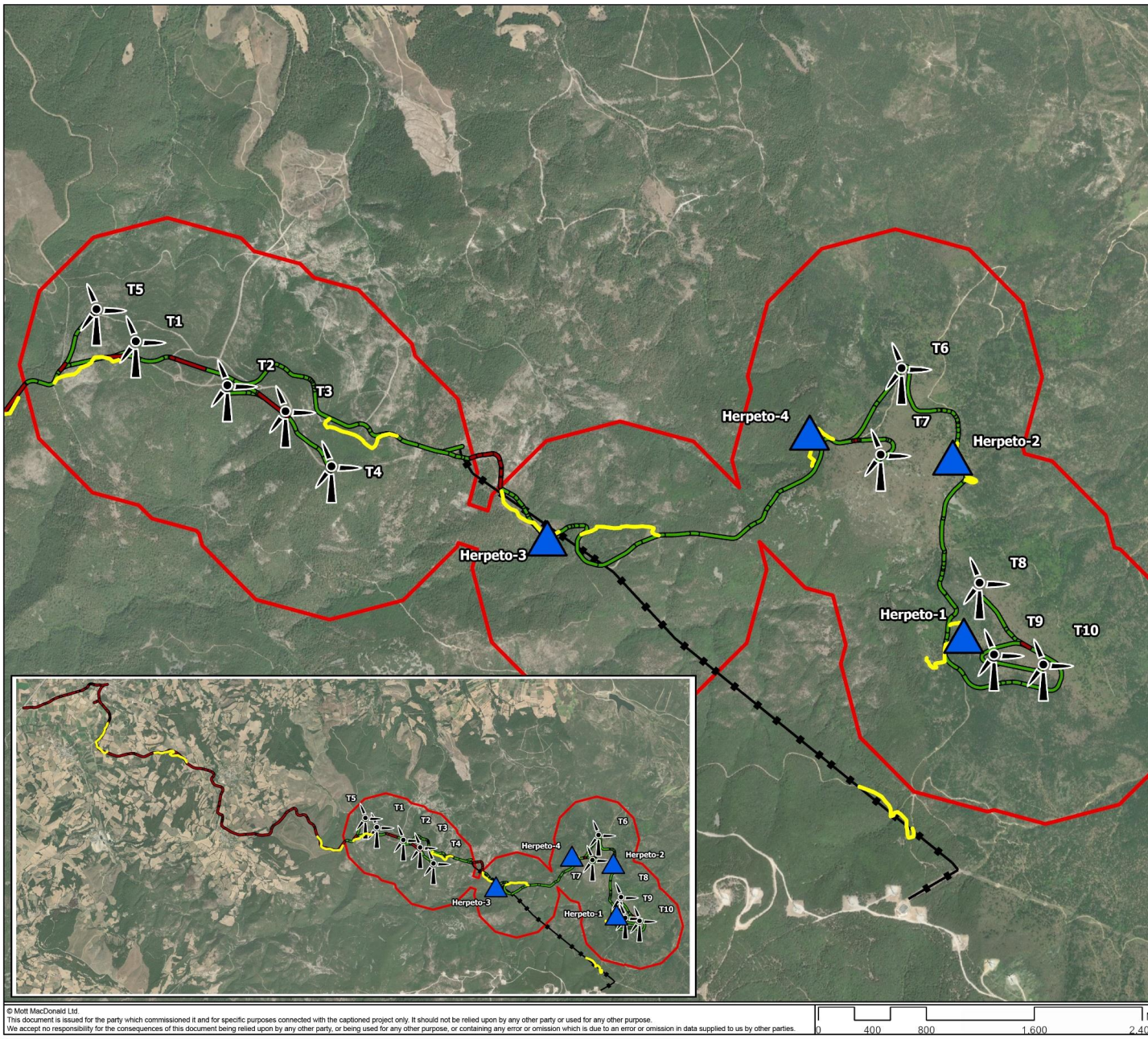

Figure 3-3)

Table 3-3 Herpetofauna Survey Locations

Sampling			Transect			
Station No	Sampling Point	Nearest Project Element	Transect No	Transect Start Location	Transect End Location	Nearest Project Element
1	40° 9'39.48"N - 26°41'16.36"E	T8 – T9	1	40°10'38.82"N - 26°37'13.89"E	40°10'33.73"N - 26°36'55.46"E	T1 - T5
2	40°10'18.62"N - 26°41'13.01"E	T7 – T6	2	40°10'13.15"N - 26°41'16.77"E	40°10'21.20"N - 26°41'14.33"E	T7 – Site Road
3	40°10'0.55"N - 26°39'16.87"E	T4	3	40° 9'41.29"N - 26°41'12.41"E	40° 9'34.02"N - 26°41'5.83"E	T9 - Site Road
4	40°10'24.01"N - 26°40'31.96"E	T7	4	40°10'22.00"N - 26°40'38.75"E	40°10'16.19"N - 26°40'32.75"E	T6 – T7
			5	40°10'0.73"N - 26°39'48.76"E	40°10'0.90"N - 26°39'26.74"E	Site Road
			6	40°10'22.34"N - 26°38'33.65"E	40°10'26.05"N - 26°38'14.32"E	T3 – T4
			7	40°10'22.34"N - 26°38'33.65"E	40°10'26.05"N - 26°38'14.32"E	T3 – T4 and Site Road
			8	40°10'10.21"N - 26°39'3.75"E	40°10'1.43"N - 26°39'20.16"E	Switch Yard - ETL - Access Road
			9	40° 9'5.72"N - 26°40'46.23"E	40° 8'56.51"N - 26°41'2.00"E	ETL
			10	40°12'2.42"N - 26°32'51.72"E	40°11'40.65"N - 26°32'51.01"E	Access Road
			11	40°11'39.95"N - 26°33'38.09"E	40°11'32.45"N - 26°34'10.50"E	Access Road

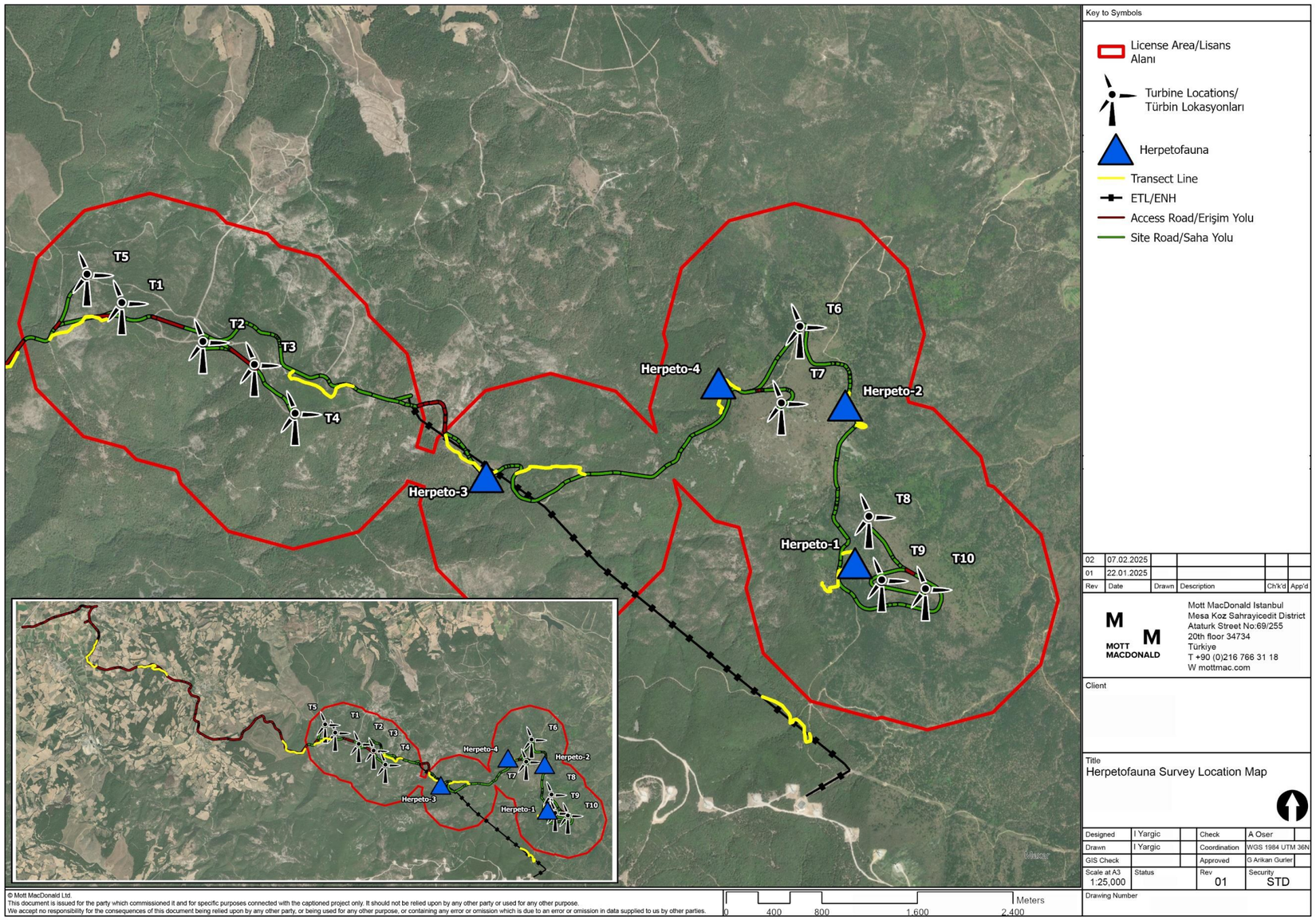

Figure 3-3 Transect and Point Survey Locations of Herpetofauna

3.4 Bird

As previously presented in the standalone methodology reports[4], studies on birds were carried out on 3 main topics: Turbine Vantage Point (VP) survey, ETL VP survey, and Breeding Bird Survey.

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

- VP located between T1 and 2 was moved 1 km west for improved coverage (see Section 3.4.1)
- A VP was added to improve ETL coverage (see Section 3.4.2)
- VPs were renamed (numeration) for field surveyor convenience (see Section 3.4.1, and Section 3.4.2)
- Spring season for the Project region was considered as extending to mid-June as confirmed by the local ornithology experts. (see Section 3.4.4)

3.4.1 Vantage Point Methodology

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

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

Due to the proximity to the Dardanelles Strait and the suspicion that the site might be on a minor migration route for soaring migratory birds, 72 hours of effort was targeted for each VP during migration season.

The appropriate time of observations is determined as when target species are active which is between 09:00 - 17:00, though changing daylight conditions between seasons are also considered when scheduling observations. The observer scans the area within the main viewing angle every 5 minutes, using the maximum angle if a bird contact moves outside of the main angle. When a bird is detected, the species is identified, total number of birds is noted, minimum and maximum flight height during the course is estimated, first and last time of the sighting is noted. A standard field recording sheet was used and given in Appendix 6.9.

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 167 hours and 19 minutes of surveys were conducted across two vantage points (VP1 and VP2) 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 83 hours and 40 minutes of surveys were conducted per vantage point.

[4] Harmancık WPP Biodiversity Monitoring Methodology. Mott MacDonald. Issue date 28 March 2024.

Table 3-4 VP survey effort and dates in spring

Week	First Day	VP1	VP2	Total (h)
W12	18/03	11:43	14:21	26:04
W13	25/03	14:48	14:26	29:14
W17	22/04	08:15	08:23	16:38
W18	29/04	21:44	13:40	35:24
W22	27/05	07:33	08:09	15:42
W23	03/06	22:13	22:04	44:17
Total	-	86:16	81:03	167:19

Commented [AF6]: good that 72hours was exceeded, same comment as other reports - why not exact hours and why more than intended?

Commented [ED7R6]: With the exact hours topic, please see similar comments from mainly Kestanederesi. I think this was a case of the team's schedule allowing more observation effort to the VPs to extend beyond 72. We did not specifically ask them to stop at 72. Actually ended up being nice to have more effort coverage here, since the migration rates were lower than expected in 2024, apparent from the lack of white stork and LSE from VP results in spring, and we have higher coverage and more data to back up that claim.

During the summer of 2024, between 47:40 and 53:21 hours of surveys were conducted across two vantage points (VP1 and VP2) as presented in Table 3-5. Week number of the year are denoted with Monday as first day. The summer surveys started in mid-June and continued until the mid-August. On average, approximately 50 hours and 30 minutes of surveys were conducted per vantage point.

Table 3-5 VP survey effort and dates in summer

Week	First Day	VP1	VP2	Total (h)
W26	24/06	22:19	24:21	46:40
W31	29/07	14:30	15:56	30:26
W32	05/08	10:51	13:04	23:55
Total	-	47:40	53:21	101:01

During the autumn of 2024, a total of 82:44 and 79:24 hours of surveys were conducted across two vantage points (VP1 and VP2) as presented in Table 3-6. Week number of the year are denoted with Monday as first day. Autumn surveys started in mid-August and continued until mid-November. On average, approximately 81 hours and 4 minutes of surveys were conducted per vantage point.

Table 3-6 VP survey effort and dates in autumn

Week	First Day	VP1	VP2	Total (h)
W34	19/08	-	6:25	6:25
W35	26/08	12:25	-	12:25
W39	23/09	25:19	26:52	52:11
W42	14/10	20:58	22:50	43:48
W43	21/10	3:19	4:08	7:27
W46	11/11	20:43	19:09	39:52
Total	-	82:44	79:24	162:08

3.4.1.2 VP Locations

2 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	472859	4446855
VP2	467119	4446991

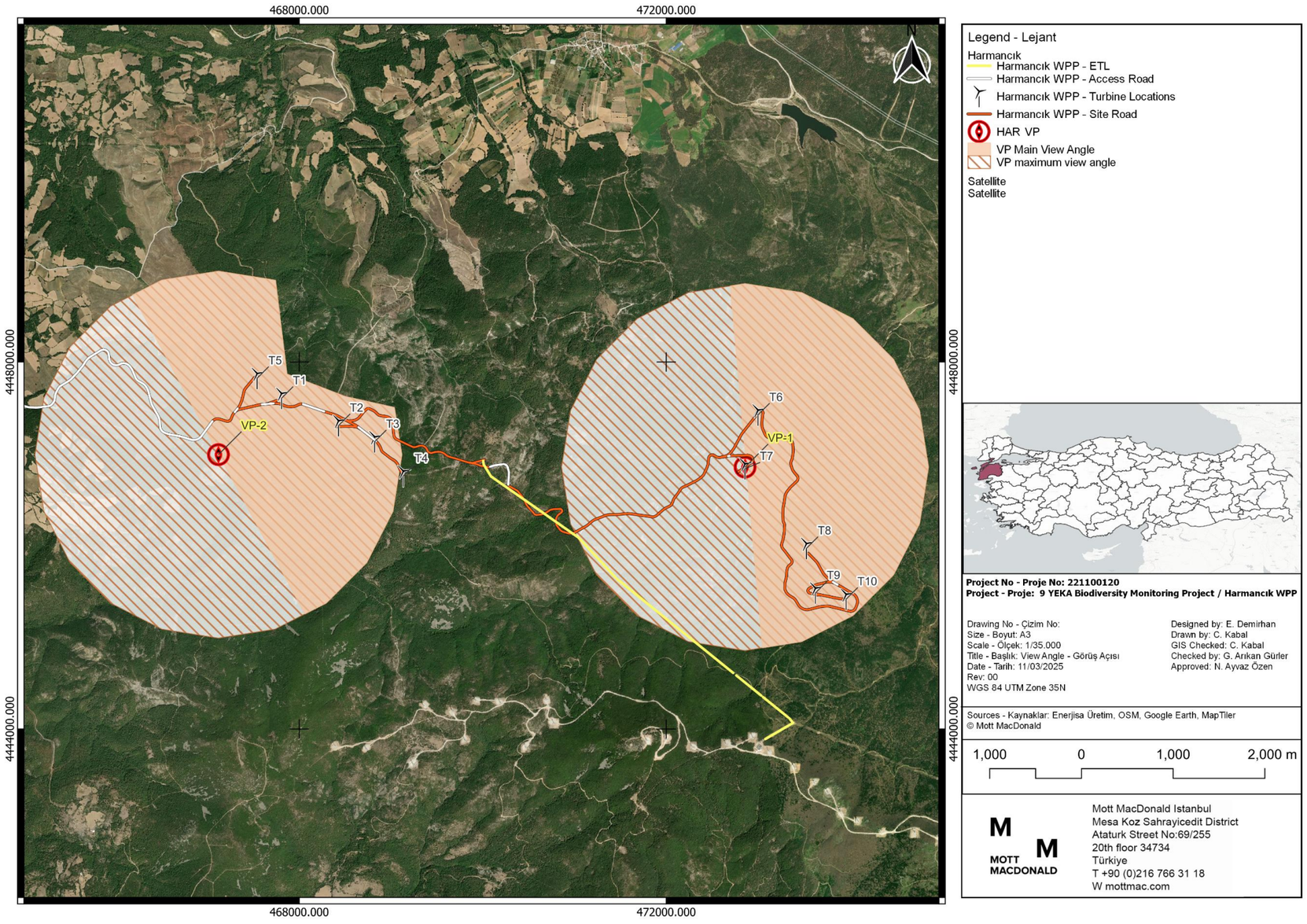

Figure 3-4 Locations of the VPs

Commented [ED8]: Revised VP maps to clarify main vs max angles.

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, 2 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 79 hours and 38 minutes of surveys were conducted during the spring of 2024, starting on 25 March, and finishing on 3 June. The surveys were carried out at two transmission line points (VPs ETL1, ETL2). On average, approximately 40 hr of survey was conducted per vantage point (VP ETL) as shown in Table 3-8.

Table 3-8 ETL survey effort and dates in spring

Week	First Day	VP ETL1	VP ETL2	Total
W13	25/03	15:26	13:47	29:13
W17	22/04	-	06:33	06:33
W18	29/04	07:34	07:06	14:40
W22	27/05	-	06:31	06:31
W23	03/06	15:38	07:03	22:41
Total	-	38:38	41:00	79:38

A total of 49 hours and 37 minutes of surveys were conducted during the summer of 2024, between June 16 and August 18. The surveys were carried out at two transmission line points (VPs ETL1, ETL2). On average, approximately 24 hr 48 min of survey was conducted per vantage point (VP ETL) as shown in Table 3-9.

Table 3-9 ETL survey effort and dates in summer

Week	First Day	VP ETL1	VP ETL2	Total
W26	24/06	16:05	6:45	22:50

Week	First Day	VP ETL1	VP ETL2	Total
W31	29/07	14:58	-	14:58
W32	05/08	-	11:49	11:49
Total	-	31:03	18:34	49:37

A total of 105 hours and 36 minutes of surveys were conducted during the autumn of 2024, between August 19 and November 15. The surveys were carried out at two transmission line points (VPs ETL1, ETL2). On average, approximately 52 hr 48 min of survey was conducted per vantage point (VP ETL) as shown in Table 3-10.

Table 3-10 ETL survey effort and dates in autumn

Week	First Day	VP ETL1	VP ETL2	Total
W34	19/08	13:49	6:58	20:47
W35	26/08	-	12:45	12:45
W39	23/09	12:22	12:42	25:04
W42	14/10	8:16	13:03	21:19
W43	21/10	3:46	-	3:46
W46	11/11	8:04	13:51	21:55
Total	-	46:17	59:19	105:36

3.4.2.2 ETL Observation Locations

2 ETL 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	470060	4446879
VP ETL2	472818	4445223

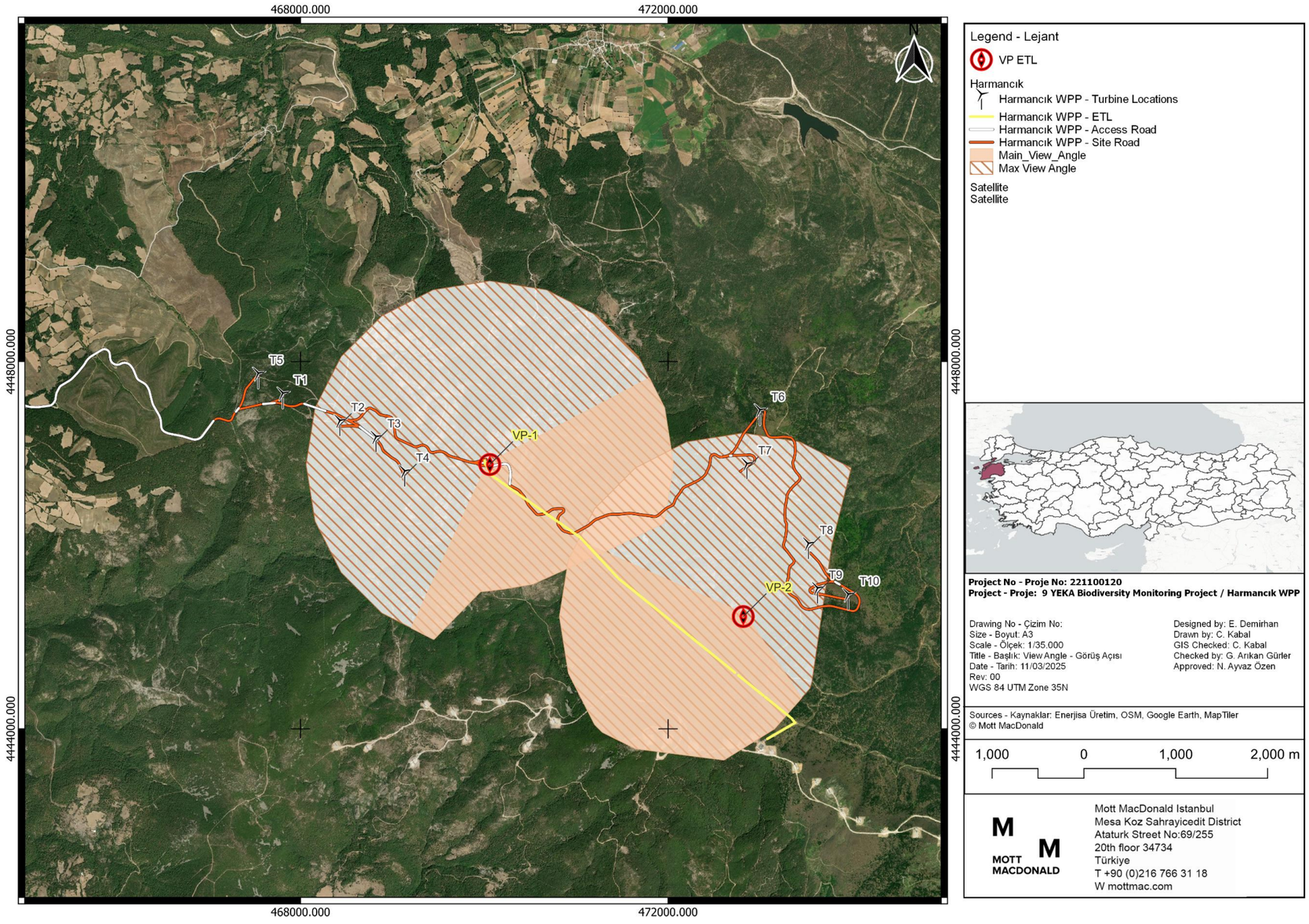

Figure 3-5 Locations of the ETL VPs

3.4.3 Collision Risk Methodology

NatureScot Guidance note describes a methodology for assessing the full impact of wind farms on ornithological interests which includes a two-stage process for the assessment of collision risk (NatureScot 2000). Stage (1) involves the calculation of the number of birds that fly through the rotors, which itself consists of two separate approaches, modified in order to calculate (a) resident bird numbers and (b) migratory bird numbers. Stage (2) involves the calculation of the probability of a bird being hit by a rotor when flying through. Avoidance rates in both approaches are accounted for according to NatureScot (2018), which for raptors is specified as 98% (see Appendix 6.4).

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 x πR2 where N is the number of rotors and R is the rotor radius
4. Express the total rotor area as a proportion A / W of the risk window.
5. Number of birds passing through rotors = number of birds through risk window x proportion occupied by rotors = n x (A / W)

3.4.3.2 Birds using the Wind Farm Airspace

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

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

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

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

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

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

n x (Vr / Vw) bird-secs.

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

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

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

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

3.4.4 Breeding Bird Methodology

In the region, the breeding season for most bird species is between March and July, according to the Turkish Breeding Bird Atlas (which was incorporated into European Breeding Bird Atlas[5]). 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 (TLs) methods. For the line transect method, transects were selected adjacent to vantage points. Observers walked along these transect lines, recording each potential breeding bird observed, along with the species and the highest level of breeding code for each bird species as given in Table 3-12. For the point count method, observers recorded each potential breeding bird observed at VP and VP ETL points during bird monitoring surveys, along with the species and the highest level of breeding code for each bird species.

[5] https://ebba2.info/

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 5 transect walks were conducted in April and June (Table 3-13). The walks lasted an average of 58.6 minutes and covered 1.2 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 March 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	Duration (min)	Distance (km)
HRC-TL2	28.04.2024	Apr	09:28:00	54	2
HRC-VP2	29.04.2024	Apr	08:55:00	61	1
HRC-VP1	29.04.2024	Apr	09:34:00	60	1
HRC-VP2	03.06.2024	Jun	09:14:00	64	1
HRC-VP1	03.06.2024	Jun	09:45:00	54	1

3.5 Bat

No major changes to the established bat methodology were made and there are no minor ones to mention.

However, some data loss occurred in summer due to unforeseen circumstances, resulting from the theft of three devices during the study. Devices recording for SP01, SP02, and SP03 during summer was stolen by unknown parties and were never recovered, resulting in total data loss. Make-up surveys could not be scheduled due to short-notice timing and logistical planning difficulties. However, due to the relative homogeny of habitats of the turbine pads of the Project, and coverage of the identified cave entrance by additional survey, the data obtained may still be relevant and adequate.

Commented [AF9]: agreed

Commented [ED10R9]: Thank you, much appreciated. It was quite unfortunate, hoping it does not repeat.

Other sources of data loss were 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 4-37, summer in Table 4-43 and autumn in Table 4-49 (no failures). Failures resulted in no recordings and show up as blank in table cells for the device.

Commented [ED11]: Adding a reference here to point out where failures can be found.

3.5.1 Ground Static and Mobile Acoustic Survey Methodology

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

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

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

3.5.2 Acoustic Analysis Methodology

Bat recordings obtained from bat detectors were analysed using BatExplorer and Kaleidoscope Pro (produced by Wildlife Acoustics) and species identifications were done by following established scientific literature and industry best practice (Appendix 6.5). 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 Türkiye, 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.

Commented [ED12]: Adding that bit from the call about Myotis here.

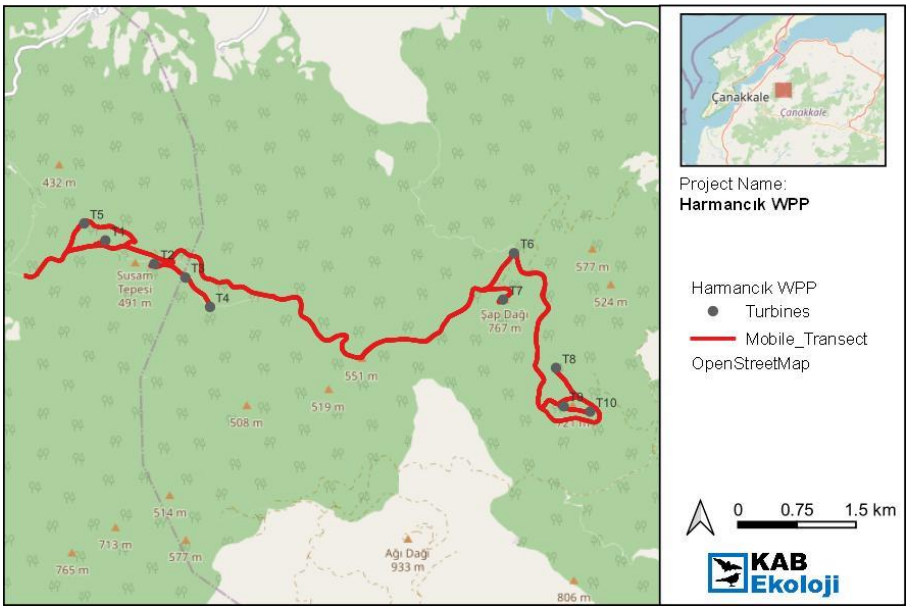

Figure 3-6 Transect survey route at the project

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	27 June	6 July	10 nights
Spring Transect Survey 1	30 June	30 June	1 night
Spring Transect Survey 2	7 July	7 July	1 night
Summer Static Surveys	10 August	21 August	10 nights
Summer Transect Survey 1	14 August	14 August	1 night
Summer Transect Survey 2	21 August	21 August	1 night
Autumn Static Surveys	26 September	9 October	10 nights
Autumn Transect Survey 1	25 September	25 September	1 night
Autumn Transect Survey 2	26 September	26 September	1 night

Table 3-15 Weather conditions during the surveys

Date	Temperature (°C)	Wind Speed (m/s)	Cloud cover %	Precipitation (mm)
2024-06-27	20	4	0	0
2024-06-28	20	3	0	0
2024-06-29	21	4	10	0
2024-06-30	21	4	0	0
2024-07-01	22	2	0	0
2024-07-02	21	2	0	0
2024-07-03	23	1	10	0
2024-07-04	20	1	20	0
2024-07-05	19	1	30	0
2024-07-06	21	2	10	0
2024-07-07	21	4	0	0
2024-08-10	24	2	0	0
2024-08-11	24	3	0	0
2024-08-12	24	4	0	0
2024-08-13	25	3	0	0
2024-08-14	25	2	0	0
2024-08-15	25	5	0	0
2024-08-16	25	3	0	0
2024-08-17	22	4	0	0
2024-08-18	21	3	0	0
2024-08-19	22	2	0	0
2024-08-20	22	2	0	0
2024-08-21	26	3	20	0
2024-08-22	21	1	0	0
2024-09-26	16	2	10	0

Date	Temperature (°C)	Wind Speed (m/s)	Cloud cover %	Precipitation (mm)
2024-09-27	18	2	10	0
2024-09-28	17	2	0	0
2024-09-29	18	2	0	0
2024-09-30	14	4	70	1,7
2024-10-01	12	1	50	0
2024-10-02	12	1	0	0
2024-10-03	14	2	0	0
2024-10-04	16	2	0	0
2024-10-05	19	2	0	0
2024-10-06	22	2	90	0
2024-10-07	17	2	2	0
2024-10-08	16	2	0	0
2024-10-09	15	2	0	0
2024-10-10	18	2	20	0
2024-10-04	16	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 3-7. Turbines 1, 2, 3, 4 and 5 will be key holed into woodland, and therefore this group of turbines needs a representative sampling point which can mimic the turbine pads once the forest is cleared. These turbines are located in close proximity and located in similar habitat. SP1 was selected to represent this group. While the sampling point count is less than the prescribed number by NatureScot, due to the forest cover at the Project AoI as described in ESIA Report, SP1 area is one of the only ideal locations for sampling which is also why this grouping makes sense. The methodology is still much more comprehensive than the minimum acceptable standard for WPPs which is EUROBATS guidelines.

Note that due to the theft incident during summer where SP1, SP2 and SP3 was stolen, the western turbine group represented by SP1 was effectively without coverage. Due to the homogeneity of the habitats this incident, while very unfortunate, potentially did not lead to complete loss of valuable information from the summer study. Activity levels could potentially be inferred relatively from the spring and autumn seasons by comparison to the other devices.

Additionally, a cave near T6 was discovered in spring which was surveyed during the summer and autumn seasons, coordinates of which is available in Table 3-16 as the sampling point was the cave opening.

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

SP	Easting	Northing	Nearest Project Element
SP1	468420	4447337	T2
SP2	472893	4446854	T7
SP3	473003	4447432	T6
SP4	473544	4445947	T8
SP5	473693	4445524	T9

Commented [AF13]: previously accepted by IESC as acceptable. Which of these were stolen though. It states SP01, SP02 and SP03 are those HRC-1, HRC-2, HRC-3? Quite surprising that ones so far apart were stolen. More importantly, if HRC-1 was stolen then that left no coverage of the western turbines at all.

Commented [ED14R13]: Added an explanation below. Western side as you have observed did end up with no representing device. Habitat similarity and relative comparison of the devices with spring and autumn seasons may allow some additional information.

Commented [AF15]: where?

Commented [ED16R15]: Please see map below near T6-7

SP	Easting	Northing	Nearest Project Element
SP6	473955	4445411	T10
Cave	473304	4447111	T6, T7

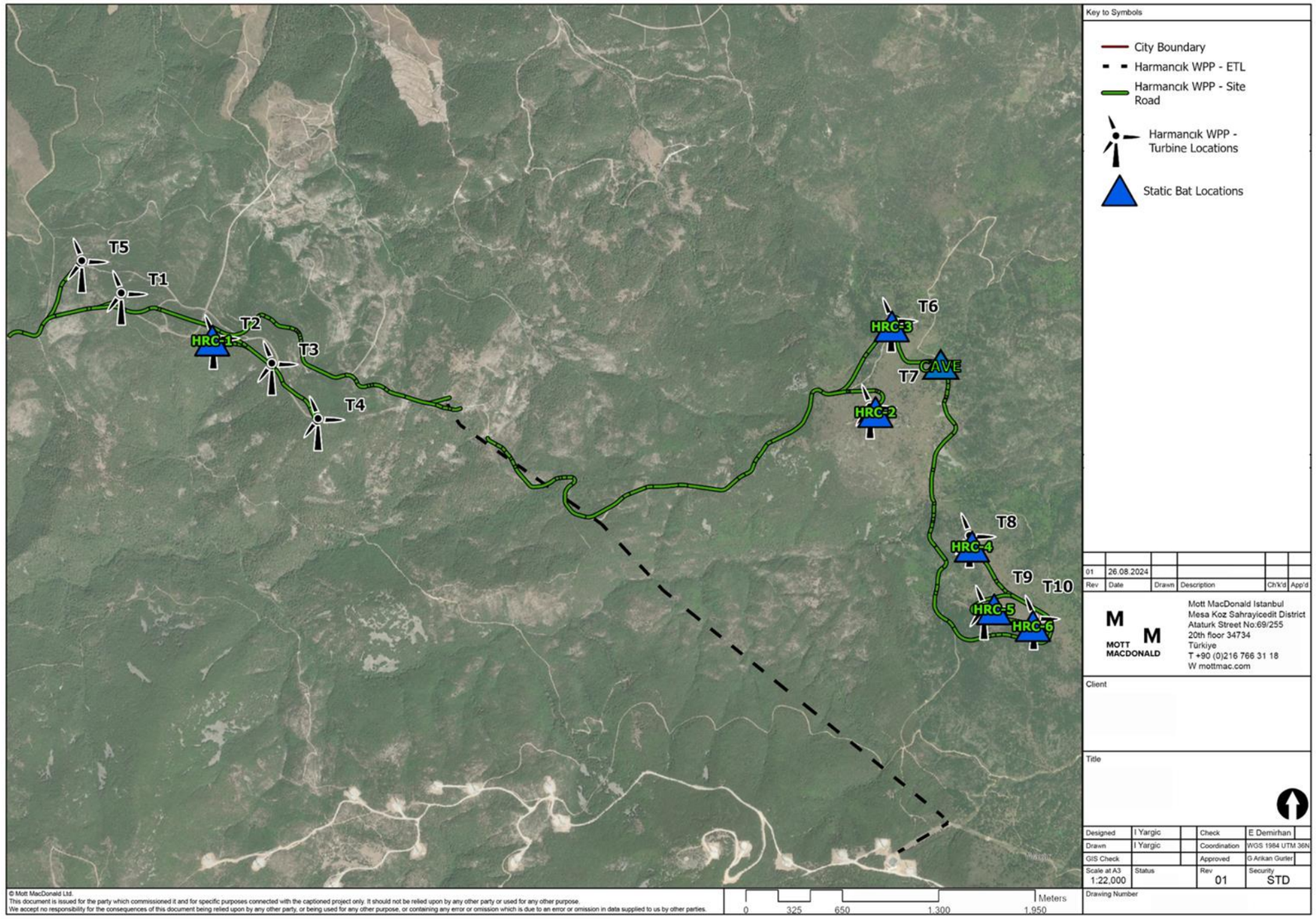

Figure 3-7 Ground static bat detector locations

4 Results

4.1 Flora

4.1.1 Biga Mountains and Çanakkale Strait Key Biodiversity Area

The Project area is located within Biga Dağları Key Biodiversity Area (KBA). A portion of the project's access road falls within the boundaries of the Çanakkale Strait KBA[6]; however, no construction activities will be undertaken along these sections, as only the existing roads will be utilized. Table 4-1 lists the plant species identified within the KBA. KBAs are internationally recognised areas that currently do not have legal protection in Türkiye but are widely used for various conservation aims. Biga Mountains KBA does not have any national protection status.

During the course of the previous field survey conducted in the Project area, *Crocus candidus* was observed, and further identification of this species was supported by relevant findings from literature studies[7]. The *Crocus candidus* is assessed as Vulnerable (VU) according to the Turkish Red Data Book (TRDB) and is classified as a regional endemic species. No floral species assessment has been conducted within the boundaries of the Çanakkale Strait KBA.

Table 4-1 KBA Flora Species

Family	Species	Obsevation Status
AMARYLLIDACEAE	*Galanthus trojanus* A.P.Davis & Özhatay	Not observed
IRIDACEAE	*Crocus candidus* E.D.Clarke	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, along with their wide distribution areas within the study area and Figure 4-1 shows the determined habitat types in AoI. The amount of habitat lost due to site roads, turbine footprints, ETL and switchyard area are given in Table 4-3 through Table 4-6.

Table 4-2 Habitat Types of the Project AoI

Broad habitat type	EUNIS Habitat Type	Extend within Project AoI (ha)	Percentage (%)
Woodland	G1.3 Mediterranean riparian woodland	175.6282	1.75%
	G1.7 Termophilus deciduous woodland	1412.447	14.04%
	G3.5 Pinus nigra Woodland	3551.333	35.31%
	G3.7 Pinus brutia woodland (Lowland to montane Mediterranean Pinus woodland (excluding Pinus nigra))	122.578	1.22%
	G3.F Highly artificial coniferous plantations	2111.937	21.00%
Maquis	F5.2 Maquis	90.55021	0.90%

[6] https://www.keybiodiversityareas.org/site/factsheet/28345
[7] https://www.keybiodiversityareas.org/site/factsheet/28338

Inland unvegetated or sparsely vegetated habitats	H3.6 Weathered rock and outcrop habitats	31.18492	0.31%
Agricultural Areas	I1.1 Intensive unmixed crops	2357.264	23.44%
	I1.3 Arable land with unmixed crops grown by low-intensity agricultural methods	171.7301	1.71%
	I2.2 Small-scale ornamental and domestic garden areas	32.96199	0.33%

Table 4-3 Habitat Loss on Site Roads

EUNIS	Area (ha)	Percentage
G1.7 Termophilus deciduous woodland	5.25	0.3715%
G3.5 Pinus nigra Woodland	3.36	0.0947%
G3.F Highly artificial coniferous plantations	7.33	0.3469%
H3.6 Weathered rock and outcrop habitats	0.26	0.8472%
I1.1 Intensive unmixed crops	0.00	0.0000%
Total	**16.20**	

Table 4-4 Habitat Loss on Turbine Footprint

EUNIS	Area (ha)	Percentage
G1.7 Termophilus deciduous woodland	4.86	0.3442%
G3.5 Pinus nigra Woodland	3.57	0.1005%
G3.F Highly artificial coniferous plantations	6.72	0.3183%
H3.6 Weathered rock and outcrop habitats	0.00	0.0000%
I1.1 Intensive unmixed crops	0.00	0.0000%
Total	**15.15**	

Table 4-5 Habitat Loss on Switchyard Area

EUNIS	Area	Percentage
G1.7 Termophilus deciduous woodland	0.00	0.0000%
G3.5 Pinus nigra Woodland	0.00	0.0001%
G3.F Highly artificial coniferous plantations	1.20	0.0567%
H3.6 Weathered rock and outcrop habitats	0.00	0.0000%
I1.1 Intensive unmixed crops	0.00	0.0000%
Total	**1.20**	

Table 4-6 Habitat Loss on ETL

EUNIS	Area (ha)	Percentage
G3.F Highly artificial coniferous plantations	10.64516	0.50%
G3.5 Pinus nigra Woodland	12.24407	0.34%
G1.7 Termophilus deciduous woodland	16.59291	1.17%
G1.3 Mediterranean riparian woodland	4.696314	2.67%
Total	**44.17846**	

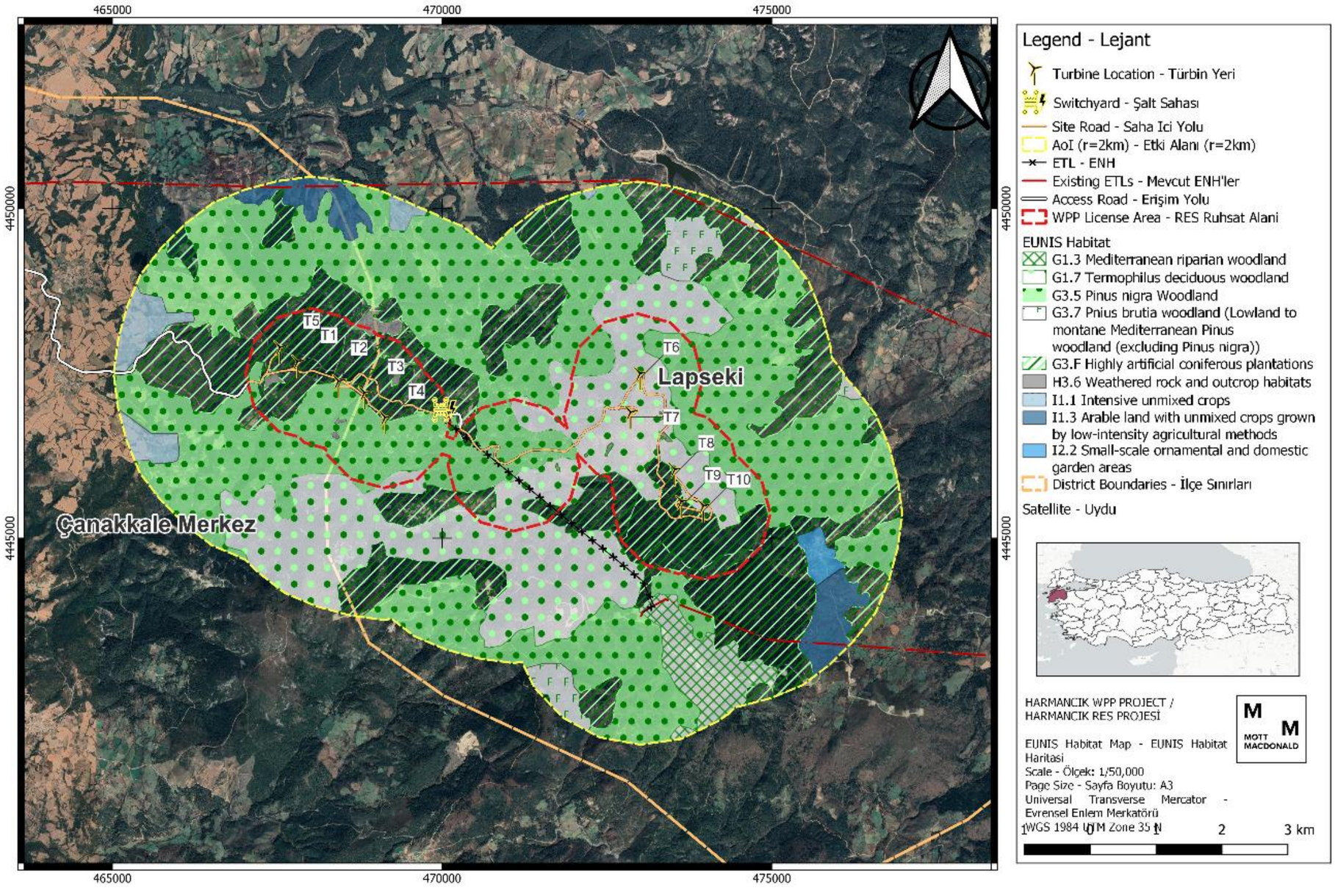

Figure 4-1 EUNIS Habitat Classification of Harmancık WPP Area of Influence

Commented [AF17]: but this looks to exclude the sections of new access road within the Cannakale strait KBA? What were they classified as? Are there habitat maps?

Commented [AO18R17]: Certain sections of the access road intersect with the Çanakkale Strait KBA; however, the access road utilizes existing roads within the KBA. Therefore, no damage to natural areas is anticipated, and no loss of natural habitat will occur. Additionally, the roads to be used have been classified under the EUNIS Habitat unit J4.2, designated as "Road Networks." Consequently, no habitat map has been prepared for the access road section.

The assessment of flora and fauna within the Çanakkale Strait KBA has been incorporated into the following sections: Flora: Section 4.1.1, Terrestrial Mammal: Section 4.2.1, and Herpetofauna: Section 4.3.1.

4.1.3 Floristic Analyses

As a result of the field studies, 306 plant taxa at the species and subspecies level from 57 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	1	2	3	4	5
ACERACEAE	1	*Acer campestre* L. subsp. *campestre*	Euro-Siberia											X				X			
ANACARDIACEAE	2	*Pistacia terebinthus* L. subsp. *terebinthus*	Mediterranean										X					X			
	3	*Rhus coriaria* L.	Widespread										X					X			
ARALIACEAE	4	*Hedera helix* L.	Widespread								X				X			X			
ARISTOLACHIACEAE	5	*Aristolochia bodamae* Dingler	Widespread								X							X			
	6	*Aristolochia pallida* Willd.	Widespread								X							X			
ASPLENIACEAE	7	*Ceterach officinarum* DC.	Widespread													X		X			
	8	*Asplenium onopteris* L.	Widespread													X		X			
ASTERACEAE	9	*Achillea coarctata* Poir.	Widespread								X	X						X			
	10	*Achillea wilhelmsii* C. Koch	Widespread								X							X			
	11	*Anthemis austriaca* Jacq.	Widespread								X										
	12	*Anthemis chia* L.	Mediterranean								X			X		X					
	13	*Anthemis cotula* L.	Widespread											X				X			
	14	*Anthemis cretica* subsp. *leucanthemoides* (Boiss.) Grierson	Widespread								X							X			
	15	*Anthemis tinctoria* L. *var. tinctoria*	Widespread								X	X						X			
	16	*Bellis annua* L.	Mediterranean								X	X		X				X			
	17	*Bellis perennis* L.	Mediterranean								X	X		X				X			
	18	*Bellis sylvestris* Cyr.	Widespread									X						X			
	19	*Carduus nutans* L. sensu lato	Widespread								X	X						X			
	20	*Carlina vulgaris* L.	Widespread									X						X			
	21	*Carthamus lanatus* L.	Widespread								X							X			
	22	*Centaurea cyanus* L.	Widespread								X	X						X			
	23	***Centaurea olympica* C. Koch**	**Mediterranean**		**X**		**LC**				**X**							**X**			
	24	*Centaurea solstitialis* L. subsp. *solstitialis*	Widespread								X							X			
	25	*Centaurea urvillei* DC. subsp. *stepposa* Wagenitz	Irano-Turanian								X							X			
	26	*Centaurea virgata* Lam.	Widespread								X							X			
	27	*Cichorium intybus* L.	Widespread								X							X			
	28	*Chondrilla juncea* L . var. *juncea*	Widespread								X							X			
	29	*Cirsium vulgare* (Savi) Ten.	Widespread								X							X			
	30	***Cirsium balikesirense* Yıldız, Arabacı & Dirmenci**	**Mediterranean**	**X**			**VU**				**X**							**X**			
	31	*Conyza canadensis* (L.) Cronquist	Widespread								X							X			
	32	*Crepis alpina* L.	Widespread								X	X						X			
	33	*Crepis foetida* L.	Widespread								X	X		X				X			
	34	*Crepis sancta* (L.) Babcock	Widespread								X	X	X	X				X			
	35	*Doronicum orientale* Hoffm.	Widespread								X	X		X				X			
	36	*Echinops ritro* L.	Widespread								X							X			
	37	*Filago pyramidata* L.	Mediterranean								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	1	2	3	4	5
	38	*Helminthotheca echioides* (L.) Holub	Widespread								X	X						X			
	39	*Hyphocoeris radicata* L.	Euro-Siberia								X	X						X			
	40	*Jurinea mollis* (L.) Reichb	Mediterranean								X							X			
	41	*Lactuca serriola* L.	Euro-Siberia								X							X			
	42	*Lapsana communis* L. subsp. *intermedia* (Bieb.) Hayek	Widespread								X	X						X			
	43	*Leontodon tuberosus* L.	Mediterranean								X	X						X			
	44	*Onopordum illycum* L. var. *carduncul*us Boiss.	Mediterranean								X							X			
	45	*Picnomon acarna* (L.) Cass.	Mediterranean								X							X			
	46	*Pilosella hoppeana* (Schultes) C.H.& F.W.Schultz	Widespread								X	X		X				X			
	47	*Scariola viminea* (L.) F.W. Schmidt	Widespread								X							X			
	48	*Senecio vernalis* Waldst. et Kit	Widespread								X							X			
	49	*Senecio vulgaris* L.	Widespread								X							X			
	50	*Solidago virgaurea* L. subsp. *virgaurea*	Widespread													X		X			
	51	*Sonchus asper* (L.) Hill subsp. glaucescens (Jordan) Ball.	Widespread								X							X			
	52	*Tragopogon longirostris* Bisch. ex Schultz Bip.	Widespread								X							X			
	53	*Tripleurospermum oreades* (Boiss.) Rech. Fil. Var. *oreades*	Widespread								X			X				X			
	54	*Tussilago farfara* L.	Euro-Siberia									X						X			
	55	*Xeranthemum annuum* L.	Widespread								X							X			
BETULACEAE	56	*Alnus glutinosa* (L.) Gaertne rsubsp. *Glutinosa*	Widespread												X			X			
BORAGINACEAE	57	*Buglossoides arvensis* (L.) Johnston	Widespread								X							X			
	58	*Echium italicum* L.	Mediterranean								X	X						X			
	59	*Echium plantagineum* L.	Mediterranean								X	X						X			
	60	*Heliotropium europaeum* L.	Mediterranean								X							X			
	61	*Myosotis arvensis* L.	Euro-Siberia								X	X						X			
	62	*Myosotis refracta* Boiss. subsp. *refracta*	Mediterranean								X	X						X			
	63	*Alliaria petiolata* (Bieb.) Cav. & Grande	Widespread								X							X			
BRASSICACEAE	64	*Alyssum minutum* Schlecht. ex DC.	Widespread								X	X						X			
	65	*Alyssum murale* Waldst. & Kit.	Widespread								X	X						X			
	66	*Arabis verna* (L.) DC.	Widespread								X	X						X			
	67	*Capsella bursa-pastoris* (L.) Medik.	Widespread								X	X						X			
	68	*Cardamine graeca* L.	Widespread								X							X			
	69	*Cardamine hirsuta* L.	Widespread								X							X			
	70	*Clypeola jonthlaspi* L.	Widespread								X							X			
	71	*Descurainia sophia* (L.)	Widespread								X	X						X			
	72	*Erophila verna* (L.) Chevall. subsp. *verna*	Widespread								X	X						X			
	73	*Erysimum smyrnaeum* Boiss. & Bal.	Widespread								X			X				X			
	74	*Hirschfeldia incana* (L.) Lag.-Foss	Widespread								X							X			
	75	*Thlaspi perfolatum* 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	1	2	3	4	5
CYPERACEAE	76	*Carex divulsa* Stokes ssp. *divulsa*	Euro-Siberia								X	X						X			
CAMPANULACEAE	77	***Campanula lyrata* Lam. subsp. *lyrata***	**Mediterranean**											**X**				**X**			
	78	*Legousia pentagonia* (L.) Thellung	Mediterranean								X	X						X			
CAPRIFOLIACEAE	79	*Lonicera etrusca* Santi	Mediterranean								X	X		X				X			
CARYOPHYLLACEAE	80	*Arenaria serpyllifolia* L. var *leptoclados* Reichb.	Widespread								X	X						X			
	81	*Cerastium gracile* Duf.	Widespread								X	X		X				X			
	82	*Cerastium illyricum* Ard. subsp. *comatum* (Pesv.) P.D.Seel & Whitehead	Mediterranean								X	X		X				X			
	83	*Dianthus calocephalus* Boiss.	Widespread								X	X						X			
	84	*Moenchia mantica* (L.) Bartl. Subsp. *mantica*	Widespread								X			X				X			
	85	*Petrorhagia velutina* (Guss.) Ball & Heywood	Mediterranean								X	X						X			
	86	*Scleranthus annuus* L.	Widespread								X							X			
	87	*Silene italica* (L.) Pers.var. *incana* Gris.	Mediterranean								X	X		X				X			
	88	*Silene vulgaris* (Moench) Garcke var. *vulgaris*	Widespread								X	X						X			
	89	*Stellaria holostea* L.	Euro-Siberia								X							X			
	90	*Stellaria media* (L.) Vill.	Widespread								X	X						X			
	91	*Velezia rigida* L. var. *fasciculata* (Boiss.) Post.	Mediterranean								X							X			
CISTACEAE	92	*Cistus salviifolius* L.	Mediterranean								X							X			
	93	*Cistus creticus* L.	Mediterranean								X							X			
	94	*Tuberaria guttata* (L.) Fourr. var. *guttata*	Widespread								X							X			
CONVOLVULACEAE	95	*Convolvulus arvensis* L.	Widespread								X							X			
CORNACEAE	96	*Cornus mas* L.	Widespread												X			X			
CORYLLACEAE	97	*Carpinus betulus* L.	Euro-Siberia											X				X			
	98	*Coryllus avellana* L. var. *avellana*	Euro-Siberia											X				X			
CRASSULACEAE	99	*Sedum album* L.	Widespread								X							X			
	100	*Sedum confertiflorum* Boiss.	Mediterranean								X							X			
	101	*Sedum pallidum* Bieb. var. *bithynicum* (Boiss.) Chamberlain	Euro-Siberia								X							X			
	102	*Umbilicus rupestris* (Salisb.) Dandy	Widespread													X		X			
CUPRESSACEAE	103	*Juniperus oxycedrus* L. ssp. *oxycedrus* L.	Mediterranean								X	X						X			
CUSCUTACEAE	104	*Cuscuta australis* R. *subsp. tinei.*	Mediterranean								X							X			
CYPERACEAE	105	*Carex panicea* L.	Euro-Siberia								X	X						X			
DIPSACACEAE	106	*Knautia integrifolia* (L.) Bert var. *bidens* (Sm.) Borbas	Mediterranean								X							X			
	107	*Pterocephalus plumosus* (L.) Coulter	Widespread								X	X						X			
	108	*Scabiosa argentea* L.	Widespread								X	X						X			
ERICACEAE	109	*Arbutus andrachne* L.	Mediterranean								X	X		X					X		
	110	*Arbutus unedo* L.	Mediterranean								X	X		X					X		
	111	*Erica arborea* L.	Mediterranean								X	X		X					X		
	112	*Rhododendron luteum* Sweet	Euro-Siberia											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	1	2	3	4	5
EUPHORBIACEAE	113	*Euphorbia amygdaloides* L. *var. amygdaloides*	Euro-Siberia								X	X		X					X		
	114	*Euphorbia myrsinites* L.	Widespread								X							X			
	115	*Euphorbia rigida* Bieb.	Mediterranean								X							X			
	116	*Mercurialis perennis* L.	Euro-Siberia											X				X			
FABACEAE	117	*Adenocarpus complicatus* (L.) Gay	Widespread										X					X			
	118	*Chamaecytisus hirsutus* (L.) Link	Widespread								X	X	X					X			
	119	*Coronilla parviflora* Willd. var. *luchani* Uhrova	Mediterranean								X							X			
	120	*Genista tinctoria* L.	Euro-Siberia										X					X			
	121	*Hippocrepis unisiliquosa* L. subsp. *unisiliquosa*	Mediterranean								X							X			
	122	*Hymenocarpus circinnatus* (L.) Savi	Mediterranean								X	X						X			
	123	*Lathyrus aphaca* L. var. *affinis* (Guss.) Arc.	Mediterranean								X	X						X			
	124	*Lathyrus laxiflorus* (Desf.) O. Kuntze	Widespread								X	X		X				X			
	125	*Lens nigricans* (Bieb.) Godr.	Mediterranean								X	X		X				X			
	126	*Lotus corniculatus* L.var. *corniculatus*	Widespread												X			X			
	127	*Medicago orbicularis* (L.) All.	Mediterranean								X	X						X			
	128	*Medicago sativa* L. subsp. *sativa*	Widespread								X	X						X			
	129	*Medicago polymorpha* L. var. *vulgaris* (Benth.) Shinners	Widespread									X						X			
	130	*Ornithopus compressus* L.	Mediterranean								X	X						X			
	131	*Trifolium angustifolium* L. var.*angustifolium*	Widespread								X	X						X			
	132	*Trifolium arvense* L. var. *arvense*	Widespread								X	X						X			
	133	*Trifolium campestre* Schreb.	Mediterranean								X	X						X			
	134	*Trifolium hybridum* L. *var. hybridum*	Widespread								X	X						X			
	135	*Trifolium isthmocarpum* Brot.	Widespread								X	X						X			
	136	*Trifolium pratense* L. var. *pratense*	Widespread								X	X						X			
	137	*Trifolium repens* L. var. *repens*	Widespread								X	X						X			
	138	*Trifolium stellatum* L.	Widespread								X	X						X			
	139	*Trifolium uniflorum* L.	Mediterranean								X	X						X			
	140	*Vicia cracca* L. subsp. *stenophylla* Vel.	Widespread								X							X			
	141	*Vicia hybrida* L.	Mediterranean								X							X			
	142	*Vicia narbonensis* L. var. *narbonensis*	Widespread								X	X						X			
FAGACEAE	143	*Fagus orientalis* Lipsky	Euro-Siberia								X							X			
	144	*Quercus cerris* L. var. *cerris*	Mediterranean								X	X		X						X	
	145	*Quercus frainnetto* Ten.	Widespread								X	X		X						X	
	146	*Quercus infectoria* Olivier subsp. *infectoria*	Euro-Siberia									X								X	
	147	*Quercus petrea* (Mattuschka) Liebl. subsp. *iberica* (Steven ex Bieb.) Krassiln	Widespread								X	X		X						X	
GENTIANACEAE	148	*Centaurium erythraea* Rafn. ssp. *rumelicum* (Velen.) Melderis	Mediterranean								X							X			
GERANIACEAE	149	*Erodium ciconium* (L.) L'Herit	Widespread								X							X			
	150	*Geranium asphodeloides* Burm. Fil. Subsp. *asphodeloides*	Euro-Siberia								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	1	2	3	4	5
	151	*Geranium lucidum* L.	Widespread								X	X						X			
	152	*Geranium purpureum* Vill.	Widespread								X	X						X			
	153	*Geranium rotundifolium* L.	Widespread								X	X						X			
HYPERICACEAE	154	*Hypericum olympicum* L. subsp. *olympicum*	Mediterranean										X					X			
	155	*Hypericum perforatumn* L.	Widespread								X							X			
HYPOLEPIDACEAE	156	*Pteridium aquilinum* (L.) Kuhn	Widespread								X							X			
IRIDACEAE	157	***Crocus candidus* E.D. Clarke**	**Mediterranean**	**X**		**VU**					**X**	**X**						**X**			
	158	*Crocus pulchellus* Herbert	Mediterranean								X	X						X			
	159	*Romulea bulbocodium* (L.) Seb.&Mauri	Mediterranean								X							X			
JUNCACEAE	160	*Luzula forsteri* (Sm.) DC.	Euro-Siberia								X	X							X		
	161	*Juncus gerardi* Loisel subsp. *gerardi*	Widespread								X	X		X					X		
LAMIACEAE	162	*Acinos rotundifolius* Pers.	Widespread								X	X						X			
	163	*Clinopodium vulgare* L. *subsp. arundonum* (Boiss.) Nyman	Widespread								X	X						X			
	164	*Lamium amplexicaule* L.	Euro-Siberia								X	X						X			
	165	*Lamium garganicum* L. subsp. *striatum* (Sm.) Hayek var. *striatum*	Mediterranean								X	X						X			
	166	*Lamium purpureum* L. var. *purpureum*	Euro-Siberia								X	X						X			
	167	*Melissa officinalis* L. subsp. *officinalis*	Widespread								X	X						X			
	168	*Origanum vulgare* L. subsp. *hirtum* (Link) Letswaart	Mediterranean								X	X						X			
	169	*Prunella vulgaris* L. var. *laciniata*	Euro-Siberia								X	X						X			
	170	*Salvia tomentosa* Miller	Mediterranean								X	X						X			
	171	*Salvia virgata* Jacq.	Irano-Turanian								X	X						X			
	172	***Stachys tmolea* Boiss.**	**Mediterranean**	**X**		**LC**					**X**							**X**			
	173	*Teucrium chamaedrys* L. subsp. *chameedrys*	Euro-Siberia								X	X						X			
	174	*Teucrium lamiifolium* d'Urv. Subsp. *lamiifolium*	Widespread								X	X						X			
	175	***Thymus zygioides* Griseb. var. *lycaonicus* (Celak.) Ronniger**	**Mediterranean**	**X**		**LC**					**X**	**X**						**X**			
LILIACEAE	176	*Allium paniculatum* L. subsp.*paniculatum*	Mediterranean								X							X			
	177	*Allium scorodoprasum* L. ssp.*rotundum* (L.) Stearn.	Mediterranean								X	X						X			
	178	*Asparagus acutifolius* L.	Mediterranean								X	X						X			
	179	*Asphodelus aestivus* Brot.	Mediterranean									X		X				X			
	180	*Gagea bohemica* (Zauschn.)Schultes& Schultes fil.	Widespread								X	X						X			
	181	*Ornithogalum nutans* L.	Mediterranean								X	X						X			
	182	*Ornithogalum umbellatum* L.	Widespread								X	X						X			
	183	*Muscari neglectum* Guss.	Mediterranean								X	X						X			
	184	*Muscari comosum* (L.) Miller	Mediterranean											X				X			
	185	*Ruscus aculeatus L.* var. *angustifolius* Boiss.	Widespread								X	X						X			
	186	*Scilla autumnalis* L.	Widespread								X	X						X			
	187	*Scilla bifolia* L.	Mediterranean											X				X			
	188	*Smilax excelsa* L.	Euro-Siberia								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	1	2	3	4	5
	189	*Tulipa orphanidea* Boiss. ex Heldr.	Widespread								X	X						X			
LYTHRACEAE	190	*Lythrum salicaria* L.	Euro-Siberia												X			X			
MALVACEAE	191	*Alcea pallida* Waldst. & Kit.	Widespread								X							X			
	192	*Lavatera punctata* All.	Mediterranean								X							X			
	193	*Malva sylvestris* L.	Widespread								X							X			
OLEACEAE	194	*Fraxinus ornus* L. subsp. *ornus*	Euro-Siberia								X							X			
	195	*Jasminum fruticans* L.	Mediterranean								X	X						X			
	196	*Phillyrea latifolia* L.	Mediterranean								X	X							X		
ORCHIDACEAE	197	*Cephalanthera damasonium* (Miller) Druce	Euro-Siberia								X	X						X			
	198	*Limodorum abortivum* (L.) Swartz	Widespread								X	X						X			
PAPAVERACEAE	199	*Corydalis integra* Barbey & Major	Widespread								X	X						X			
	200	*Fumaria vaillantii* Lois.	Widespread								X	X						X			
	201	*Papaver dubium* L.	Widespread								X							X			
	202	*Papaver rhoeas* L.	Widespread								X							X			
	203	*Roemeria hybrida* (L.) DC.	Widespread								X							X			
PINACEAE	204	*Pinus brutia* Ten.	Mediterranean									X									X
	205	*Pinus nigra* J.F. Arenold subsp. *nigra* var. *caramanica* (Loudon) Rehder	Widespread											X							X
PLANTAGINACEAE	206	*Plantago bellardii* All.	Widespread								X							X			
	207	*Plantago coronopus* L. subsp. *coronopus*	Euro-Siberia								X	X						X			
	208	*Plantago lagopus* L.	Mediterranean								X	X						X			
	209	*Plantago lanceolata* L.	Widespread								X			X				X			
PLATANACEAE	210	*Platanus orientalis* L.	Widespread												X			X			
POACEAE	211	*Aegilops triuncialis* L. subsp. *triuncialis*	Widespread								X							X			
	212	*Aegilops umbellulata* Zhuk. subsp. *umbellulata*	Irano-Turanian								X							X			
	213	*Agrostis capillaris* L. var. *aristata* (Boiss.) M. Doğan	Euro-Siberia								X	X						X			
	214	*Aira elegantissima* Schur subsp. *ambigua* (Arc.) M. Doğan	Widespread								X							X			
	215	*Alopecurus myosuroides* Hudson var. *myosuroides*	Euro-Siberia								X	X						X			
	216	*Anthoxanthum odoratum L. subsp. odoratum*	Euro-Siberia								X	X						X			
	217	*Brachypodium sylvaticum* (Hudson) P. Beauv	Euro-Siberia								X	X						X			
	218	*Briza maxima* L.	Widespread								X	X						X			
	219	*Briza media* L.	Widespread								X	X						X			
	220	*Bromus japonicus* Thunb.subsp. *japonicus*	Widespread								X	X						X			
	221	*Bromus squamosus* L. subsp. *noëanus* Boiss. ex Pénzes	Widespread								X	X						X			
	222	*Bromus sterilis* L.	Widespread								X	X						X			
	223	*Bromus tectorum* L.	Widespread								X	X						X			
	224	*Cynodon dactylon* (L.) Pers.var. *dactylon*	Widespread												X			X			
	225	*Cynosurus cristatus* L.	Widespread								X	X						X			
	226	*Dactylis glomerata* L. subsp. *hispanica* (Roth) Nyman	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	1	2	3	4	5
	227	*Festuca valesiaca* Schleicher ex Gaudin	Widespread								X	X						X			
	228	*Hordeum bulbosum* L.	Widespread								X	X						X			
	229	*Hordeum murinum* L. subsp. *leporinum* (Link) Arc.	Mediterranean								X	X						X			
	230	*Lolium rigidum* Gaudin var. *rigidum*	Mediterranean								X	X	X					X			
	231	*Milium vernale* Bieb. Subsp. *vernale*	Mediterranean								X		X					X			
	232	*Piptatherum coerulescens* (Desv.) P. Beauv.	Widespread								X	X	X					X			
	233	*Poa annua* L.	Widespread								X										
	234	*Poa bulbosa* L.subsp. *timeolontis* (Boiss.) Hayek	Widespread								X	X	X	X				X			
	235	*Taeniatherum caput- medusae* (L.) Nevski subsp.*crinitum* (Schreber) Melderis	Irano-Turanian								X							X			
	236	*Trachynia distachya* (L.) Link	Mediterranean								X	X						X			
	237	*Vulpia ciliata* Dumort subsp. *ciliata*	Widespread									X						X			
POLYGONACEAE	238	*Polygonum bellardii* All.	Widespread								X							X			
	239	*Rumex acetosella* L.	Widespread								X	X						X			
	240	*Rumex tuberosus* L. subsp. *tuberosus*	Widespread								X	X		X				X			
POLYPODIACEAE	241	*Polypodium vulgare* L.subsp. *vulgare*	Widespread													X		X			
PRIMULACEAE	242	*Anagallis arvensis L.var. arvensis*	Widespread								X							X			
	243	*Androsace maxima* L.	Widespread								X							X			
	244	*Primula vulgaris* Huds. Subsp. *sibthorpii* (Hoffmanns.) W.W. Sm. & Forrest	Euro-Siberia								X			X				X			
RANUNCULACEAE	245	*Anemone blanda* Schott & Kotschy	Widespread								X	X		X				X			
	246	*Ceratocephalus falcatus* (L.) Pers.	Widespread								X							X			
	247	*Clematis vitalba* L.	Widespread									X			X			X			
	248	*Nigella arvensis* L. var. *involucrata* Boiss.	Widespread								X							X			
	249	*Ranunculus arvensis* L.	Mediterranean								X							X			
	250	*Ranunculus constantinopolitanus* (DC.) d'Urv.	Widespread											X	X			X			
	251	*Ranunculus ficaria* L. subsp. *ficariiformis* Rouy & Fouc.	Widespread								X	X						X			
	252	*Ranunculus illyricus* L. subsp. *illyricus*	Widespread								X	X						X			
	253	*nculus marginatus* d'Urv. subsp. *trachycarpos* (Fisch. & Mey.) Azn.	Widespread								X		X					X			
RESEDACEAE	254	*Reseda lutea* L. var. *lutea*	Widespread								X							X			
ROSACEAE	255	*Agrimonia eupatoria* L.	Widespread								X		X					X			
	256	*Crataegus monogyna* Jacq. Subsp. *monogyna*	Widespread												X			X			
	257	*Crataegus orientalis* Pallas ex Bieb. var. *orientalis*	Euro-Siberia								X							X			
	258	*Geum urbanum* L.	Euro-Siberia								X	X						X			
	259	*Orthurus heterocarpus* (Boiss.) Juz.	Widespread								X	X		X				X			
	260	*Potentilla micrantha* Ramond ex DC	Widespread								X	X		X				X			
	261	*Potentilla recta* L.	Widespread								X	X						X			
	262	*Potentilla reptans* L.	Widespread								X	X						X			
	263	*Prunus divaricata* Ledeb. subsp. *divaricata*	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	1	2	3	4	5
	264	*Pyrus elaeagnifolia* Pallas subsp. *elaeagnifolia*	Widespread								X	X		X				X			
	265	*Rosa canina* L.	Widespread								X	X						X			
	266	*Rubus idaeus* L.	Widespread								X	X		X				X			
	267	*Rubus sanctus* Schreber	Mediterranean									X			X			X			
	268	*Sanguisorba minor* Scop. subsp. *muricata* (Spach)Brig	Widespread								X							X			
	269	*Sorbus torminalis* (L.) Crantz.var. *torminalis*	Euro-Siberia											X				X			
RUBIACEAE	270	*Asperula involucrata* Wahlenb	Euro-Siberia								X	X						X			
	271	*Crucianella angustifolia* L.	Mediterranean								X	X						X			
	272	*Cruciata taurica* (Pallas ex Willd.) Ehrend.	Irano-Turanian								X	X						X			
	273	*Galium paschale* Forsskal	Mediterranean								X	X						X			
	274	*Galium spurium* L. subsp. *spurium*	Euro-Siberia								X							X			
	275	*Sherardia arvensis* L.	Mediterranean								X	X						X			
SANTALACEAE	276	*Osyris alba* L.	Mediterranean								X	X						X			
SCROPHULARIACEAE	277	*Bellardia trixago* (L.) All.	Mediterranean								X	X						X			
	278	***Digitalis trojana* Ivan.**	**Mediterranean**	**X**		**VU**					**X**							**X**			
	279	*Kickxia elatine* (L.) Dumort *subsp. crinita* (Mabille) Greuter	Mediterranean								X							X			
	280	*Linaria pelisseriana* (L.) Miller	Mediterranean								X							X			
	281	*Parentucellia latifolia* (L.) Caruel subsp. *latifolia*	Mediterranean								X							X			
	282	***Verbascum hasbenlii* Aytaç & H. Duman**	**Euro-Siberia**	**X**		**CR**										**X**		**X**			
	283	***Verbascum lydium* Boiss. *var. heterandrum* Murb.**	**Mediterranean**	**X**		**VU**					**X**							**X**			
	284	*Veronica chamaedrys* L.	Euro-Siberia								X	X						X			
	285	*Veronica cymbalaria* Bodard	Mediterranean								X	X						X			
	286	*Veronica hederifolia* L. subsp. *triloba (*Opiz) Celak.	Widespread								X							X			
STYRACACEAE	287	*Styrax officinalis* L.	Widespread								X	X						X			
UMBELLIFERAE/APIACEAE	288	*Anthriscus nemorosa* (Bieb.) Sprengel	Widespread								X							X			
	289	*Caucalis platycarpos* L.	Mediterranean								X		X					X			
	290	*Conium maculatum* L.	Widespread								X	X						X			
	291	*Daucus carota* L.	Widespread															X			
	292	*Eryngium campestre* L. var. *campestre*	Widespread								X							X			
	293	***Ferulago trojana* Akalın & Pimenov**	**Euro-Siberia**	**X**		**VU**						**X**		**X**				**X**			
	294	*Lagoecia cuminoides* L.	Mediterranean								X							X			
	295	*Myrrhoides nodosa* (L.) Cannon	Widespread								X	X						X			
	296	*Oenanthe pimpinelloides* L.	Widespread								X	X						X			
	297	*Oenanthe silaifolia* Bieb.	Widespread								X	X						X			
	298	*Scandix australis* subsp. *grandiflora* (L.) Thell.	Widespread								X							X			
	299	*Torilis arvensis* (Huds.) Link subsp. *elongata* (Hoffmanns. & Link) Cannon	Mediterranean								X							X			
URTICACEAE	300	*Urtica dioica* L.	Widespread								X	X						X			
	301	*Urtica pilulifera* L.	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	1	2	3	4	5
VALERIANACEAE	302	*Valerianella carinata* Lois.	Widespread								X							X			
	303	*Valeriana dioscoridis* Sm	Mediterranean								X	X						X			
VIOLACEAE	304	*Viola sieheana* Becker	Widespread								X	X						X			
	305	*Viola odorata*L.	Widespread								X	X						X			
	306	*Viola occulta* Lehm.	Widespread								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: G1.7: Thermophilous deciduous woodland

2: G3.7: Pinus brutia woodland (Lowland to montane Mediterranean Pinus woodland (excluding Pinus nigra))

3: G3.F: Highly artificial coniferous plantations

4: G3.5: Pinus nigra woodland

5: G1.3: Mediterranean riparian woodland

6: H3.6: Weathered rock and outcrop habitats

4.1.4 Status of Plants in Terms of Threatened Category and Endemism

As a result of the field study, a total of 10 endemic plant species were identified including 6 regional endemics (*Crocus candidus, Digitalis trojana, Verbascum hasbenlii, Verbascum lydium var. heterandrum, Feulago trojana, Cirsium balikesirense)* and 4 widespread endemics (*Centaurea olympica, Campanula lyrata subsp. lyrata, Stachys tmolea, Thymus zygioides var. lycaonicus*). There is no data different from which was identified in the local EIA process for the ETL and access road, and no rare/regional or endangered plant species are present in these locations.

. The regional endemic species *Verbascum hasbenlii*, identified in the Project area, was first introduced to the scientific community in 2012 from Kirazlı[8], situated approximately 12 km southeast of the Project area. As a result, the distribution range of this species remains highly restricted.Other regional endemic species identified in the area are predominantly found in the provinces of Balıkesir and Çanakkale, while the wide-ranging endemic species are generally distributed across similar habitats in the Marmara and Aegean regions.

Taking into account the current population status and the threats faced by *Verbascum hasbenlii*, the species has been classified as "CR" (Critically Endangered)[9] based on its recent identification and the assessments provided by the experts involved in its identification. However, the threatened level of the species has not been officially determined. The species is located in Project AoI. The turbine areas, access roads or ETL route do not contain suitable habitat for the species and therefore there will be no habitat loss for this species due to Project activities.

The other regional endemic species identified within the Project area are distributed in the provinces of Çanakkale and Balıkesir. Given the relatively stable population status in the areas they inhabit, all of these species are categorized under the Turkish Red Data Book (TRDB) List threat level "VU: Vulnerable". The widespread endemic species identified in the Project area, all of which are also distributed across the Marmara and Aegean Regions, are classified as "LC: Least Concern" according to the TRDB List of Threatened Species.(See Table 4-8 and Figure 4-2)

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

Taxon	National Red List Category	Bern	Coordinates
Regional Endemic Species			
Verbascum hasbenlii (Locally endemic)	CR	-	35T 473322N 4447139D 35T 473315N 4447090D 35T 473319N 4447039D
Digitalis trojana	VU	-	35T 473745N 4444369D
Verbascum lydium var. heterandrum	VU	-	35T 473065N 4447197 D
Ferulago trojana	VU	-	35T 473532N 4444519D; 35T 469138N 4446784 D
Crocus candidus	VU	-	35T 468843N 4447190D
Cirsium balikesirense	VU	-	35T 473532N 4444519D

Commented [AF19]: looks like from the figure multiple individuals were found this time. which is good news! Please confirm

Commented [AO20R19]: As the species was observed at three distinct locations in close proximity to one another, the map was prepared accordingly. The coordinates presented in Table 4-8 reflect the central location of these observations, and the table has been revised accordingly.

[8] Aytaç, Z., Duman, H. 2012. Verbascum hasbenlii (Scrophulariaceae), a new species from Turkey. Turk J Bot 36: 322-327.

[9] Aytaç, Z., Duman, H. 2012. Verbascum hasbenlii (Scrophulariaceae), a new species from Turkey. Turk J Bot 36: 322-327.

Widespread Endemic Species			
Centaurea olympica	LC	-	35T 47375N 4444369D; 35T 473349N 4445851D; 35T 468843N 4447190D
Campanula lyrate subsp. Lyrate	LC	-	35T 474709N 4444821D
Stachys tmolea	LC	-	35T 473351N 4446911D
Thymus zygioides var. lycaonicus	LC	-	35T 468843N 4447190D

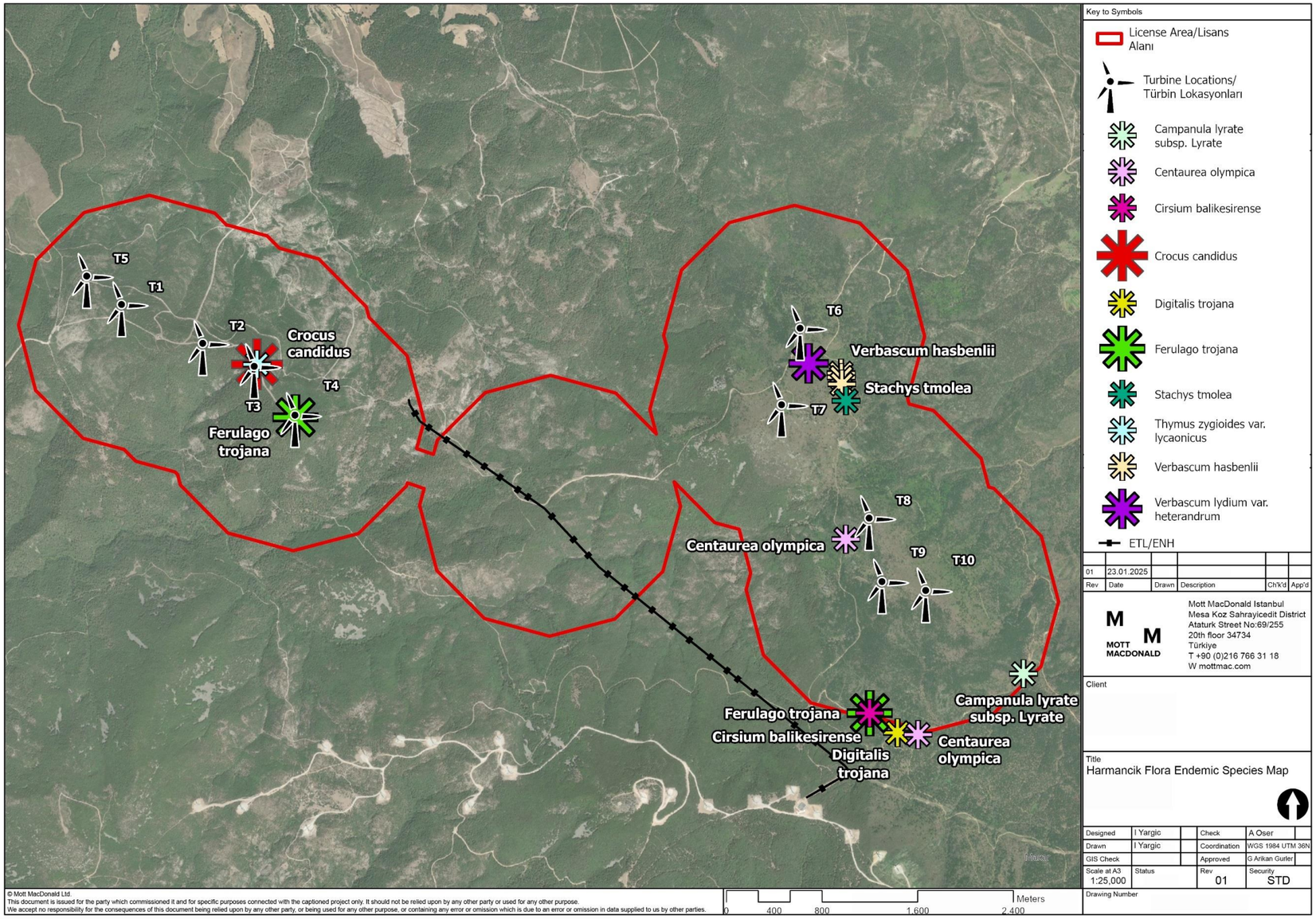

Figure 4-2 Endemic Flora Species Location Map

4.2 Terrestrial Mammal

4.2.1 Biga Mountains and Çanakkale Strait Key Biodiversity Area

The KBA (Key Biodiversity Area) report for the Biga Mountains[10], along with the online databases and resources reviewed, does not provide specific information regarding the presence of mammal species relevant to the KBA in the region.

A portion of the project's access road falls within the boundaries of the Çanakkale Strait KBA[11]; however, no construction activities will be undertaken along these sections, as only the existing roads will be utilized.

Within the Çanakkale Strait KBA, the Mouse-tailed Dormouse (*Myomimus roachi*) is listed as an "other species not triggering KBA criteria." However, this species was not observed during the field surveys and is referenced solely based on literature records.

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, literature reviews, and survey interviews. Among these species, 13 were directly observed during fieldwork, 4 were recorded through surveys, and 12 were identified through a thorough review of existing literature (See 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 II 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 Region, is one of the important mammal species found in the Project area. 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.

Although Mouse-tailed dormouse (*Myomimus roachi*) (VU) was not observed in the field, it was identified as a species which would use the habitat at the Project area (especially the old trees) by the local mammal expert. 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. Considering the vast geographical occurrence of the species and presence of various subspecies and populations, the Mediterranean evaluation is very important for Anatolian populations. According to local mammal expert the species would be expected to occur at the site sporadically. Brown bear has been recorded as literature data.

Commented [AF21]: But *Myomimus roachi* Mouse-tailed Dormouse is one of the species listed on the Cannakale Striait KBA which the access track crosses. That needs to be stated.

Commented [AO22R21]: Added:
“A portion of the project's access road falls within the boundaries of the Çanakkale Strait KBA; however, no construction activities will be undertaken along these sections, as only the existing roads will be utilized.
Within the Çanakkale Strait KBA, the Mouse-tailed Dormouse (*Myomimus roachi*) is listed as an "other species not triggering KBA criteria." However, this species was not observed during the field surveys and is referenced solely based on literature records.”

[10] https://www.keybiodiversityareas.org/site/factsheet/28338
[11] https://www.keybiodiversityareas.org/site/factsheet/28345

Table 4-9 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*	Southern Water Shrew	-	LC	Ann -II	-	-	L
Soricidae	*Crocidura suaveolens*	Lesser White-toothed Shrew	-	LC	Ann -II	-	-	L
Soricidae	*Crocidura leucodon*	Bicolored Shrew	-	LC	Ann -III	-	-	L
Talpidae	*Talpa levantis*	Levantine Mole	-	LC	Ann -III	-	-	L / O
Leporidae	*Lepus europaeus*	European Hare	-	LC	Ann -III	-	-	L / O
Sciuridae	*Sciurus anomalus*	Caucasian Squirrel	-	LC	Ann -III	-	-	L / O
Muridae	*Microtus hartingi*	Harting's Vole	-	LC		-	-	L / O
Muridae	*Microtus mystacinus*	East European vole	-	LC		-	-	L / O
Muridae	*Cricetulus migratorius*	Migratory Hamster	-	LC		-	-	L
Muridae	*Apodemus mystacinus*	Broad-toothed Field Mouse	-	LC		-	-	L / O
Muridae	*Apodemus flavicollis*	Yellow-necked Mouse	-	LC		-	-	L
Muridae	*Apodemus witherbyi*	Steppe Field Mouse	-	LC		-	-	L
Muridae	*Mus domesticus*	House Mouse	-	LC		-	-	L / O
Muridae	*Mus macedonicus*	Macedonian Mouse	-	LC		-	-	L / O
Muridae	*Rattus rattus*	Black Rat	-	LC		-	-	L
Gliridae	*Dryomys nitedula*	Forest Dormouse	-	LC	Ann -III	-	-	L
Gliridae	*Myomimus roachi*	Mouse-tailed Dormouse	-	VU	Ann -II	-	X	L
Canidae	*Canis aureus*	Golden Jackal	-	LC	-	-	-	L / O
Canidae	*Canis lupus*	Grey Wolf	-	LC	Ann -II	Ann -II	-	L

Canidae	*Vulpes vulpes*	Red Fox	-	LC	-	-	-	L / O
Ursidae	*Ursus arctos*	Brown Bear	-	LC	Ann -II	Ann -II	X	L
Mustelidae	*Mustela nivalis*	Least Weasel	-	LC	Ann -III	-	-	L / O
Mustelidae	*Martes foina*	Beech Marten	-	LC	Ann -III	-	-	L
Mustelidae	*Vormela peregusna*	Marbled Polecat	-	VU	Ann -III		X	L
Mustelidae	*Meles meles*	European Badger	-	LC	Ann -III	-	-	L
Felidae	*Felis silvestris*	Wildcat	-	LC	Ann -II	Ann -II	-	L
Suidae	*Sus scrofa*	Boar	-	LC		-	-	L / O
Cervidae	*Capreolus capreolus*	Roe Deer	-	LC	-	-	X	L

4.3 Herpetofauna

4.3.1 Biga Mountains and Çanakkale Strait Key Biodiversity Area

The KBA (Key Biodiversity Area) report for the Biga Mountains, 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.

A portion of the project's access road falls within the boundaries of the Çanakkale Strait KBA[12]; however, no construction activities will be undertaken along these sections, as only the existing roads will be utilized. Within the Çanakkale Strait KBA, the Common tortoise (*Testudo graeca*,) is listed as an "other species not triggering KBA criteria." However, this species was not observed during the field surveys and is referenced solely based on literature records.

4.3.2 Amphibia

The same data as provided in the ESIA regarding amphibia has been obtained. total of 7 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, 3 were directly observed during fieldwork, and 4 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, 4 species are listed in Annex II of the Bern Convention, 3 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 seven species are listed in the annexes.

Permanent aquatic habitats, such as ponds, were not identified within the project boundaries during field surveys. Nonetheless, irrigation channels formed due to intensive agricultural practices were present in adjacent agricultural lands, where the recorded species were observed utilizing these temporary water features.

Commented [AO23]: Due to the absence of permanent water sources within the project area, the observed amphibian species were recorded in irrigation channels formed as a result of agricultural watering activities.

4.3.3 Reptilia

The same data as provided in the ESIA regarding Reptilia has been obtained. A total of 24 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 18 were identified through the 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, 11 species are listed in Annex II of the Bern Convention, 13 species in Annex III. According to the IUCN Red List, no species in the area are classified as endangered.

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

[12] https://www.keybiodiversityareas.org/site/factsheet/28345

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*	Turkish Smooth Newt	-	LC	Ann -II	-	-	L
Salamandridae	*Triturus ivanbureschi*	Balkan-Anatolian Crested Newt	-	LC	Ann -II	-	-	L
Bufonidae	*Bufo bufo*	Common Toad	-	LC	Ann-III	-	-	L / O
Bufonidae	*Bufotes viridis*	European green toad	-	LC	Ann -II	-	-	L / O
Hylidae	*Hyla orientalis*	eastern tree frog	-	LC	Ann -III	-	-	L / O
Pelobatidae	*Pelobates syriacus*	eastern spadefoot	-	LC	Ann -II	-	-	L
Ranidae	*Pelophylax bedriagae*	Levant water frog	-	LC	Ann -III	-	-	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	L
Gekkonidae	*Hemidactylus turcicus*	Mediterranean House Gecko	-	LC	Ann -III	-	-	L
Agamidae	*Stellagama stellio*	Laudakia Stellio	-	LC	Ann -II	-	-	O / L
Anguidae	*Pseudopus apodus*	Sheltopusik	-	LC	Ann -II	-	-	O / L
Scincidae	*Ablepharus kitaibelii*	European Copper Skink	-	LC	Ann -II	-	-	L
Scincidae	*Heremites auratus*	Levant Skink	-	LC	Ann -III	-	-	L
Lacertidae	*Lacerta diplochondrodes*	Rhodos Green Lizard	-	LC	Ann -III	-	-	O / L
Lacertidae	*Lacerta viridis*	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	-	-	L
Colubridae	*Coronella austriaca*	Smooth Snake	-	LC	Ann -III	-	-	L
Colubridae	*Dolichophis caspius*	Caspian Whipsnake	-	LC	Ann -III	-	-	O / L
Colubridae	*Eirenis modestus*	Ring-Headed Dwarf Snake	-	LC	Ann -III	-	-	L
Colubridae	*Elaphe sauromates*	Blotched Snake	-	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 -II	-	-	L
Colubridae	*Platyceps collaris*	Red Whip Snake	-	LC	Ann -III	-	-	L
Colubridae	*Telescopus fallax*	European Cat Snake	-	LC	Ann -II	-	-	L
Colubridae	*Zamenis situla*	European ratsnake	-	LC	Ann -II	-	-	L
Natricidae	*Natrix natrix*	Grass snake	-	LC	Ann -III	-	-	L
Typhlopidae	*Xerotyphlops vermicularis*	European blind snake	-	LC	Ann -III	-	-	L
Viperidae	*Montivipera xanthina*	Ottoman viper	-	LC	Ann -II	-	-	L

Commented [AF24]: listed on the Cannakale Strait KBA citation. needs to be made clearer here. At the moment that KBA is largely overlooked but it is crossed by the access track with at least two new sections of road constructed.

Commented [AO25R24]: Added:
“A portion of the project's access road falls within the boundaries of the Çanakkale Strait KBA; however, no construction activities will be undertaken along these sections, as only the existing roads will be utilized.
Within the Çanakkale Strait KBA, the Common tortoise (*Testudo graeca*,) is listed as an "other species not triggering KBA criteria." However, this species was not observed during the field surveys and is referenced solely based on literature records.”

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.

Commented [AF26]: please provide flightline mapping

Commented [ED27R26]: We have provided FL mapping appendixes for all projects.

Spring

During spring VP surveys, a total of 75 birds were detected at the site (Table 4-12). The most frequently encountered species was the Common Buzzard (*Buteo buteo*), with 34 contacts observed, including 1 migrant and 33 residents. Other notable observations included the Short-toed Snake-Eagle (*Circaetus gallicus*) with 15 contacts, comprised of 4 migrants and 11 residents, and the Eurasian Kestrel (*Falco tinnunculus*), with 7 contacts, 6 of which were residents and 1 of unknown status. Despite the variety of species, no threatened species were recorded during the survey.

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
Common Buzzard	*Buteo buteo*	LC	1	33	-	34
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	4	11	-	15
Eurasian Kestrel	*Falco tinnunculus*	LC	-	6	1	7
Unidentified Falcon	*Falco spec.*	-	-	-	4	4
Eurasian Sparrowhawk	*Accipiter nisus*	LC	2	2	-	4
Black Stork	*Ciconia nigra*	LC	2	-	-	2
Eurasian Griffon Vulture	*Gyps fulvus*	LC	-	2	-	2
Unidentified Raptor	*Accipitridae xx*	-	-	-	2	2
Eleonora’s Falcon	*Falco eleonorae*	LC	-	-	1	1
Hen Harrier	*Circus cyaneus*	LC	-	1	1	2
Black Kite	*Milvus migrans*	LC	-	1	-	1
Levant Sparrowhawk	*Accipiter brevipes*	LC	1	-	-	1
Total	-	-	10	56	9	75

Commented [AF28]: interesting record. The site doesn't seem that suitable. It re-raises my previous question of how migratory vs resident is being determined.

Commented [ED29R28]: Hen Harrier is a non-breeding migrant in Turkey. However, some individuals remain for extended periods of time at staging areas along their migration route. We consider these birds as resident for CRM purposes, as they may spend significant time around the turbines and should be evaluated accordingly. If memory serves right might have previously discussed this either in a comment thread for one of the interim baseline or during the call we had to discuss Interim CHA, but it’s more of a denotation of extended airspace / habitat usage useful for CRM as this data is specifically collected for getting fed into the model. Harriers tend to do this during migration, e.g. in a different study we had a migrant Pallid in Thrace who stopped over the WPP for 2 days, resting and feeding. Got classified as a resident so it would be fed into the model to be considered for “flight duration” as opposed to “number of birds.”

The migration rate was determined to be 0,12 birds per hour for the spring migratory season in 2024.

Among the birds observed, 32 (about 43% of all observed birds) were reported to fly at risk zone (both fly at rotor height and below and 500 m buffer of the Project site) (Table 4-13). 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	-	17	-	17
Eurasian Kestrel	*Falco tinnunculus*	LC	-	4	1	5
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	-	4	-	4
Eleonora's Falcon	*Falco eleonorae*	LC	-	-	1	1
Eurasian Sparrowhawk	*Accipiter nisus*	LC	1	1	-	2
Black Kite	*Milvus migrans*	LC	-	1	-	1

Common Name	Scientific Name	IUCN	Migrant	Resident	Unknown	Total
unidentified Falcon	*Falco spec.*	-	-	-	1	1
Levant Sparrowhawk	*Accipiter brevipes*	LC	1	-	-	1
Total	-	-	2	27	3	32

Figure 4-3 Eurasian Griffon Vulture observed at the project site (photo: Muammer Ülker)

Summer

During summer VP surveys, a total of 44 birds were detected at the site. The most frequently encountered species was the Eleonora's Falcon (*Falco eleonorae*), with 27 contacts observed. No threatened or migrant species were observed during summer VP surveys (Table 4-14)

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
Eleonora's Falcon	Falco eleonorae	LC	-	27	-	27
Common Buzzard	Buteo buteo	LC	-	6	-	6
Short-toed Snake-Eagle	Circaetus gallicus	LC	-	4	-	4
Eurasian Sparrowhawk	Accipiter nisus	LC	-	3	-	3
unidentified Raptor	Accipitridae xx	-	-	-	2	2
Eurasian Kestrel	Falco tinnunculus	LC	-	1	-	1
unidentified Falcon	Falco spec.	-	-	1	-	1
Total	-	-	-	42	2	44

During the summer of 2024, a survey averaging approximately 59 hours and 56 minutes was conducted per vantage point. Over this period, no migrant birds were identified. The migration rate was determined to be 0

Among the birds observed, 20 (about 23% of all observed birds) were reported to fly at risk zone (both fly at rotor height and below and 500 m buffer of the project). The species that most frequently entered the risk zone was Eleonora's Falcon (*Falco eleonorae*). However, these numbers do not represent unique birds and contain multiple reports of the same bird for residents. (Table 4-15).

Table 4-15 Resident and migrant bird occurrences at risk zone in summer 2024

Common Name	Scientific Name	IUCN	Migrant	Resident	Unknown	Total
Eleonora's Falcon	*Falco eleonorae*	LC	-	16	-	16
Eurasian Sparrowhawk	*Accipiter nisus*	LC	-	1	-	1
unidentified Falcon	*Falco spec.*	-	-	1	-	1
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	-	1	-	1
Common Buzzard	*Buteo buteo*	LC	-	1	-	1
Total	-	-	-	**20**	-	**20**

Autumn

During autumn VP surveys, a total of 109 birds were detected at the site . The most frequently encountered species was the Eurasian Sparrowhawk (*Accipiter nisus*), with 30 contacts observed. Other notable observations included the Common Buzzard (*Buteo buteo*) and European Honey-buzzard (*Pernis apivorus*) with 28 and 24 contacts, respectively. Red-footed Falcon, listed VU-Vulnerable in IUCN Red List, was observed during autumn VP surveys (Table 4-16).

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
Eurasian Sparrowhawk	*Accipiter nisus*	LC	25	2	3	30
European Honey-buzzard	*Pernis apivorus*	LC	24	-	-	24
Common Buzzard	*Buteo buteo*	LC	22	5	1	28
Eurasian Marsh-Harrier	*Circus aeruginosus*	LC	7	-	-	7
Booted Eagle	*Hieraaetus pennatus*	LC	3	-	-	3
unidentified Raptor	*Accipitridae xx*	-	2	-	3	5
Red-footed Falcon	*Falco vespertinus*	VU	2	-	-	2
Eurasian Kestrel	*Falco tinnunculus*	LC	-	-	2	2
Lesser Spotted Eagle	*Clanga pomarina*	LC	2	-	-	2
Eleonora's Falcon	*Falco eleonorae*	LC	1	-	-	1
Osprey	*Pandion haliaetus*	LC	1	-	-	1
Hen Harrier	*Circus cyaneus*	LC	1	-	-	1
Black Kite	*Milvus migrans*	LC	1	-	-	1
unidentified Falcon	*Falco spec.*	-	1	-	-	1
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	1	-	-	1
Total	-	-	93	7	9	109

During the autumn of 2024, a survey averaging approximately 81 hours and 4 minutes was conducted per vantage point. Over this period, 93 birds were identified as migrant. The migration rate was determined to be 1,15 birds per hour for the autumn season.

Among the birds observed, 32 (about 29% of all observed birds) were reported to fly at risk zone (both fly at rotor height and below and 500 m buffer of the project site). The species that most frequently entered the risk zone was Eurasian Sparrowhawk (*Accipiter nisus*). However, these numbers do not represent unique birds and contain multiple reports of the same bird for residents (Table 4-17).

Table 4-17 Resident and migrant bird occurrences at risk zone in autumn 2024

Common Name	Scientific Name	IUCN	Migrant	Resident	Unknown	Total
Eurasian Sparrowhawk	*Accipiter nisus*	LC	8	1	1	10
Common Buzzard	*Buteo buteo*	LC	7	3	1	11
European Honey-buzzard	*Pernis apivorus*	LC	5	-	-	5
unidentified Raptor	*Accipitridae xx*	-	-	-	2	2
Eleonora's Falcon	*Falco eleonorae*	LC	1	-	-	1
Hen Harrier	*Circus cyaneus*	LC	1	-	-	1
Eurasian Kestrel	*Falco tinnunculus*	LC	-	-	1	1
Booted Eagle	*Hieraaetus pennatus*	LC	1	-	-	1
Total	-	-	23	4	5	32

Figure 4-4 European Honey Buzzard observed at the project (photo: Muammer Ülker)

4.4.2 ETL Observations

During the spring 2024 surveys at VP ETL points, a total of 22 birds were detected across various species (Table 4-18). Out of these, 8 birds, which account for approximately 36% 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 Snake-Eagle (*Circaetus*

gallicus), with 10 individuals detected and 1 of them flying at risk height. Another notable species includes the Common Buzzard (*Buteo buteo*) with 9 individuals observed, 6 of which were at risk height.

The most frequently encountered species was Common Raven (*Corvus corax*), a non-target species not in conservation concern.

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

Common Name	Scientific Name	IUCN	Status	VP ETL1	VP ETL2	Total
Common Buzzard	*Buteo buteo*	LC	Resident	3	3	6
unidentified Falcon	*Falco spec.*	LC	Resident	1	-	1
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	Resident	-	1	1
Total	-	-		4	4	8

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

Summer

During the summer 2024 surveys at TL points, a total of 11 birds were detected across various species. Out of these, 4 birds, which account for approximately 36% of the total, were observed flying at the height of the transmission lines, placing them at potential risk of collision (Table 4-19).

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

Common Name	Scientific Name	IUCN	Status	VP ETL1	VP ETL2	Total
Eleonora's Falcon	*Falco eleonorae*	Resident	LC	1	-	1
European Honey-buzzard	*Pernis apivorus*	Migrant	LC	1	-	1
Eurasian Hobby	*Falco subbuteo*	Resident	LC	1	-	1
Common Buzzard	*Buteo buteo*	Resident	LC	-	1	1
Total	-		-	3	1	4

Autumn

During the autumn 2024 surveys at TL points, a total of 47 birds were detected across various species. Out of these, 11 birds, which account for approximately 23% 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 were the Eurasian Sparrowhawk (*Accipiter nisus*) and Common Buzzard (*Buteo buteo*), with 25 individuals detected and 8 of them flying at risk height and 12 individuals detected and 3 of them flying at risk height, respectively (Table 4-20).

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

Common Name	Scientific Name	IUCN	Status	VP ETL1	VP ETL2	Total
Common Buzzard	*Buteo buteo*	LC	Resident	6	2	8
Eurasian Sparrowhawk	*Accipiter nisus*	LC	Resident	1	2	3
Total	-	-		7	4	11

Summary

Based on the surveys conducted in spring, summer, and autumn 2024 at the transmission line points, the overall risk of bird collision with the ETL appears low (Figure 4-5). Across all seasons, a total of 80 birds were detected, with 23 birds (approximately 29%) observed flying at the height of the transmission lines, placing them at potential risk of collision. However, this is a relatively small proportion of the total bird sightings (Table 4-21).

Table 4-21 Total number of bird species observed across all VP ETL surveys

Common Name	Scientific Name	IUCN	VPTL1	VP ETL2	Total
Common Buzzard	*Buteo buteo*	LC	14	22	36
Eurasian Sparrowhawk	*Accipiter nisus*	LC	3	11	14
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	-	10	10
Eleonora's Falcon	*Falco eleonorae*	LC	1	5	6
European Honey-buzzard	*Pernis apivorus*	LC	1	4	5
Unidentified Raptor	*Accipiter xx*	-	3	-	3
Eurasian Hobby	*Falco subbuteo*	LC	2	-	2
Black Kite	*Milvus migrans*	LC	-	1	1
Booted Eagle	*Hieraaetus pennatus*	LC	-	1	1
Eurasian Marsh-Harrier	*Circus aeruginosus*	LC	-	1	1
Unidentified Falcon	*Falco sp.*	-	1	-	1
Total	-	-	25	55	80

While certain species, such as the Common Buzzard, were frequently observed at risk height, the total number of birds at risk remains relatively low across all seasons. Therefore, based on the data collected from the surveys, the risk of collision with the Energy Transmission Lines is minimal, suggesting that the transmission lines do not pose a significant threat to bird populations. (Table 4-22)

Table 4-22 Risk quantification values of each VP ETL point based on passage rates

Season	VP ETL1	VP ETL2
Spring	0.10	0.10
Summer	0.13	0.08
Autumn	0.12	0.05
Average	0.12	0.08

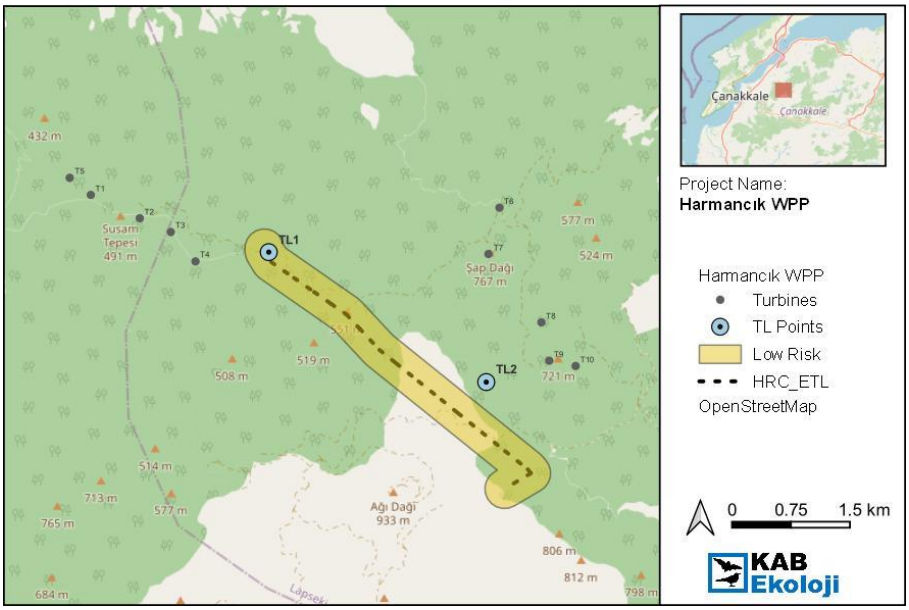

Figure 4-5 ETL segment risk assessment

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.[13][14][15]

Commented [ED30]: Adam please see detailed explanation about your daylight hours question with additional references reflected in the text. I hope that this clarifies there was not an error and the hours used were a deliberate choice to improve prediction. Please also note that modulating the daylight hours as needed in the future depending on project needs would be a matter of simple ratios (e.g. if the 10 hour results need be modulated to 12 hours, multiply all by 1.2 etc.) Any amount of daylight hours can be accounted for in this manner and does not involve complex modelling or any more information than already contained in this report.

Spring

Sample collision risk calculation for migrant species is shown in Table 4-23. Calculation for all migrant species with risk above 0 is shown on Table 4-24.

Table 4-23 Mortality rate calculation for migrant species in detail (spring)

Variable	Value	Unit
Species	Eurasian Sparrowhawk	
Recorded number of birds at risk height/zone	1	birds
Duration of observation	83.66	hr/VP
Study Period	2024-03-01	
	2024-06-15	
Total migration hours	1070	hr
Estimated number of birds at risk height/zone (n)	12.79	birds
N	10	
width	7857	m
height	180	m
W	1414260	m2
A	150874.7	m2
A/W	0.11	%
n x (A/W)	1.36	birds
P. Probability of bird being hit when flying through the rotor	0.08	
Mortality rate without avoidance	0.11	birds
(1 - avoidance rate)	0.02	
Mortality estimation per year	0.00	birds

Table 4-24 The estimated mortality rates of migrant species in spring 2024 (mort. w/o avo.: mortality without avoidance, mort. w/ avo.: mortality with avoidance)

Common Name	observed	# observed	# thru rotors	Mort. w/o avo.	Mort. w/ avo.
Eurasian Sparrowhawk	1	12.79	1.36	0.11	0.00
Levant Sparrowhawk	1	12.79	1.36	0.12	0.00
Total	2	25.58	2.73	0.23	0.00

[13] 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.

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

[15] 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 resident species with risk above 0 is shown on Table 4-26.

Table 4-25 Mortality rate calculation for resident species in detail (spring)

Variable	Value	Unit
Species	Common Buzzard	
Total duration of individual bird observations	525.73	sec
Total duration of observations	83.66	hr/VP
Study Period	2024-03-01	
	2024-06-15	
Total migration hours	1284	hr
Estimated total birds x seconds	8069.05	bird x sec
N	10	
Area	5572110	m2
height	180	m
Vw	1002979800	m3
Sweeping Area	150874.7	m2
r	69.3	m
d	4	m
L	0.58	m
Vr = N x πR2 x (d + l)	690251.6	m3
n	8069.05	sec
n x (Vr / Vw)	5.55	sec
v	11.6	m/s
t = (d + l) / v	0.39	sec
n x (Vr / Vw) / t	14.08	birds
Probability of bird being hit when flying through the rotor	0.09	
Mortality rate without avoidance	1.32	birds
(1 - avoidance rate)	0.02	
Mortality estimation for study period	0.03	birds

Commented [AF31]: why is this different to the figure above for sparrowhawk? Surely its the available daylight hours within the survey period which is the same for both of these species in spring.

Commented [AF32R31]: same comment throughout these tables.

Commented [ED33R31]: Highest case of daylight hours in the 9 WPP projects for a season, results from expanded season for spring and 12 hour assumption for residents

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	526	8069	6	14	1.32	0.03
Short-toed Snake-Eagle	228	3506	2	7	0.61	0.01
Eurasian Kestrel	90	1376	1	2	0.19	0.00
Eurasian Sparrowhawk	15	230	0	0	0.03	0.00
Black Kite	1	22	0	0	0.00	0.00
Total	860	13203	9	24	2.17	0.04

Summer

The mortality rate for migrant species was not calculated as no migrants at risk zone were observed during summer.

Commented [AF34]: empty table

Commented [ED35R34]: We provided zero tables for consistency so that it does not appear that we did not calculate, it was that none were seen during the period as also pointed out in the text here. However seeing as that too may cause confusion, I'll be removing the zero tables. Revised.

Sample collision risk calculation for resident 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 resident species in detail (summer).

Variable	Value	Unit
Species	Eleonora's Falcon	
Total duration of individual bird observations	344.93	sec
Total duration of observations	50.51	hr/VP
Study Period	2024-06-16	
	2024-08-18	
Total migration hours	768	hr
Estimated total birds x seconds	5244.8	bird x sec
N	10	
Area	5572110	m2
height	180	m
Vw	1002979800	m3
Sweeping Area	150874.7	m2
r	69.3	m
d	4	m
L	0.39	m
Vr = N x πR2 x (d + l)	662339.8	m3
n	5244.8	sec
n x (Vr / Vw)	3.46	sec
v	12.8	m/s
t = (d + l) / v	0.34	sec
n x (Vr / Vw) / t	10.1	birds
Probability of bird being hit when flying through the rotor	0.08	
Mortality rate without avoidance	0.78	birds
(1 - avoidance rate)	0.02	
Mortality estimation for study period	0.02	birds

Commented [AF36]: why so much lower than spring. Was the summer period really that much shorter than the spring survey period?

Commented [ED37R36]: Please see the daylight and date cutoff clarifications, for spring and autumn dates are assumed different

Table 4-28: 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.
Eleonora's Falcon	345	5245	3	10	0.78	0.02
Common Buzzard	41	621	0	1	0.10	0.00
Short-toed Snake-Eagle	27	409	0	1	0.07	0.00
Eurasian Sparrowhawk	3	52	0	0	0.01	0.00
unidentified Falcon	2	38	0	0	0.01	0.00
Total	419	6365	4	12	0.96	0.02

Autumn

Sample collision risk calculation for migrant 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 migrant species in detail (Autumn).

Variable	Value	Unit
Species	Eurasian Sparrowhawk	
Recorded number of birds at risk height/zone	8	birds
Duration of observation	81.07	hr/VP
Study Period	2024-08-19	
	2024-11-15	
Total migration hours	890	hr
Estimated number of birds at risk height/zone (n)	87.83	birds
N	10	
width	7857	m
height	180	m
W	1414260	m2
A	150874.7	m2
A/W	0.11	%
n x (A/W)	9.37	birds
P. Probability of bird being hit when flying through the rotor	0.08	
Mortality rate without avoidance	0.79	birds
(1 - avoidance rate)	0.02	
Mortality estimation per year	0.02	birds

Table 4-30: 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.
Eurasian Sparrowhawk	8	87.83	9.37	0.79	0.02
Common Buzzard	7	76.85	8.2	0.77	0.02
European Honey-buzzard	5	54.89	5.86	0.51	0.01
Booted Eagle	1	10.98	1.17	0.11	0.00
Eleonora's Falcon	1	10.98	1.17	0.09	0.00
Others	1	10.98	1.17	0.13	0.00
Total	23	252.51	26.94	2.40	0.05

Sample collision risk calculation for resident 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 resident species in detail (Autumn).

Variable	Value	Unit
Species	Common Buzzard	
Total duration of individual bird observations	45.22	sec
Total duration of observations	81.07	hr/VP
Study Period	2024-08-19	
	2024-11-15	

Variable	Value	Unit
Total migration hours	1068	hr
Estimated total birds x seconds	595.76	bird x sec
N	10	
Area	5572110	m2
height	180	m
Vw	1002979800	m3
Sweeping Area	150874.7	m2
r	69.3	m
d	4	m
L	0.58	m
Vr = N x πR2 x (d + l)	690251.6	m3
n	595.76	sec
n x (Vr / Vw)	0.41	sec
v	11.6	m/s
t = (d + l) / v	0.39	sec
n x (Vr / Vw) / t	1.04	birds
Probability of bird being hit when flying through the rotor	0.09	
Mortality rate without avoidance	0.10	birds
(1 - avoidance rate)	0.02	
Mortality estimation for study period	0.00	birds

Table 4-32: 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.
Common Buzzard	45	596	0	1	0.10	0.00
Eurasian Sparrowhawk	24	317	0	1	0.05	0.00
Total	69	912	1	2	0.14	0.00

4.4.4 Additive Collision Risk (Project Galeforce)

Since each WPP within the financial package is a subproject 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 subproject 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 subproject’s Chapter 17 was based on Gauld et al (2022) study[16] 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 subproject 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 subprojects 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 4-33. The results demonstrate that baseline risk over the study period was

[16] 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. Subprojects 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 subprojects 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 subprojects.

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 subproject. 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 4-33: Collision risk summary for Project Galeforce and each of its subprojects as calculated in 2024

Subproject	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 comprehensive data table summarizing the project specific collision risk estimations from the data is presented in Table 4-34.

Table 4-34 Additive Collision Risk Assessment summary for Project Galeforce

Common Name	Subproject	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 51 bird species. Among these, 34 species have a breeding code higher than 0, indicating active breeding. The most common species observed were the Common Chaffinch (*Fringilla coelebs*), European Serin (*Serinus serinus*), and Eurasian Blue Tit (*Cyanistes caeruleus*). Additionally, species observed during breeding bird surveys which are not breeding were included (denoted -) All species are listed in Table 4-35.

Commented [AF38]: no eleanoras falcon despite it being commonly seen on VPs. There must be nests somewhere near the site

Commented [ED39R38]: Eleonora's Falcon nest almost exclusively on small islands in the Aegean Sea, in Greek waters. There are hardly any permanent colony in Turkey. Nothing I'm aware of within the AOI or even EAAA. These are non-breeding residents in spring and summer as also noted in other projects where you commented for the species.

Table 4-35 List of species encountered during breeding bird surveys and highest number recorded each month (X: observed but not counted).

Common Name	Scientific Name	IUCN	Code	Mar	Apr	May	Jun
Common Wood-Pigeon	*Columba palumbus*	LC	B3	X	2	-	7
European Turtle-Dove	*Streptopelia turtur*	VU	-	-	-	-	2
Common Cuckoo	*Cuculus canorus*	LC	A2	X	1	-	-
Alpine Swift	*Tachymarptis melba*	LC	-	X	-	-	-
Black Stork	*Ciconia nigra*	LC	-	X	-	-	-
Short-toed Snake-Eagle	*Circaetus gallicus*	LC	B3	X	-	-	5
Levant Sparrowhawk	*Tachyspiza brevipes*	LC	-	-	X	-	-
Eurasian Sparrowhawk	*Accipiter nisus*	LC	-	X	-	-	-
Common Buzzard	*Buteo buteo*	LC	A1	X	-	-	3
Eurasian Hoopoe	*Upupa epops*	LC	-	X	X	-	X
European Bee-eater	*Merops apiaster*	LC	-	-	-	-	X
Middle Spotted Woodpecker	*Dendrocoptes medius*	LC	-	-	-	-	X
Great Spotted Woodpecker	*Dendrocopos major*	LC	A1	-	1	-	-
Syrian Woodpecker	*Dendrocopos syriacus*	LC	-	-	-	-	X
Eurasian Green Woodpecker	*Picus viridis*	LC	-	-	-	-	1
Eurasian Kestrel	*Falco tinnunculus*	LC	-	X	X	-	X
Eurasian Hobby	*Falco subbuteo*	LC	-	-	-	-	X
Eurasian Golden Oriole	*Oriolus oriolus*	LC	-	-	-	-	X
Eurasian Jay	*Garrulus glandarius*	LC	B3	X	6	-	9
Common Raven	*Corvus corax*	LC	B3	X	4	-	4
Coal Tit	*Periparus ater*	LC	A2	X	5	-	5
Eurasian Blue Tit	*Cyanistes caeruleus*	LC	C16	X	6	X	5
Great Tit	*Parus major*	LC	C12	X	5	X	5
Wood Lark	*Lullula arborea*	LC	C16	X	3	-	1
Barn Swallow	*Hirundo rustica*	LC	-	-	6	-	-
European red-rumped Swallow	*Cecropis rufula*	LC	B3	X	2	-	2
Common Chiffchaff	*Phylloscopus collybita*	LC	B3	X	7	-	7
Long-tailed Tit	*Aegithalos caudatus*	LC	C12	X	10	X	8
Eurasian Blackcap	*Sylvia atricapilla*	LC	A2	-	1	-	1
Lesser Whitethroat	*Curruca curruca*	LC	A2	-	2	-	-
Sardinian Warbler	*Curruca melanocephala*	LC	C14	X	2	-	2
Eastern Subalpine Warbler	*Curruca cantillans*	LC	C12	-	3	-	4
Greater Whitethroat	*Curruca communis*	LC	A2	-	X	X	-
Krüper's Nuthatch	*Sitta krueperi*	LC	A1	X	4	-	6
Eurasian Nuthatch	*Sitta europaea*	LC	B3	-	-	-	2
Short-toed Treecreeper	*Certhia brachydactyla*	LC	A2	X	3	-	3

Common Name	Scientific Name	IUCN	Code	Mar	Apr	May	Jun
Eurasian Wren	*Troglodytes troglodytes*	LC	A2	-	5	-	3
Mistle Thrush	*Turdus viscivorus*	LC	A2	-	4	X	-
Song Thrush	*Turdus philomelos*	LC	A1	-	2	-	-
Eurasian Blackbird	*Turdus merula*	LC	A2	X	8	X	3
Spotted Flycatcher	*Muscicapa striata*	LC	-	-	-	-	X
European Robin	*Erithacus rubecula*	LC	A2	X	13	X	11
Black Redstart	*Phoenicurus ochruros*	LC	A1	X	1	-	-
House Sparrow	*Passer domesticus*	LC	-	X	-	-	-
Common Chaffinch	*Fringilla coelebs*	LC	C13	X	20	X	15
Hawfinch	*Coccothraustes coccothraustes*	LC	A2	-	-	-	1
European Greenfinch	*Chloris chloris*	LC	A2	X	4	-	2
Eurasian Linnet	*Linaria cannabina*	LC	-	-	-	-	3
European Goldfinch	*Carduelis carduelis*	LC	C12	X	6	-	10
European Serin	*Serinus serinus*	LC	B3	X	11	-	11
Cirl Bunting	*Emberiza cirlus*	LC	A2	X	3	-	2

4.5 Bat

Spring

Based on Auto-ID results, a total of 63,032 recordings were made. 7,938 recordings, or 12.60%, identified as bat recordings in spring. Noise accounted for the majority of the recordings (87.41%), with an average nightly noise percentage ranging from 58.12% to 97.61%. Nights 5, 7, and 9 were selected for manual species identification. A summary is shown on Table 4-36.

Table 4-36 Number of bat recordings and noise recorded each night based on Auto-ID in spring.

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
1	6	187	7584	7771	97.59%	
2	6	380	7693	8073	95.29%	
3	6	233	9521	9754	97.61%	
4	6	288	6611	6899	95.83%	
5	6	760	5722	6482	88.28%	Manual_ID
6	6	659	6015	6674	90.13%	
7	6	2466	4086	6552	62.36%	Manual_ID
8	6	787	2344	3131	74.86%	
9	6	1267	988	2255	43.81%	Manual_ID
10	6	671	3276	3947	83.00%	
11	6	191	1186	1377	86.13%	
12	6	49	68	117	58.12%	
Total	-	7938	55094	63032	87.41%	-

Table 4-37 presents the distribution of bat recordings across six SPs based on Auto-ID results. SP03 had the highest average recordings, accounting for 42.53% of all detections, followed by SP06 and SP01. Night 7 recorded the highest bat activity (2466), 18.8 times the average value, showing the highest potential of the site. Failures of the recorders are indicated by blank cells in the table.

Table 4-37 Distribution of bat recordings across SPs by night based on Auto-ID results in spring

Night	SP01	SP02	SP03	SP04	SP05	SP06	Total
1	7	4	66	29	5	76	187
2	46	12	129	43	12	138	380
3	13	5	48	25	25	117	233
4	21	2	34	14	13	204	288
5	145	63	310	87	48	107	760
6	28	11	188	61	155	216	659
7	542	110	753	352	349	360	2466
8	253		303	125	106		787
9	332		699	125	111		1267
10	63		349	93	166		671
11	8		73	62	48		191
12			0	0	49		49
Average	133	30	268	92	91	174	131
Average_corrected	115	26	231	79	79	150	113

Table 4-38 and Table 4-39 summarizes the results of the Manual-ID analysis of bat recordings for the selected nights (5, 7, and 9), yielding a total of 2,946 recordings across six SPs over three nights. Overall, the number of recordings identified through Manual-ID closely aligns with those identified through Auto-ID, with a difference of approximately 5%. However, in some instances, noise was misclassified as bat calls by one detector, widening the discrepancy. Ultimately, the total number of bat recordings identified through Manual-ID corresponds to 86.33% of the total results from Auto-ID for the surveyed period.

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

Night	Method	SP01	SP02	SP03	SP04	SP05	SP06	Total
5	Auto ID	0	63	310	87	48	107	615
7	Auto ID	542	110	753	352	349	360	2466
9	Auto ID	332	0	0	0	0	0	332
Total	Auto ID	874	173	1063	439	397	467	3413

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

Night	Method	SP01	SP02	SP03	SP04	SP05	SP06	Total
5	Manual ID	0	61	318	85	45	73	582
7	Manual ID	576	124	635	368	289	29	2021
9	Manual ID	343	0	0	0	0	0	343
Total	Manual ID	919	185	953	453	334	102	2946

The Auto ID of the sounds at all nights shows the most common species was Common Pipistrelle *(Pipistrellus pipistrellus)* with 54.03% recordings and with 78.04% recordings when non-id species are distributed evenly (Table 4-40). Remarkably, the second most common species is Schreiber's Bent-winged Bat, Vulnerable (VU), *(Miniopterus schreibersii),* with 4.67% recordings and with 6.75% recordings when non-id species are distributed evenly. Two species listed as vulnerable (VU), Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) and Giant Noctule (*Nyctalus lasiopterus*), were recorded.

The software failed to identify more than 30.76% of the recordings.

Table 4-40 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	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	1246	100	1808	449	442	244	4289	54.03%	78.04%
Pipistrelloid	MINSCH	VU	30	37	178	33	68	25	371	4.67%	6.75%
Pipistrelloid	PIPKUH	LC	32	6	29	23	29	30	149	1.88%	2.71%
Pipistrelloid	PIPPYG	LC	3	0	14	1	7	33	58	0.73%	1.06%
Pipistrelloid	HYPSAV	LC	2	2	22	6	4	1	37	0.47%	0.67%
Pipistrelloid	PIPNAT	LC	0	0	5	0	4	0	9	0.11%	0.16%
Nyctaloid	EPTSER	LC	7	9	224	35	44	11	330	4.16%	6.00%
Nyctaloid	NYCLEI	LC	14	0	6	12	7	3	42	0.53%	0.76%

Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	Total	Percent	Percent_2
Nyctaloid	VESMUR	LC	4	0	3	0	0	1	8	0.10%	0.15%
Nyctaloid	NYCLAS	VU	1	2	0	1	1	0	5	0.06%	0.09%
Nyctaloid	NYCNOC	LC	0	0	1	2	2	0	5	0.06%	0.09%
Tadarida	TADTEN	LC	0	3	0	1	2	0	6	0.08%	0.11%
Plecotus	PLESPE	NA	0	0	7	1	0	0	8	0.10%	0.15%
Myotis	MYOSPE	NA	8	0	8	16	20	23	75	0.94%	1.36%
Rhinolophus	RHIFER	NT (E,M)	0	0	11	85	3	0	99	1.25%	1.80%
Rhinolophus	RHIHIP	NT (E,M)	0	0	0	1	0	4	5	0.06%	0.09%
-	NoID	-	111	48	636	350	454	843	2442	30.76%	
Total	-	-	1458	207	2952	1016	1087	1218	7938	-	-

When checking the Manual ID species of 2,946 records in total, we can see some differences compared to the Auto ID data (Table 4-41). Firstly, the most common species, Common Pipistrelle *(Pipistrellus pipistrellus)*, accounted for 66.87% of the manually identified records, which is higher than the 54.03% in the Auto ID results. Secondly, Schreiber's Bent-winged Bat *(Miniopterus schreibersii)* appeared more frequently in the manual ID data (12.19%) than in the Auto ID results (4.67%). Lastly, Serotine (*Eptesicus serotinus*) showed 3.63% of the manually identified records, which is less than its proportion (4.16%) in the Auto ID data.

Table 4-41 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	Total	Percent
Pipistrelloid	PIPPIP	LC	800	86	580	247	206	51	1970	66.87%
Pipistrelloid	MINSCH	VU	29	78	110	31	77	34	359	12.19%
Pipistrelloid	PIPKUH/PIPNAT	-	44	9	31	22	4	0	110	3.73%
Pipistrelloid	HYPSAV	LC	1	1	12	5	1	0	20	0.68%
Pipistrelloid	PIPPYG	LC	0	0	2	1	3	0	6	0.20%
Nyctaloid	EPTSER	LC	4	3	80	9	10	1	107	3.63%
Nyctaloid	NYCLEI	LC	33	2	7	15	1	1	59	2.00%
Nyctaloid	NYCNOC	LC	0	0	0	2	0	0	2	0.07%
Plecotus	PLESPE	NA	0	0	4	5	1	0	10	0.34%
Myotis	MYOSPE	NA	6	6	79	10	14	11	126	4.28%
Rhinolophus	RHIFER	NT (E,M)	2	0	43	106	11	0	162	5.50%
Rhinolophus	RHIHIP	NT (E,M)	0	0	0	0	0	4	4	0.14%
Rhinolophus	RHIBLA	VU (E)	0	0	0	0	1	0	1	0.03%
Barbastella	BARBAR	VU (E)	0	0	5	0	5	0	10	0.34%

Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	Total	Percent
Total	-	-	919	185	953	453	334	102	2946	-

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 illustrates the activity patterns of these selected species throughout the night during the spring season, spanning from 21:00 to 05:00.

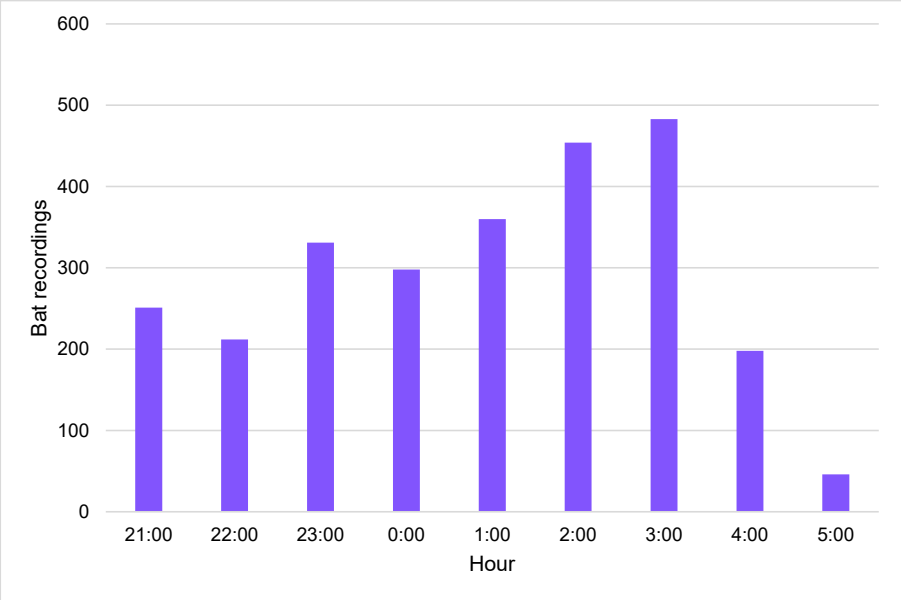

Figure 4-6 Hourly distribution of bat recordings through the night in spring

Summer

Based on Auto-ID results, a total of 30,186 recordings were made (Table 4-42). 5,231 recordings, or 17.3%, identified as bat recordings in summer. Noise accounted for the majority of the recordings 82.67%, with an average nightly noise percentage ranging from 20.20% to 97.01%.

Nights 1 and 3 were selected for manual species identification.

Table 4-42 Number of bat recordings and noise recorded each night based on Auto-ID in summer

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
1	6	1472	3030	4502	67.30%	Manual_ID
2	6	957	3676	4633	79.34%	
3	6	345	5435	5780	94.03%	Manual_ID
4	6	719	3382	4101	82.47%	
5	6	125	4058	4183	97.01%	

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
6	6	161	786	947	83.00%	
7	6	197	1612	1809	89.11%	
8	6	253	1097	1350	81.26%	
9	6	391	99	490	20.20%	
10	6	239	242	481	50.31%	
11	6	167	1311	1478	88.70%	
12	6	205	227	432	52.55%	
Total	-	5231	24955	30186	82.67%	

Table 4-43 presents the distribution of bat recordings across three SPs based on Auto-ID results. SP04 had the highest average recordings, followed by SP06 and SP05. Night 1 recorded the highest bat activity with 1472 recordings, showing the highest potential of the site. Failures of the recorders are indicated by blank cells in the table.

*Please note that during the summer bat surveys, three bat recorders were stolen, resulting in the loss of data from SP01, SP02, and SP03 (indicated by “x” in the table) .

Table 4-43 Distribution of bat recordings across SPs by night based on Auto-ID results in summer

Night	SP01	SP02	SP03	SP04	SP05	SP06	Total
1	x	x	x	746	148	578	1472
2	x	x	x	559	51	347	957
3	x	x	x	182	21	142	345
4	x	x	x	429	52	238	719
5	x	x	x	19	8	98	125
6	x	x	x		93	68	161
7	x	x	x		37	160	197
8	x	x	x		137	116	253
9	x	x	x		391		391
10	x	x	x		239		239
11	x	x	x		167		167
12	x	x	x		205		205
Average				387	129	218	245
Average_corrected				349	116	197	221

X=Stolen devices.

Table 4-44 and Table 4-45 summarizes the results of the Manual-ID analysis of bat recordings for the selected nights, yielding a total of 1640 recordings across 3 SPs over two nights. Overall, the number of recordings identified through Manual-ID closely aligns with those identified through Auto-ID, with a difference of approximately 5%. However, in some instances, noise was misclassified as bat calls by one detector, widening the discrepancy. Ultimately, the total number of bat recordings identified through Manual-ID corresponds to 90.2% of the total results from Auto-ID for the season.

Table 4-44 Distribution of bat recordings across SPs by selected nights based on Manual-ID results in summer

Night	Method	SP01, 02, 03	SP04	SP05	SP06	Total
1	Manual ID	x	645	130	553	1328
3	Manual ID	x	157	16	139	312
Total	Manual ID	x	802	146	692	1640

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

Night	Method	SP01, 02, 03	SP04	SP05	SP06	Total
1	Auto ID	x	746	148	578	1472
3	Auto ID	x	182	21	142	345
Total	Auto ID	x	928	169	720	1817

The Auto-ID of the sounds at all nights shows the most common species was Common Pipistrelle (*Pipistrellus pipistrellus*) with 66.37% of recordings and 89.25% of recordings when non-ID species are distributed evenly (Table 4-46). Again, the second most common species is Schreiber's Bent-winged Bat, Vulnerable (VU), (*Miniopterus schreibersii*) with 3.21% of recordings and 4.32% of recordings when non-ID species are distributed evenly.

Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) and Giant Noctule (*Nyctalus lasiopterus*) are the vulnerable species (VU) which is detected at the site.

The software failed to identify more than 25.64% of the recordings.

Table 4-46 Bat groups and species recorded during selected nights at each SP based on Auto-ID in summer

Group	Species	IUCN	SP01,2,3	SP04	SP05	SP06	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	X	1139	1166	1167	3472	66.37%	89.25%
Pipistrelloid	MINSCH	VU	X	46	76	46	168	3.21%	4.32%
Pipistrelloid	PIPKUH	LC	X	14	25	10	49	0.94%	1.26%
Pipistrelloid	HYPSAV	LC	X	3	17	8	28	0.54%	0.72%
Pipistrelloid	PIPPYG	LC	X	9	1	0	10	0.19%	0.26%
Pipistrelloid	PIPNAT	LC	X	0	2	2	4	0.08%	0.10%
Nyctaloid	NYCLEI	LC	X	5	13	9	27	0.52%	0.69%
Nyctaloid	NYCNOC	LC	X	4	17	1	22	0.42%	0.57%
Nyctaloid	VESMUR	LC	X	1	3	10	14	0.27%	0.36%
Nyctaloid	EPTSER	LC	X	6	0	4	10	0.19%	0.26%
Nyctaloid	NYCLAS	VU	X	0	2	5	7	0.13%	0.18%
Tadarida	TADTEN	LC	X	0	3	1	4	0.08%	0.10%
Plecotus	PLESPE	NA	X	0	2	13	15	0.29%	0.39%
Myotis	MYOSPE	NA	X	14	2	7	23	0.44%	0.59%
Rhinolophus	RHIHIP	NT (E,M)	X	1	0	0	1	0.02%	0.03%
Barbastella	BARBAR	VU (E)	X	28	1	7	36	0.69%	0.93%
	NoID		X	665	219	457	1341	25.64%	
Total	-	-	X	1935	1549	1747	5231	-	-

When checking the Manual-ID species of the total 1640 records, we can see some differences compared to the Auto-ID results (Table 4-47):

In the Auto-ID results, Common Pipistrelle (*Pipistrellus pipistrellus*) accounted for 66.37% of the recordings, whereas in the Manual-ID results, it accounted for 79.63%. This indicates that Manual-ID identified this species more frequently, suggesting more accurate identification of the most common bat species.

In the Auto-ID results, Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) was the second most common with 3.21%, while in the Manual-ID results, it accounted for 7.68%. This shows that Manual-ID identified this species more often than Auto-ID did.

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

Group	Species	IUCN	SP01,2,3	SP04	SP05	SP06	Total	Percent
Pipistrelloid	PIPPIP	LC	x	659	105	542	1306	79.63%
Pipistrelloid	MINSCH	VU	x	67	8	51	126	7.68%
Pipistrelloid	PIPKUH/PIPNAT	-	x	19	13	5	37	2.26%
Pipistrelloid	PIPPYG	LC	x	5	0	1	6	0.37%
Pipistrelloid	HYPSAV	LC	x	0	1	5	6	0.37%
Nyctaloid	NYCLEI	LC	x	9	10	68	87	5.30%
Nyctaloid	EPTSER	LC	x	3	0	1	4	0.24%
Nyctaloid	NYCLAS	VU	x	1	0	2	3	0.18%
Nyctaloid	NYCNOC	LC	x	0	1	0	1	0.06%
Tadarida	TADTEN	LC	x	0	0	3	3	0.18%
Plecotus	PLESPE	NA	x	0	2	9	11	0.67%
Myotis	MYOSPE	NA	x	11	4	2	17	1.04%
Rhinolophus	RHIFER	NT (E,M)	x	6	1	0	7	0.43%
Rhinolophus	RHIBLA	VU (E)	x	2	1	0	3	0.18%
Rhinolophus	RHIHIP	NT (E,M)	x	0	0	1	1	0.06%
Barbastella	BARBAR	VU (E)	x	20	0	2	22	1.34%
Total	-	-	x	802	146	692	1640	-

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 4-7 illustrates the activity patterns of these selected species throughout the night during the summer season, spanning from 20:00 to 06:00.

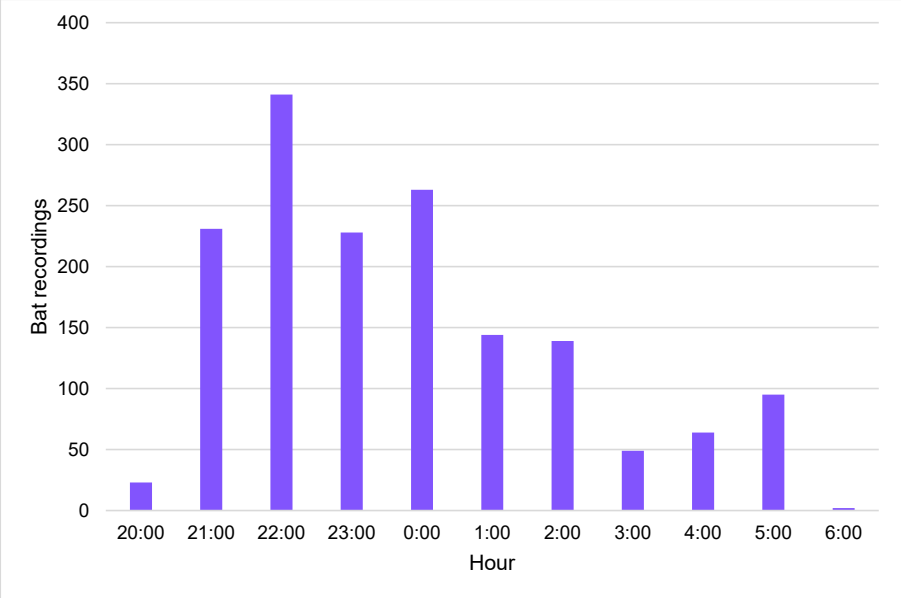

Figure 4-7 Hourly distribution of bat recordings through the night in summer

Autumn

Based on Auto-ID results, a total of 30,172 recordings were made. Of these, 11,272 recordings, or 37.35%, were identified as bat recordings in autumn. Noise accounted for the majority of the recordings, with 18,900 noise recordings, making up 62.64% of the total. The average nightly noise percentage ranged from 9.86% to 93.40%. A summary is shown on Table 4-48.

Nights 1 and 6 were selected for manual species identification.

Table 4-48 Number of bat recordings and noise recorded each night based on Auto-ID in autumn

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
1	6	1573	745	2318	32.14%	Manual_ID
2	6	1392	418	1810	23.09%	
3	6	2851	312	3163	9.86%	
4	6	909	968	1877	51.57%	
5	6	701	105	806	13.03%	
6	6	551	177	728	24.31%	Manual_ID
7	6	323	305	628	48.57%	
8	6	321	3119	3440	90.67%	
9	6	1142	2805	3947	71.07%	
10	6	294	4163	4457	93.40%	
11	6	257	3036	3293	92.20%	
12	6	482	727	1209	60.13%	
13	6	476	2020	2496	80.93%	

Night	Detectors	Bat	Noise	Total	Noise Ratio	Analysis
Total	-	11272	18900	30172	62.64%	-

Table 4-49 presents the distribution of bat recordings across 6 SPs based on Auto-ID results. SP01 had the highest average recordings, accounting for approximately 293/145, or 31.63%, of all detections, followed by SP04 with 186 recordings (12.83%) and SP06 with 138 recordings (29.03%). Night 3 recorded the highest bat activity, with 2,851 detections, which is approximately 19.66 times the average nightly total, highlighting the site's significant potential for bat activity.

Commented [AF40]: great that you were able to get replacement detectors out in autumn for those stolen in summer

Commented [ED41R40]: Thank you. A valuable lesson learned for how many backup devices are needed per allocated devices. We actually had a few, but ended up needing more anyway.

Table 4-49 Distribution of bat recordings across SPs by night based on Auto-ID results in autumn

Night	SP01	SP02	SP03	SP04	SP05	SP06	Total
1	207	71	75	490	51	679	1573
2	308	177	49	711	49	98	1392
3	610	483	566	417	328	447	2851
4	776	9	40	15	16	53	909
5	282	30	55	186	45	103	701
6	93	42	121	137	55	103	551
7	47	40	15	122	27	72	323
8	186	27	19	43	16	30	321
9	764	89	214	34	8	33	1142
10	191	5	25	21	9	43	294
11	139	17	46	25	17	13	257
12	138	89	32	85	42	96	482
13	71	186	44	135	21	19	476
Average	293	97	100	186	53	138	145

Table 4-50 and Table 4-51 summarizes the results of the Manual-ID analysis of bat recordings for the selected nights (1 and 6), yielding a total of 2,116 recordings across 6 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 0.38%. 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 99.62% of the total results from Auto-ID for the autumn season.

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

Night	Method	SP01	SP02	SP03	SP04	SP05	SP06	Total
1	Manual ID	211	65	55	498	49	706	1584
6	Manual ID	90	41	120	121	54	106	532
Total	Manual ID	301	106	175	619	103	812	2116

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

Night	Method	SP01	SP02	SP03	SP04	SP05	SP06	Total
1	Auto ID	207	71	75	490	51	679	1573

Night	Method	SP01	SP02	SP03	SP04	SP05	SP06	Total
6	Auto ID	93	42	121	137	55	103	551
Total	Auto ID	300	113	196	627	106	782	2124

The Auto-ID analysis of all nights shows that the most common species was Common Pipistrelle (*Pipistrellus pipistrellus*), accounting for 66.08% of the recordings and 81.51% when non-ID species are distributed evenly. Once more, the second most common species was Schreiber's Bent-wing Bat, Vulnerable (VU), (*Miniopterus schreibersii*), which represented 4.30% of the recordings and 5.31% with even distribution of non-ID species. The presence of Vulnerable (VU) species, such as Schreiber's Bent-wing Bat (*Miniopterus schreibersii*) and Giant Noctule (*Nyctalus lasiopterus*), underscores their conservation priority and the importance of ongoing monitoring efforts. However, the software failed to identify 18.93% of the recordings. (Table 4-52)

Table 4-52 Bat groups and species recorded during selected nights at each SP based on Auto-ID in autumn

Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	Total	Percent	Percent_2
Pipistrelloid	PIPPIP	LC	2594	855	965	1523	339	1172	7448	66.08%	81.51%
Pipistrelloid	MINSCH	VU	78	31	26	199	35	116	485	4.30%	5.31%
Pipistrelloid	HYPSAV	LC	116	7	21	11	7	21	183	1.62%	2.00%
Pipistrelloid	PIPKUH	LC	47	6	14	12	6	20	105	0.93%	1.15%
Pipistrelloid	PIPNAT	LC	13	3	1	11	3	7	38	0.34%	0.42%
Pipistrelloid	PIPPYG	LC	6	3	3	5	4	5	26	0.23%	0.28%
Nyctaloid	NYCLEI	LC	52	10	19	33	28	32	174	1.54%	1.90%
Nyctaloid	NYCNOC	LC	7	1	15	32	12	6	73	0.65%	0.80%
Nyctaloid	VESMUR	LC	21	7	9	7	11	16	71	0.63%	0.78%
Nyctaloid	NYCLAS	VU	8	4	2	2	3	43	62	0.55%	0.68%
Nyctaloid	EPTSER	LC	6	7	10	15	10	11	59	0.52%	0.65%
Tadarida	TADTEN	LC	72	8	14	53	51	36	234	2.08%	2.56%
Plecotus	PLESPE	NA	65	11	23	13	4	2	118	1.05%	1.29%
Myotis	MYOSPE	NA	10	3	9	11	3	6	42	0.37%	0.46%
Rhinolophus	RHIHIP	NT (E,M)	0	1	0	0	0	0	1	0.01%	0.01%
Rhinolophus	RHIFER	NT (E,M)	0	0	0	1	0	0	1	0.01%	0.01%
Barbastella	BARBAR	VU (E)	0	2	7	0	6	3	18	0.16%	0.20%
-	NoID	-	717	306	163	493	162	293	2134	18.93%	
Total	-	-	3812	1265	1301	2421	684	1789	11272	-	-

When checking the manual id species of 2116 records in total, we can see some differences (Table 4-53):

Common Pipistrelle (*Pipistrellus pipistrellus*): This species accounted for 69.38% of the recordings based on Manual-ID, compared to 66.08% in Auto-ID. The Manual-ID percentage is

slightly higher, indicating more consistent identification of this dominant species through manual analysis.

Schreiber's Bent-wing Bat (*Miniopterus schreibersii*): This Vulnerable species represented 17.63% of the recordings in Manual-ID, a significant increase compared to 4.30% in Auto-ID.

Pipistrelle Species (*Pipistrellus kuhlii/Pipistrellus nathusii*): These species accounted for 2.32% in Manual-ID, compared to a combined 1.27% in Auto-ID (sum of *Pipistrellus kuhlii* and *Pipistrellus nathusii* percentages).

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

Group	Species	IUCN	SP01	SP02	SP03	SP04	SP05	SP06	Total	Percent
Pipistrelloid	PIPPIP	LC	230	66	114	451	54	553	1468	69.38%
Pipistrelloid	MINSCH	VU	34	15	8	115	16	185	373	17.63%
Pipistrelloid	PIPKUH/PIPNAT	-	5	0	7	6	5	26	49	2.32%
Pipistrelloid	PIPPYG	LC	4	2	1	3	1	5	16	0.76%
Pipistrelloid	HYPSAV	LC	0	0	5	0	0	0	5	0.24%
Nyctaloid	NYCLEI	LC	8	21	26	25	23	21	124	5.86%
Nyctaloid	EPTSER	LC	8	1	6	9	1	13	38	1.80%
Nyctaloid	NYCLAS	VU	3	0	0	1	0	0	4	0.19%
Nyctaloid	NYCNOC	LC	0	0	1	0	0	0	1	0.05%
Tadarida	TADTEN	LC	0	0	3	1	1	2	7	0.33%
Plecotus	PLESPE	NA	0	0	0	2	0	0	2	0.09%
Myotis	MYOSPE	NA	9	1	3	4	2	4	23	1.09%
Rhinolophus	RHIBLA	VU (E)	0	0	0	1	0	1	2	0.09%
Rhinolophus	RHIEUR	VU (E,M)	0	0	1	0	0	0	1	0.05%
Rhinolophus	RHIFER	NT (E,M)	0	0	0	1	0	0	1	0.05%
Rhinolophus	RHIHIP	NT (E,M)	0	0	0	0	0	1	1	0.05%
Barbastella	BARBAR	VU (E)	0	0	0	0	0	1	1	0.05%
Total	-	-	301	106	175	619	103	812	2116	-

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 4-8 illustrates the activity patterns of these selected species throughout the night during the autumn season, spanning from 18:00 to 06:00.

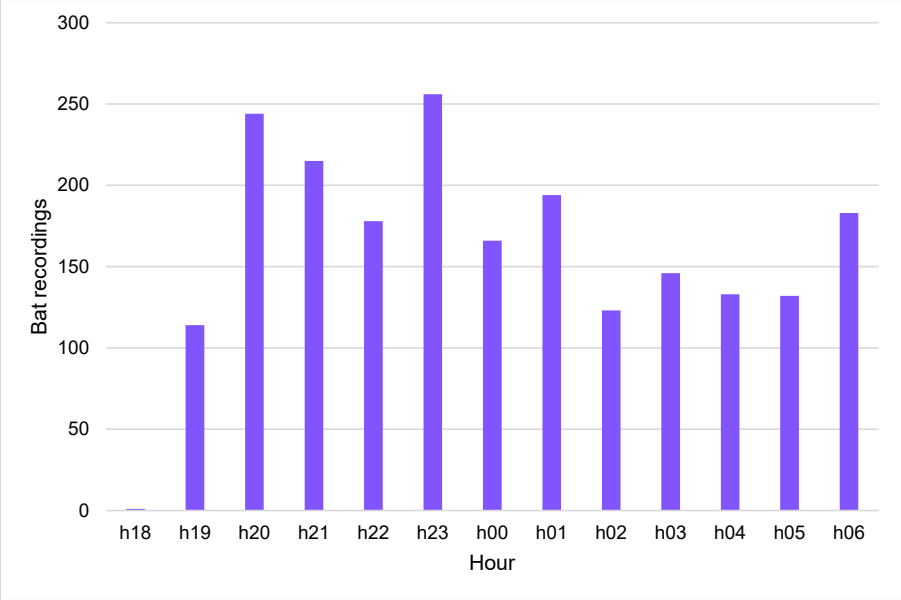

Figure 4-8 Bat groups and species recorded during the hours of the night in autumn

Harmancık Cave Observations

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Based on Auto-ID results, a total of 9748 (1778 bat recordings) and 4508 (272 bat recordings) recordings were made in summer and autumn, respectively. In summer, noise accounted for the majority of the recordings 81.76%, while the noise ratio was 39.62% in autumn. (Table 4-54)

Table 4-54 Number of bat recordings and noise recorded each night based on Auto-ID during cave survey in summer and autumn

Date	Bat	Noise	Total	Noise Ratio
2024-08-10	53	194	247	78.54%
2024-08-11	323	383	706	54.25%
2024-08-12	147	630	777	81.08%
2024-08-13	100	1128	1228	91.86%
2024-08-14	149	1453	1602	90.70%
2024-08-15	72	1019	1091	93.40%
2024-08-16	71	409	480	85.21%
2024-08-17	89	452	541	83.55%
2024-08-18	197	402	599	67.11%
2024-08-19	243	354	597	59.30%
2024-08-20	204	805	1009	79.78%
2024-08-21	130	741	871	85.07%
Total	1778	7970	9748	81.76%

Date	Bat	Noise	Total	Noise Ratio
2024-09-26	123	23	146	15.75%
2024-09-27	229	49	278	17.63%
2024-09-28	213	100	313	31.95%
2024-09-29	234	67	301	22.26%
2024-09-30	205	17	222	7.66%
2024-10-01	185	30	215	13.95%
2024-10-02	110	14	124	11.29%
2024-10-03	160	35	195	17.95%
2024-10-04	277	64	341	18.77%
2024-10-05	357	122	479	25.47%
2024-10-06	380	1187	1567	75.75%
2024-10-07	122	25	147	17.01%
2024-10-08	110	49	159	30.82%
2024-10-09	17	4	21	19.05%
Total	2722	1786	4508	39.62%

The majority of the observed bats were Common Pipistrelle (Pipistrellus pipistrellus) and Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) both in summer and autumn (Table 4-55, Table 4-56). Schreiber's Bent-winged Bat is classified as Vulnerable (VU) in IUCN Red List.

Table 4-55 Bat groups and species recorded during ten nights based on Manual ID in summer

Group	Species	IUCN	Total	Percent
Pipistrelloid	PIPPIP	LC	645	36.38%
Pipistrelloid	MINSCH	VU	318	17.94%
Pipistrelloid	PIPKUH/PIPNAT	-	170	9.59%
Pipistrelloid	HYPSAV	LC	109	6.15%
Pipistrelloid	PIPPYG	LC	107	6.03%
Nyctaloid	NYCLEI	LC	31	1.75%
Nyctaloid	EPTSER	LC	8	0.45%
Nyctaloid	NYCLAS	VU	2	0.11%
Nyctaloid	NYCNOC	LC	1	0.06%
Tadarida	TADTEN	LC	2	0.11%
Plecotus	PLESPE	NA	6	0.34%
Myotis	MYOSPE	NA	108	6.09%
Rhinolophus	RHIFER	NT (E,M)	230	12.97%
Rhinolophus	RHIHIP	NT (E,M)	29	1.64%
Rhinolophus	RHIEUR	VU (E,M)	5	0.28%
Rhinolophus	RHIBLA	VU (E)	2	0.11%
Total	-	-	1773	-

Table 4-56 Bat groups and species recorded during ten nights based on Manual ID in autumn

Group	Species	IUCN	Total	Percent
Pipistrelloid	PIPPIP	LC	1903	71.89%
Pipistrelloid	MINSCH	VU	193	7.29%
Pipistrelloid	PIPKUH/PIPNAT	-	75	2.83%
Pipistrelloid	HYPSAV	LC	59	2.23%
Pipistrelloid	PIPPYG	LC	15	0.57%
Nyctaloid	NYCLEI	LC	92	3.48%
Nyctaloid	EPTSER	LC	38	1.44%
Nyctaloid	NYCLAS	VU	8	0.30%
Nyctaloid	NYCNOC	LC	7	0.26%
Tadarida	TADTEN	LC	17	0.64%
Plecotus	PLESPE	NA	52	1.96%
Myotis	MYOSPE	NA	129	4.87%
Rhinolophus	RHIFER	NT (E,M)	56	2.12%
Rhinolophus	RHIHIP	NT (E,M)	2	0.08%
Rhinolophus	RHIEUR	VU (E,M)	1	0.04%
Total	-	-	2647	-

Transect Surveys

Based on transect surveys, a total of 2922 recordings were made. 1910 recordings, or 65.37% of the total, were identified as bat recordings in spring, summer, and autumn. Noise accounted for the majority of the recordings (34.63%), with an average nightly noise percentage ranging from 8.20% to 55.81%. (Table 4-57)

Table 4-57 Number of bat recordings and noise recorded each night during transect surveys

Date	Bat	Noise	Total	Noise Ratio
2024-06-30	194	245	439	55.81%
2024-07-06	322	337	659	51.14%
2024-08-13	391	133	524	25.38%
2024-08-21	437	216	653	33.08%
2024-09-28	336	30	366	8.20%
2024-09-30	230	51	281	18.15%
Total	1910	1012	2922	34.63%

The Auto ID analysis of the sounds recorded during all nights indicates that the most common species was the Common Pipistrelle (*Pipistrellus pipistrellus*), with 47.07% of the recordings, increasing to 59.30% when non-identified species are distributed evenly. Notably, the second most common species was the Noctule (*Nyctalus noctula*), with 20.42% of the recordings, rising to 25.73% when non-identified species are evenly distributed. (Table 4-58)

Table 4-58 Bat groups and species recorded during mobile 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	41	123	292	267	167	9	899	47.07%	59.30%
Pipistrelloid	MINSCH	VU	17	3	5	16	3	0	44	2.30%	2.90%
Pipistrelloid	PIPKUH	LC	5	10	3	14	7	1	40	2.09%	2.64%
Pipistrelloid	HYPSAV	LC	1	3	3	6	6	4	23	1.20%	1.52%
Pipistrelloid	PIPNAT	LC	1	0	0	4	1	0	6	0.31%	0.40%
Pipistrelloid	PIPPYG	LC	1	0	0	0	0	0	1	0.05%	0.07%
Nyctaloid	NYCNOC	LC	28	57	33	49	73	150	390	20.42%	25.73%
Nyctaloid	NYCLEI	LC	10	14	3	10	18	12	67	3.51%	4.42%
Nyctaloid	VESMUR	LC	8	2	1	2	4	3	20	1.05%	1.32%
Nyctaloid	EPTSER	LC	4	6	0	0	1	0	11	0.58%	0.73%
Nyctaloid	NYCLAS	VU	0	1	1	0	0	0	2	0.10%	0.13%
Tadarida	TADTEN	LC	0	1	3	1	0	1	6	0.31%	0.40%
Plecotus	PLESPE	NA	0	0	0	0	1	2	3	0.16%	0.20%
Myotis	MYOSPE	NA	1	0	0	1	1	0	3	0.16%	0.20%
Barbastella	BARBAR	VU (E)	0	0	0	1	0	0	1	0.05%	0.07%
-	NoID	-	77	102	47	66	54	48	394	20.63%	
Total	-	-	194	322	391	437	336	230	1910	-	-

When checking the manual ID species of a total of 1,394 records, we can observe several differences compared to the Auto ID results. Firstly, the Common Pipistrelle (*Pipistrellus pipistrellus*) is the most common species in both tables, but it shows a significantly higher percentage in the manual ID table (76.47%) compared to the Auto ID table (47.07%), suggesting that manual identification captured a much larger proportion of this species. Secondly, the Noctule (*Nyctalus noctula*) appears more frequently in the Auto ID results (20.42%), however it is absent in the manual ID results. (Table 4-59)

Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) and Giant Noctule (*Nyctalus lasiopterus*), vulnerable species (VU), were recorded during mobile surveys.

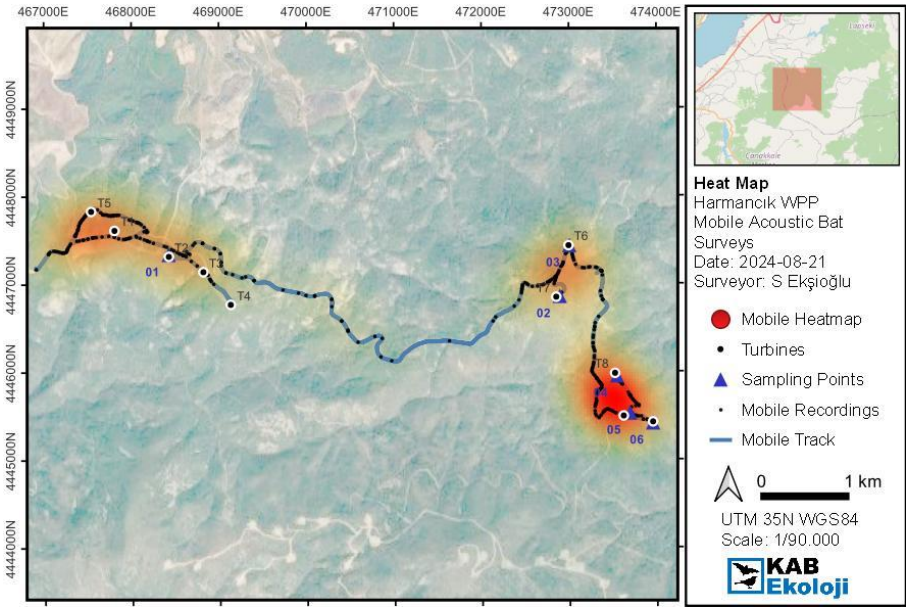
Table 4-59 Bat groups and species recorded during mobile surveys based on Manual ID results

Group	Species	IUCN	06_M1a	06_M1b	08_M1a	08_M1b	09_M1a	09_M1b	Total	Percent
Pipistrelloid	PIPPIP	LC	47	156	320	307	216	20	1066	76.47%
Pipistrelloid	MINSCH	VU	25	5	30	41	9	1	111	7.96%
Pipistrelloid	PIPKUH/PIPNAT	-	1	18	14	42	18	1	94	6.74%
Pipistrelloid	HYPSAV	LC	1	2	1	4	16	0	24	1.72%
Nyctaloid	NYCLEI	LC	12	10	2	10	19	1	54	3.87%
Nyctaloid	EPTSER	LC	1	10	0	1	4	1	17	1.22%

Group	Species	IUCN	06_M1a	06_M1b	08_M1a	08_M1b	09_M1a	09_M1b	Total	Percent
Nyctaloid	NYCLAS	VU	0	1	1	1	0	0	3	0.22%
Tadarida	TADTEN	LC	0	0	0	2	0	0	2	0.14%
Plecotus	PLESPE	NA	1	1	0	0	0	0	2	0.14%
Myotis	MYOSPE	NA	11	3	2	2	1	0	19	1.36%
Rhinolophus	RHIFER	NT (E,M)	1	0	0	0	0	0	1	0.07%
Barbastella	BARBAR	VU (E)	0	0	0	1	0	0	1	0.07%
Total	-	-	100	206	370	411	283	24	1394	-

*We currently have heat maps exclusively for the summer and autumn season, as no tracks were recorded during the spring mobile surveys. Without these tracks, we lack proper data for a comprehensive analysis.

Heat maps are shown on Figure 4-9.



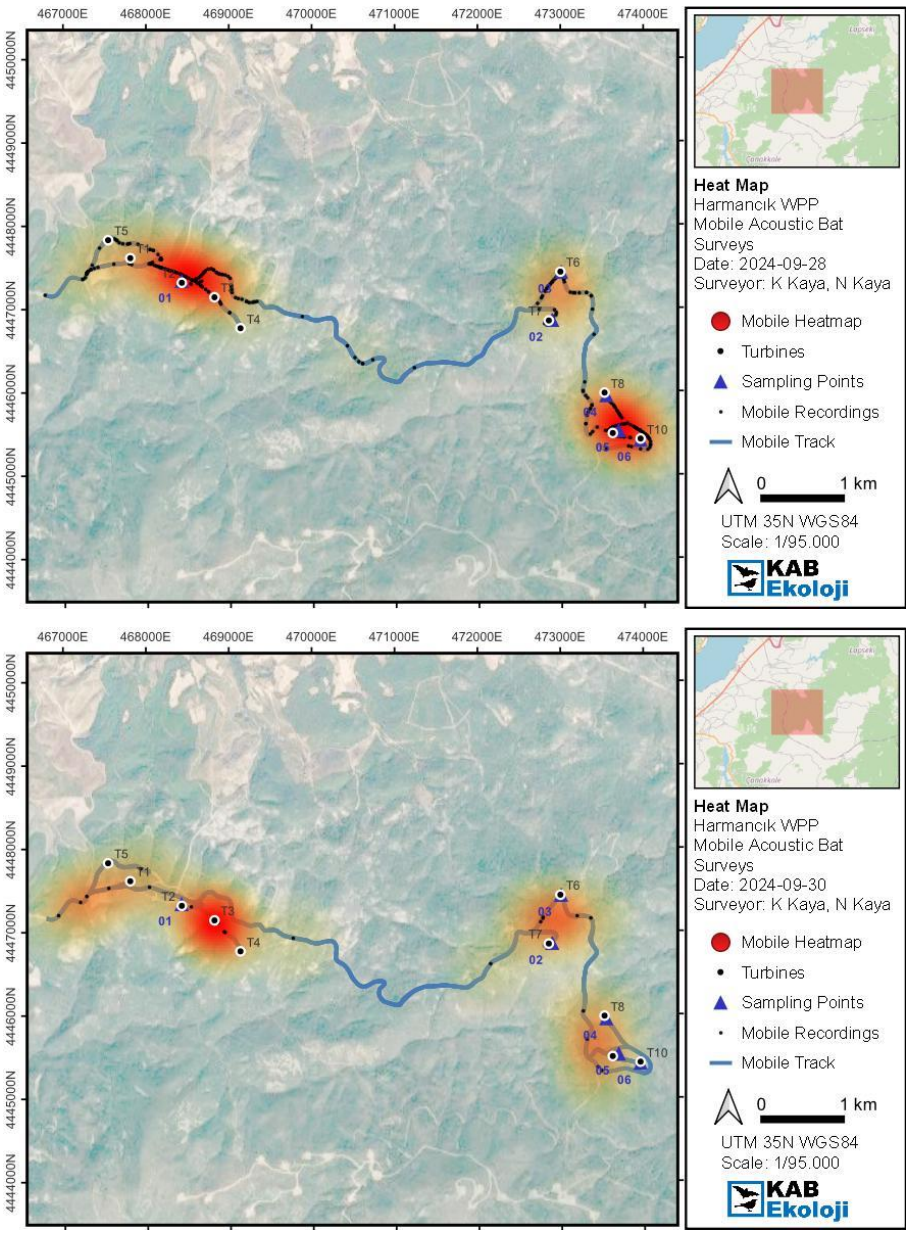


Figure 4-9 Heat maps from transect surveys.

5 Discussion

5.1 Flora

- The field study identified a total of 10 endemic plant species, including 6 regional endemics and 4 widespread endemics.
- As the widespread endemics are distributed over a large area, particularly in the Aegean and Marmara regions, no specific measures are required within the scope of the project.There is no data different from what was identified in the local EIA process for the ETL and Access road, and no rare/regional or endangered plant species are present in these locations.
- Seed collection has been conducted for the species *Digitalis trojana*, *Verbascum lydium* var. *heterandrum*, and *Cirsium balikesirense*.
    - *Verbascum hasbenlii:* The species is located in Project AoI, in the rocky area within the impact area between turbines T6 - T7 outside of the Project footprint (See Figure 4-2). The turbine areas, access roads or ETL route do not contain suitable habitat for the species and therefore there will be no habitat loss for this species due to Project activities. . It is considered that the most important impact that the Project Company must manage during the construction phase is the dust impact. During the months in which field surveys were conducted, ongoing construction activities were observed. Additionally, it was noted that dust suppression measures had been implemented to mitigate environmental impacts. DKMP did not approve the collection of seeds of the species by the Project Company, however, it will be continued to consult on targets to ensure net gain.

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*, should be monitored for their presence and usage of the area within the project area of influence. *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.
- 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.

Commented [AF44]: how far progressed was construction at the time of the survey? it may be that these plants were seen at a point after the peak potential dust impact if construction was well progressed.

Commented [AO45R44]: Added:
“During the months in which field surveys were conducted, ongoing construction activities were observed. Additionally, it was noted that dust suppression measures had been implemented to mitigate environmental impacts.”

Commented [GA46R44]: Field studies for the species were carried out three times in July, and during this period, construction activities such as soil stripping, turbine pad preparation, and site road widening were underway. Irrigation activities were carried out following the warnings of experts.

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

Initially, significant soaring bird migration was suspected at the Project due to its proximity to the Dardanelles. Consequently, the survey effort was planned to include at least 72 hours of observation during both the spring and autumn migration seasons.

Despite the increased efforts to monitor the spring migration of soaring birds, very few migratory soaring birds were detected in spring. While migration rate was 0.12 birds/hr in spring, in autumn activity increased almost 10-fold, and migratory rates went up to 1.15 birds/hr in autumn.

While these rates are not as high as those recorded along the major routes in Türkiye, the rate for autumn is on par with minor migratory route rates, demonstrating that a moderate level of migratory activity is expected for the Project overall, and may exhibit varying patterns based on yearly variations on environmental parameters during migration seasons.

One globally threatened species, the Red-footed Falcon (*Falco vespertinus*), was observed during the vantage point surveys. This migratory species is distributed widely across Türkiye but does not concentrate in bottleneck areas due to its broad front migration patterns, making it possible to encounter individuals in various countryside locations. The low number of observations at the site suggests that only a few birds are likely to appear sporadically. Additionally, since the site lacks suitable habitats for roosting or feeding, the presence of this species can be considered negligible in terms of potential impact.

The Short-toed Snake Eagle (*Circaetus gallicus*) is one of the most common species of raptor in Turkey and around the Project area. Most sightings are associated with the resident birds, but there are also some birds on passage. It is a Least Concern species.

The Eurasian Griffon Vulture (*Gyps fulvus*) has been noted as resident due to exhibited behaviour hence better classification for collision risk modelling, even though they do not have any breeding colony nearby. This species is not known to have any breeding colonies in Çanakkale province. The closest breeding sites are located in Kütahya and Afyon provinces (Boyla et al., 2018) (Figure 5-1). The observed individuals are likely staging or non-breeding birds, such as juveniles and subadults, moving between breeding colonies in the Balkans, southern and eastern Türkiye, and the Middle East. Griffon Vultures have also been recorded at other wind farm projects in Çanakkale during the migration period.

The estimated baseline risk of collision based on 2024 results for both migrant species and resident birds is very low. Collision risk in operation may be significantly different than construction due to a few factors such as (1) barrier effect, (2) disturbance, (3) attraction, and (4) habituation which are all types of effects that are directly caused by WPPs, while a fifth factor would be (5) yearly differences in migratory activity along the minor route. It is likely that all 5 types would be in effect to carious degrees and would have a mixed effect on increasing or

decreasing overall collision risk for the Project. There it is essential to compare baseline risks against operation phase estimations.

During ETL surveys, all the observed species are classified as Least Concern (LC). The most recorded species at risk height is Common Buzzard with 15 contacts. Observations along the Energy Transmission Line indicate relatively low bird passage frequency. Bird observations along the transect line indicate that bird passages are relatively evenly distributed along the transmission line route. Based on the current data, no mitigation measures are needed for any segment.

The survey did not record any globally threatened species; only common birds were noted. The verbal communication with national experts (Biol. Özmen Yeltekin and Biol. Cansu Özcan) indicates that there are no globally threatened Eastern Imperial Eagle breeding near the site. The species was not recorded during VP, VP ETL or breeding bird surveys in 2024.

The breeding bird surveys revealed that most 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 conservation status, this species is widespread in Türkiye and is known for its fast, low flight, reducing its risk of turbine collisions. This is further supported by carcass search data from Türkiye where this species is not widely encountered to the consultant's knowledge.

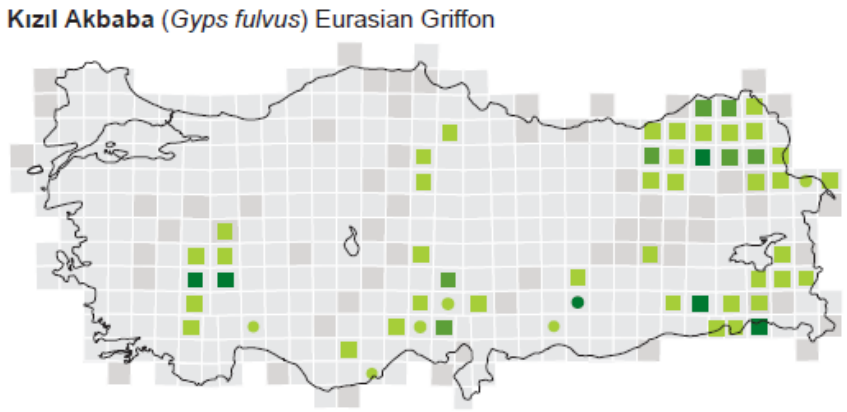


Figure 5-1 The breeding distribution of Eurasaian Griffon Vulture in Turkey. Pale, medium and dark green dots indicate the squareds with breeding records. (Boyla et al. 2018)

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 moreso 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.

Commented [AF47]: very important point.

Commented [ED48R47]: Thank you. There is some expanded points re: dardenelles route in the cumulative collision assessment as well. Looking forward to your thoughts there.

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 subprojects 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 subproject 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 subprojects, 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.

Commented [AF49]: Akköy and Ihlamur?

Commented [ED50R49]: For sure, added

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.

The timing of the surveys did not fully align with the actual spring period. The project site, located in the northern half of Türkiye, experiences a delayed arrival of spring, particularly at higher elevations. In most cases, surveys could not begin before mid-June in this region. Although, collecting additional data during April and May would offer a more comprehensive understanding of bat populations and their activity levels in the area, the current dataset seems to reflect the diversity and population level of bats.

Some technical issues were noted during specific surveys. there were some issues with the detectors. Unfortunately, during summer surveys, three detectors were stolen so 3 detectors were operational, while in the autumn survey, all detectors functioned properly until the end of the monitoring period. To overcome the issues related to the missing nights at certain Sampling Points, we calculated the average bat passes for each SP.

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

- SP1, corresponding to T1-5 cluster,
- SP4, corresponding to T8,
- SP2 near T6, is located near the cave which has relatively high activity level.
- Activity at the cave is high, featuring activity of *Miniopterus schreibersii*.

Transect surveys conducted during summer and autumn confirmed extremely similar findings, with high bat activity recorded at SP1 and SP4 with some additional activity zone near at SP2. This is the area near the bat roost at the cave surveyed. The cave has important populations of Schreiber's Bent-winged Bat (*Miniopterus schreibersii*).

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, 200-300 recordings / night / turbine in summer, and 100-200 recordings / night / turbine in autumn. Additional surveys at the cave entrance yielded 200-300 recordings / night as well.

During spring survey, bat activity was predominantly characterized by the Common Pipistrelle (Pipistrellus pipistrellus), accounting for 66.87% of the recorded calls. The Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), a globally vulnerable species, contributed 12.19%, while the Greater Horseshoe Bat (Rhinolophus ferrumequinum), listed as near-threatened regionally, represented 5.50% of the activity. Other species, including unidentified pipistrelloids (*Pipistrellus kuhlii/nathusii*) at 3.73%, the Serotine Bat (Eptesicus serotinus) at 3.63%, and the Lesser Noctule (*Nyctalus leisleri*) at 2.00%, contributed to the remaining activity.

During summer survey, bat activity was dominated by the Common Pipistrelle (Pipistrellus pipistrellus), which accounted for 79.63% of the recorded calls. The Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), a globally vulnerable species, contributed 7.68%, while the Lesser Noctule (*Nyctalus leisle*ri) represented 5.30%. Other species included Barbastelle Bat (*Barbastella barbastellus*), a vulnerable species regionally, at 1.34%.

Commented [AF51]: it seems from the data that the cave might be a roost for the species. it will be very important to understand bat mortality through the PCFM given the presence of this threatened species.

Commented [ED52R51]: Özgür Bey fyi

During autumn survey, bat activity was predominantly represented by the Common Pipistrelle (Pipistrellus pipistrellus), comprising 69.38% of the recorded calls. The Schreiber's Bent-winged Bat (*Miniopterus schreibersii*), a globally vulnerable species, accounted for 17.63%, while the Lesser Noctule (*Nyctalus leisleri*) contributed 5.86%.

The presence of the Schreiber's Bent-winged Bat (*Miniopterus schreibersii*) is significant from a conservation perspective. As a globally vulnerable species, it was recorded at a high

percentage in both sampling points, cave surveys, and mobile surveys. Another noteworthy species, the Barbastelle Bat (*Barbastella barbastellus*), which is regionally vulnerable, was documented at 1.34%.

On the other hand, the Greater Horseshoe Bat (*Rhinolophus ferrumequinum*), listed as near-threatened regionally, is not considered a significant conservation concern in this context. This species is not known to fly at high altitudes, making it less susceptible to wind farm-related collisions.

The presence of the Lesser Noctule (*Nyctalus leisleri*), a species indicative of high-quality forest habitats, further underscores the ecological value of the area. Notably, this species has not previously been recorded in the forests of western Turkey, highlighting the significance of these findings.

Commented [AF53]: This is indeed an interesting record. Again the PCFM should yield data on whether an important population is being impacted at all.

Commented [ED54R53]: Özgür Bey fyi

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. .
- Bird species: No additional monitoring and mitigation implications than for which commitments have already been established are indicated for bird species based on baseline results.
    - Operation phase VP and breeding bird / raptor monitoring, collision risk estimates, post-construction fatality monitoring will further inform adaptive management.
    - The Project is one of the subprojects in 9 WPPs where a shutdown on demand program during migration periods is recommended due to long term impact potential on the minor migratory route integrity at the Dardanelles. 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.
- Terrestrial Fauna:
    - 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*, should be monitored for their presence and usage of the area within the project area of influence. *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.
- Bat species:
    - The cave located near T6 which is used by species such as M. schreibersii should continue to be monitored during operation. In operation phase, measures should be taken to safeguard the cave area from negative impact sources such as disturbance, noise and light pollution, vibration due to maintenance activities, and dust emissions. No net loss is indicated for this species. Operation phase monitoring should indicate NNL, and adaptive management and further mitigation measures will be indicated if the species experiences negative impact. The entrance could be safeguarded through measures like installing a cage grill, if feasible.
    - If additional bat roosts are discovered during operation phase monitoring within the AoI, these will need to be included in bat surveys, and CHA and BMP should be revised based on survey results, if needed.

Commented [AF55]: is it at risk of disturbance or attack from humans. it could be an easy conservation win beneficial to the KBA to install a cage grill on the entrance with a gate to protect it.

Commented [ED56R55]: Agreed. Revised to add your suggestion to the text. Enerjisa should also ensure installing a grill does not conversely attract attention, as it could convey there is something worth the obstruction inside.

- Since the AoI is also utilized by woodland bat species, and since it is uncertain how much functional bat habitat was lost during the tree cutting phase for the Project, the Project Company should consider compensating for habitat loss impact on bats. The Project Company should identify suitable areas away from collision risk, potentially within the license area, to install bat boxes, ensuring a variety of box types are introduced. This effort should be coordinated with DKMP and General Directorate of Forestry (OGM).

Commented [AF57]: Agreed. And a range of box types. Along with cave protection this could go a long way to offsetting impacts on bats.

Commented [ED58R57]: Revised to point out using a variety of types, thank you.

6 Appendix

6.1 Literature for Flora Surveys

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6.6 Bird Survey Conditions

Date	Surveyor	VP	Cloud %	WindDir	WindSp (m/s)	Prec	Temp (°)	Vis (km)
23/03	MÜ	VP2	0	N	1	0	11	8
23/03	YÖG	VP1	0	N	2	0	11	8
24/03	MÜ	VP2	0	S	2	0	9	8
24/03	YÖG	VP1	40	SW	5	0	15	8
25/03	YÖG, MÜ	VP1	80	W	13	02:23	10	8
25/03	NY	VP2	100	W	13	02:10	10	8
26/03	MÜ	VP2	80	E	1	0	13	8
26/03	YÖG	VP1	80	E	2	0	7	8
28/04	YÖG	VP1	100	NE	7	0	13	10
28/04	MÜ	VP2	100	NE	5	02:00	15	5
29/04	YÖG	VP1	80	N	8	0	16	8
29/04	MÜ	VP2	60	NE	5	02:00	16	10
30/04	YÖG	VP1	100	NE	5	02:00	15	8
30/04	NY	VP2	80	NE	5	02:55	15	5
01/05	NY, YÖG, MÜ	VP1	100	NE	5	04:00	13	0,5
02/06	MÜ	VP2	0	NW	2	00:03	30	10
02/06	YÖG	VP1	0	NW	2	00:03	30	20
03/06	YÖG	VP1	0	E	3	00:03	31	20
03/06	MÜ	VP2	0	NE	2	-	34	20
04/06	YÖG	VP1	0	SW	3	-	32	20
04/06	NY	VP2	10	W	5	-	32	20
05/06	MÜ	VP2	0	NW	2	-	31	20
05/06	NY	VP1	0	N	2	-	32	20

Date	Surveyor	VP	Cloud %	WindDir	WindSp (m/s)	Prec	Temp (°)	Vis (km)
24/06	MÜ	VP2	0	NE	5	-	27	18
24/06	YÖG	VP1	0	E	6	-	24	18
25/06	MÜ	VP2	0	NE	6	-	27	18
25/06	NY	VP1	0	NE	7	-	27	15
26/06	MÜ	VP2	0	NE	7	-	27	18
26/06	NY	VP1	0	NE	7	-	27	20
03/08	MÜ	VP2	0	N	2	-	23	20
03/08	NY	VP1	0	N	3	-	32	20
04/08	MÜ	VP2	20	NE	4	-	31	20
04/08	NY	VP1	10	NE	4	-	31	20
05/08	NY	VP1	100	NE	4	2	28	15
05/08	YÖG	VP2	90	NE	5	2	29	10
06/08	MÜ	VP1	0	N	4	-	30	20
06/08	YÖG	VP2	20	N	4	-	30	20

Date	Surveyor	VP	Cloud %	WindDir	WindSp (m/s)	Prec	Temp (°)	Vis (km)
24/08	MÜ, CÖ	VP2	0	NE	5	-	30	20
26/08	MÜ, Sİ, CÖ	VP1	20	NE	7	-	29	20
27/08	MÜ, Sİ, CÖ	VP1	90	NE	6	-	26	15
24/09	MÜ	VP1	90	NE	2	-	25	20
24/09	YÖG	VP2	80	NE	2	-	25	10
25/09	MÜ	VP1	0	NE	2	-	24	20
25/09	YÖG	VP2	0	NE	2	-	24	20
26/09	NY	VP1	30	NE	3	-	28	20
26/09	MÜ	VP2	0	N	2	-	28	20
27/09	NY	VP1	0	E	3	-	28	20
27/09	YÖG	VP2	0	NE	3	-	27	20
18/10	MÜ	VP1	60	NE	4	-	13	20
18/10	YÖG	VP2	50	NE	4	-	14	15
19/10	YÖG	VP1	60	E	4	-	14	15
19/10	MÜ	VP2	40	E	4	-	13	20
20/10	NY	VP1	30	E	5	-	14	20
20/10	YÖG	VP2	40	E	5	-	16	15
21/10	NY	VP1	50	NE	5	-	13	20
21/10	YÖG	VP2	50	NE	5	-	15	20
13/11	YÖG	VP1	100	E	2	2	12	15
13/11	NY	VP2	100	E	2	-	12	15
14/11	NY	VP2	90	NE	2	2	14	15
14/11	YÖG	VP1	100	SE	2	2	12	5
15/11	YÖG	VP1	100	E	2	2	12	10
15/11	NY	VP2	90	NE	2	2	13	10

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*)

Date	VP	Time	Spec *	Number	Dur (sec)	Flight_Height	Behaviour	Status
23/03	VP2	11:09	Cicni	2	300	bbbaaaaaaaaaaaaaaaa	migrating	Migrant
23/03	VP2	11:32	Butbu	2	135	bbbabbccc----------	other	Resident
23/03	VP2	11:58	Butbu	3	30	cb----------	courtship (PB)	Resident
23/03	VP2	12:23	Falti	1	15	a----------	straight flight	Resident
23/03	VP2	12:49	Butbu	1	120	bbbccccc----------	soaring	Resident
23/03	VP2	13:32	Accni	1	30	cc----------	soaring	Resident
23/03	VP2	15:19	Falti	1	30	cc----------	other	Resident
23/03	VP2	16:03	Falti	1	30	bb----------	soaring	Resident
23/03	VP2	16:17	Butbu	1	300	ccccccccccccccccccc	soaring	Resident
23/03	VP2	16:52	Accni	1	15	b----------	soaring	Resident
24/03	VP2	09:51	Butbu	1	15	b----------	soaring	Resident
24/03	VP2	09:58	Butbu	2	60	ccbb----------	soaring	Resident
24/03	VP2	10:15	Butbu	1	45	ccc----------	soaring	Resident
24/03	VP2	10:42	Falti	1	30	bb----------	soaring	Resident
24/03	VP2	10:46	Butbu	1	15	b----------	soaring	Resident
24/03	VP2	11:12	Butbu	3	120	cccccccc----------	soaring	Resident
24/03	VP2	11:37	Falti	1	75	ccccb----------	other	Resident
24/03	VP2	12:47	Butbu	2	210	abccccccccccbc------	soaring	Resident
24/03	VP2	13:00	Butbu	1	300	bbcbabccccccccbcccba	hunting/foraging	Resident
24/03	VP2	13:32	Butbu	1	15	b----------	hunting/foraging	Resident
24/03	VP2	13:44	Butbu	1	15	b----------	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

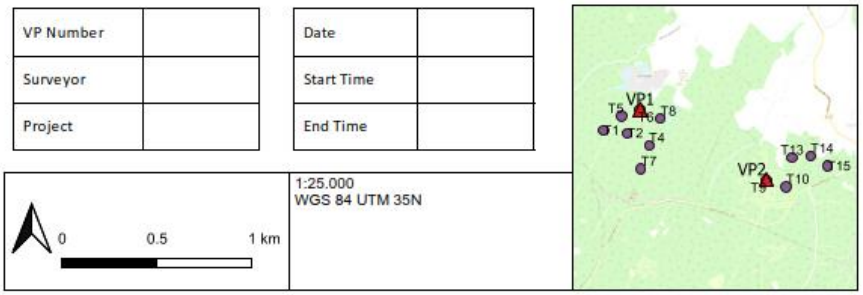
Calculation of alpha and p(collision) as a function of radius

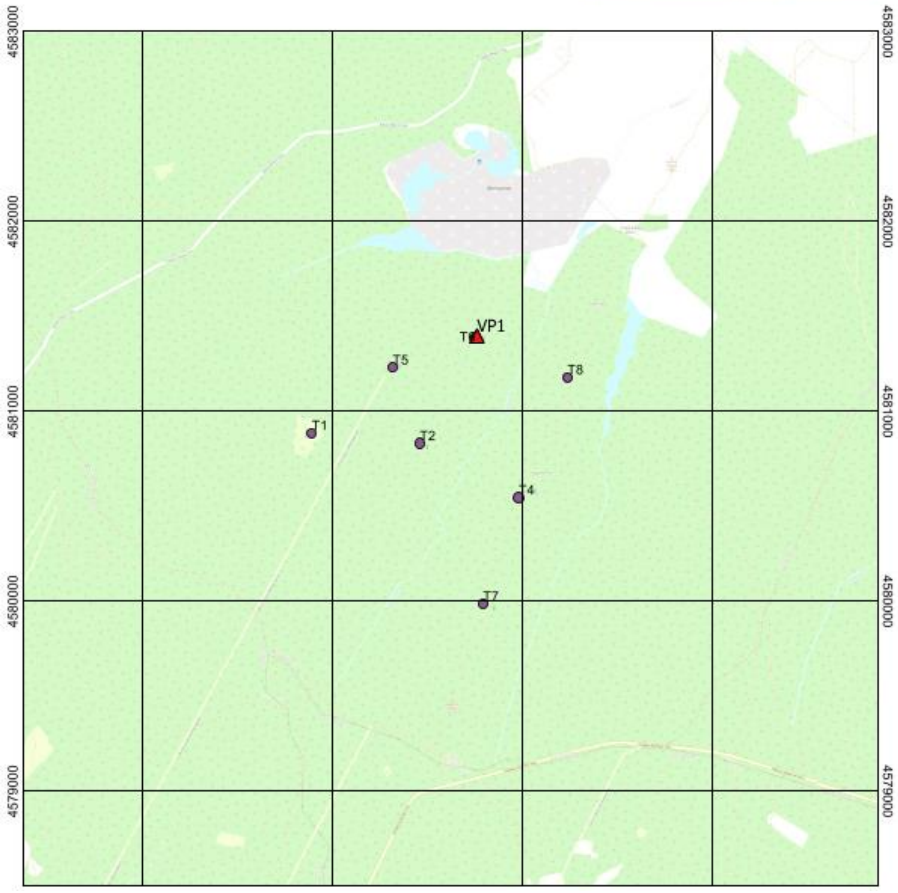
			Upwind:			Downwind:		
r/R	c/C	a	collide		contribution	collide		contribution
radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r
0,025	0,575	5,35	17,07	0,88	0,00110	14,65	0,76	0,00095
0,075	0,575	1,78	6,49	0,34	0,00252	4,08	0,21	0,00158
0,125	0,702	1,07	5,14	0,27	0,00332	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
							C					
1							B					
							A					
							C					
2							B					
							A					
							C					
3							B					
							A					
							C					
4							B					
							A					
							C					
5							B					
							A					
							C					
6							B					
							A					
							C					
7							B					
							A					
							C					
8							B					
							A					
							C					
9							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.]