WIND PARK 'DREN', MACEDONIA

BIRD & BAT SURVEY

IN PRE-CONSTRUCTION PHASE

-- ANNUAL REPORT --

This Report has been prepared for the purposes of Kaltun Energy, Skopje by the consortium composed of the consulting companies Empiria EMS, Skopje and Clean Energy Consulting, Belgrade.

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Where used as reference, this Report should be quoted as follows:

Kaltun Energy, 2019; Wind Park 'Dren', Macedonia – Pre-construction Bird and Bat Survey, Annual Report; Empiria EMS, Skopje and Clean Energy Consulting, Belgrade

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List of Abbreviations

BAI	Bat Activity Index
CRM	Collision Risk Model
EIA	Environmental Impact Assessment
EU	European Union
EUROBATS	Agreement on the Conservation of Populations of European Bats
GPS	Global Positioning System
IBA	Important Bird Area
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature (World Conservation Union)
MEPP	Ministry of Environment and Physical Planning
Ref.	Reference
SNH	Scottish National Heritage
VP	Vantage Point
WP	Wind Park
WPP	Wind Power Plant
WTG	Wind Turbine Generator

SUMMARY

Kaltun Energy, Skopje is developing a 34 Megawatt wind power plant at the locality Dren in the Demir Kapija Municipality and the Gevgelija Municipality in south Macedonia, about 100 km southeast of Skopje.

The Macedonian competent authority responsible for an environmental impact assessment – the Macedonian Ministry of Environment and Physical Planning has requested Kaltun Energy to carry out supplementary annual bird and bats baseline survey prior to construction commencement. Empiria EMS, Skopje and Clean Energy Consulting, Belgrade have been commissioned to undertake the annual bird and bat surveys at the proposed wind park site.

The principle monitoring goal is to obtain the complete insight in the baseline state and presence of birds and bats on the proposed Wind Park "Dren" site during 12-month period (an one-year cycle) and based on the provided data, to suggest adequate supplementary measures to mitigate the potential impacts on bird and bat communities from the proposed wind plant development.

This report represents the annual report and documents the key findings of the seasonal surveys conducted during one-year cycle, from October 2018 to September 2019. For each yearly season, detailed seasonal report[1] from conducted monitoring surveys was prepared.

Bird surveys through the one-year monitorong period are undertaken including:

- Vantage Point (VP) surveys;
- Breeding raptor surveys;
- Breeding bird surveys; and
- Nocturnal species.

Following bird species of interest were recorded during the surveys carried out through the one-year monitoring period:

- *Gyps fulvus*
- *Accipiter gentilis*
- *Accipiter nisus*
- *Accipiter brevipes*
- *Buteo buteo*
- *Buteo rufinus*
- *Circus cyaneus*
- *Circus aeruginosus*
- *Milvus migrans*, and
- *Falco vespertinus*

Bat surveys through the one-year monitorong period are undertaken including:

- Manual bat detector surveys on the ground;

[1] (1) Kaltun Energy,2019; Wind Park 'Dren', Macedonia – Pre-construction Bird and Bat Survey, Autumn 2018 Seasonal Interim Report; Empiria EMS, Skopje and Clean Energy Consulting, Belgrade

(2) Kaltun Energy,2019; Wind Park 'Dren', Macedonia – Pre-construction Bird and Bat Survey, Winter 2018 / 2019 Seasonal Interim Report; Empiria EMS, Skopje and Clean Energy Consulting, Belgrade

(3) Kaltun Energy,2019; Wind Park 'Dren', Macedonia – Pre-construction Bird and Bat Survey, Spring 2019 Seasonal Interim Report; Empiria EMS, Skopje and Clean Energy Consulting, Belgrade

(4) Kaltun Energy,2019; Wind Park 'Dren', Macedonia – Pre-construction Bird and Bat Survey, Summer 2019 Seasonal Interim Report; Empiria EMS, Skopje and Clean Energy Consulting, Belgrade

- Automated bat detector surveys on the ground; and
- Bat roost surveys.

Following bat species of interest were recorded during the surveys carried out through the one-year monitoring period:

- *Pipistrellus pipistrellus*
- *Pipistrellus pigmaeus*
- *Vespertilio murinus*
- *Miniopterus schreibersi.*

1 BACKGROUND

Kaltun Energy d.o.o. Skopje ('the Developer') is developing a 34 Megawatt (MW) wind power plant ('WPP' or 'the Project') at the locality Dren, in the Demir Kapija Municipality and the Gevgelija Municipality in south Macedonia, about 100 km southeast of Skopje. According to the current stage of the technical design, the Project will comprise of ten wind turbine generators (WTGs), each with a rated power of 3.4 MW.

The Project is at pre-construction stage and an Environmental Impact Assessment (EIA) has been carried out in the period from July 2017 to January 2018. The respective EIA Study was submitted to the Macedonian EIA competent authority (Ministry of Environment and Physical Planning –'MEPP') in June 2018 and was reviewed in accordance with the relevant legal requirements and administrative procedures. The review resulted in a 'Resolution on granting a consent to the project implementation' issued by the MEPP on 27 September 2018.

The approval specifies that the mitigation measures and monitoring requirements in the EIA must be implemented and, in addition, requires supplementary annual biodiversity (avian fauna and bats) survey, to be carried out prior to construction commencement.

The Project site, which covers an area of approximately 3.96 km^2, is shown in Figure 1-1.

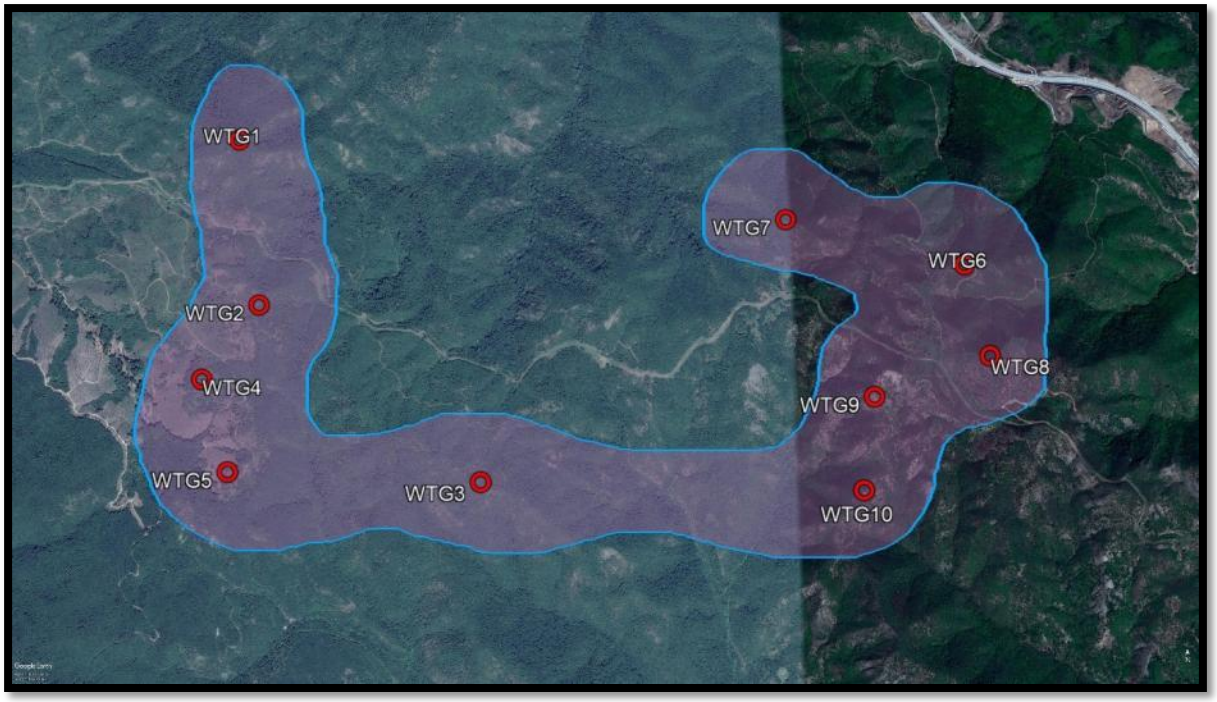

Figure 1-1 – The Project site (depicted with blue line) with positions of Wind Turbine Generators

2 BIRD SURVEY METHODS

2.1 Overview

The section 2 describes the approach to bird surveys. Firstly, the criteria used to identify target species for survey are identified. The surveys for the target species comprises of two methodologies; one for bird flight activity to inform a collision risk assessment, and one for abundance and distribution (nocturnal species).

The overall methodology for the surveys is based on guidance for bird surveys methods for wind farms developed by Scottish National Heritage (2014) complemented by specialist knowledge of the site conditions and species.

2.2 Target Species

The following criteria were used to select primary target species:

- Species with a known risk of collision with wind turbines;
- Species listed on the European Red List as Near Threatened, Vulnerable, Endangered or Critically Endangered (BirdLife International, 2015a);
- Species with an uncertain or negative short-term and/or long-term trend in Macedonia (BirdLife International, 2015a);
- Triggering species listed in IBA area Demir Kapija Gorge (Velevski et al., 2010); and
- Species registered or expected in the wider area of the proposed Wind Park „Dren".

Target species include:

1. Common crane, *Grus grus*
2. Black Stork, *Ciconia nigra*
3. Egyptian vulture, *Neophron percnopterus*
4. Griffon Vulture, *Gyps fulvus*
5. Northern goshawk, *Accipiter gentilis*
6. Sparrowhawk, *Accipiter nisus*
7. Levant sparrowhawk, *Accipiter brevipes*
8. Short-toed snake eagle, *Circaetus gallicus*
9. Marsh harrier, *Circus aeruginosus*
10. Hen harrier, *Circus cyaneus*
11. Pallid harrier, *Circus macrourus*
12. Montagu's harrier, *Circus pygargus*
13. Eurasian buzzard, *Buteo buteo*
14. Long-legged buzzard, *Buteo rufinus*
15. European honey buzzard, *Pernis apivorus*
16. Black kite, *Milvus migrans*
17. Greater spotted eagle, *Aquila clanga*
18. Booted eagle, *Aquila pennata*

19. Golden eagle, *Aquila chrysaetos*
20. Lanner falcon, *Falco biarmicus*
21. Peregine falcon, *Falco peregrinus*
22. Kestrel, *Falco tinnunculus*
23. Red-footed falcon, *Falco vespertinus*
24. Eurasian hobby, *Falco subbuteo*

All other species of birds not already included in the list of target species above were noted in separate files.

2.3 Vantage Point Surveys

The survey methodologies used are based on applicable guidance Prakljačić et al. (2011) and international best practice (Scottish Natural Heritage, 2014).

The primary purpose of the surveys is to provide input data for the Updated Collision Risk Model (Band, 2012; Masden 2015), which predicts mortalities from collision with turbines. Vantage Point (VP) surveys are designed to quantify the level of flight activity and its distribution over the survey area. Five vantage point watches (Figure 2-1) were conducted within the wind park project site.

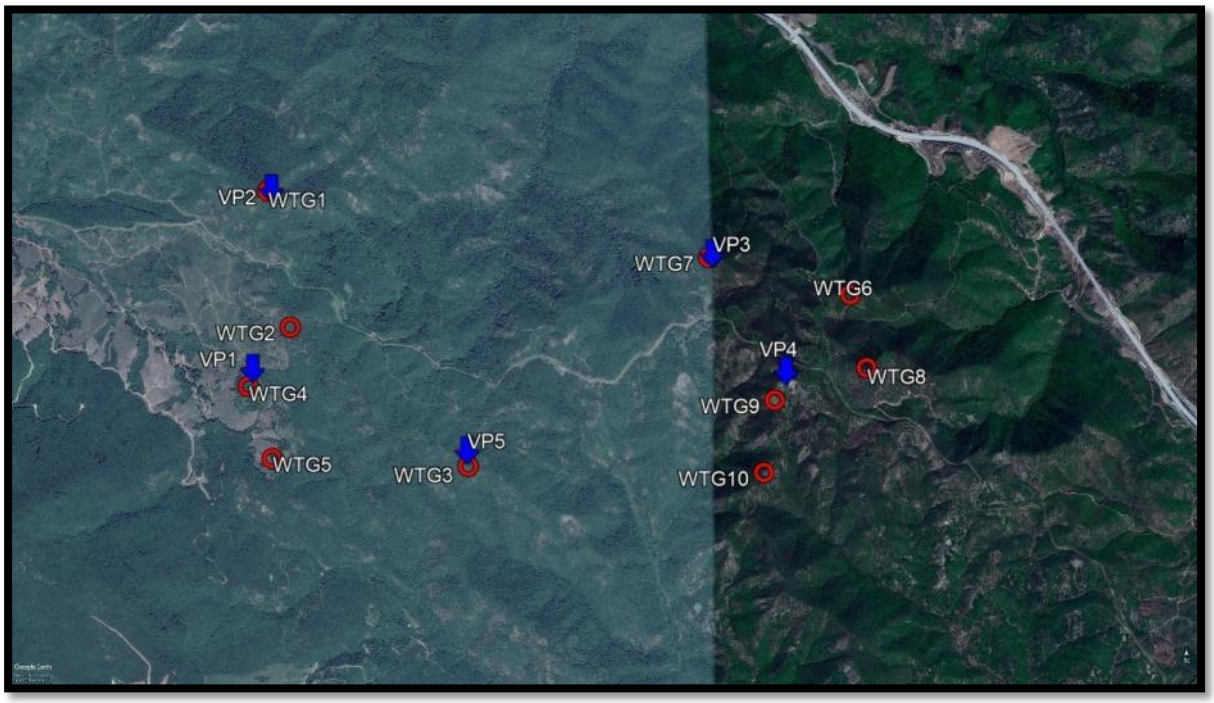

Figure 2-1 – Vantage points used for bird monitoring at the Wind Park „Dren" site

Based on SNH guidance (2014), VP watches from each location lasted three hours, with a gap of at least half an hour between each survey. Surveys were undertaken in a range of weather conditions as birds alter their behavior and flight patterns; however, it was not always possible to predict or respond to particular weather events. Start times varied, ensuring that VP watches are undertaken throughout the day, between dawn and dusk for each VP in each month. This resulted in a total of 12 hours every month per Vantage point (total 144 hours per year per VP) (Band et al. 2007, 2012; see Douglas et al. 2012).

During the VP watches, details of all target species (i.e. those identified in scoping assessment as vulnerable to collision) seen or heard were recorded. Information that was recorded includes: species,

sex (where possible), number, flight direction, location, flight duration and flight height for every 15 second period of height. Flight height were recorded as three different height categories (<50m, 50m-180m, >180m), with the minimum, maximum and average height recorded.

For the duration of a target species flight, the flight heights were recorded every 15 seconds to enable the amount of time spent within the potential collision risk height (approximately 30m-130m) to be established for each target species: an essential statistics for collision risk analysis. All target species flights were hand drawn on a map within the 2 km viewshed and that the timing of bird flights was recorded only within the collision risk window (i.e. the area of the viewshed delineated by the outmost turbines) within the viewshed. A different map were used for each VP watch, and a clear target note allowed each hand drawn flight to be associated with the correct flight details.

During the survey, information on all species were collected, and summarized at ten-minute intervals. Species not included on the target species list, but due to their flight patterns and behavior are still considered to be of some risk from a wind turbine development, are also noted. For these species, the number of individuals, flight direction and general flight height were recorded during the VP watch.

2.4 Breeding Raptor Surveys

Breeding raptor species vulnerable to collision with wind turbines can have breeding territories much larger than the extent of the wind farm. For these reasons and in accordance with SNH (2014) species specific surveys were undertaken to identify breeding locations in the wider landscape. Two survey visits for any of the target raptor species were undertaken in the relevant months where evidence of territory occupation (Visit 1) and location of active nests (Visit 2). Some overlap in the timing of breeding for the target species occured such that some survey visits included searches for several species at any one time.

In accordance with (Prakljačić et al, 2011), the survey area should extend from 1 km up to 6 km from the turbine clusters depending on the species (Figure 2-2).

In addition to census of widespread and numerous raptor species more detailed searches were conducted for any large raptors in the wider area.

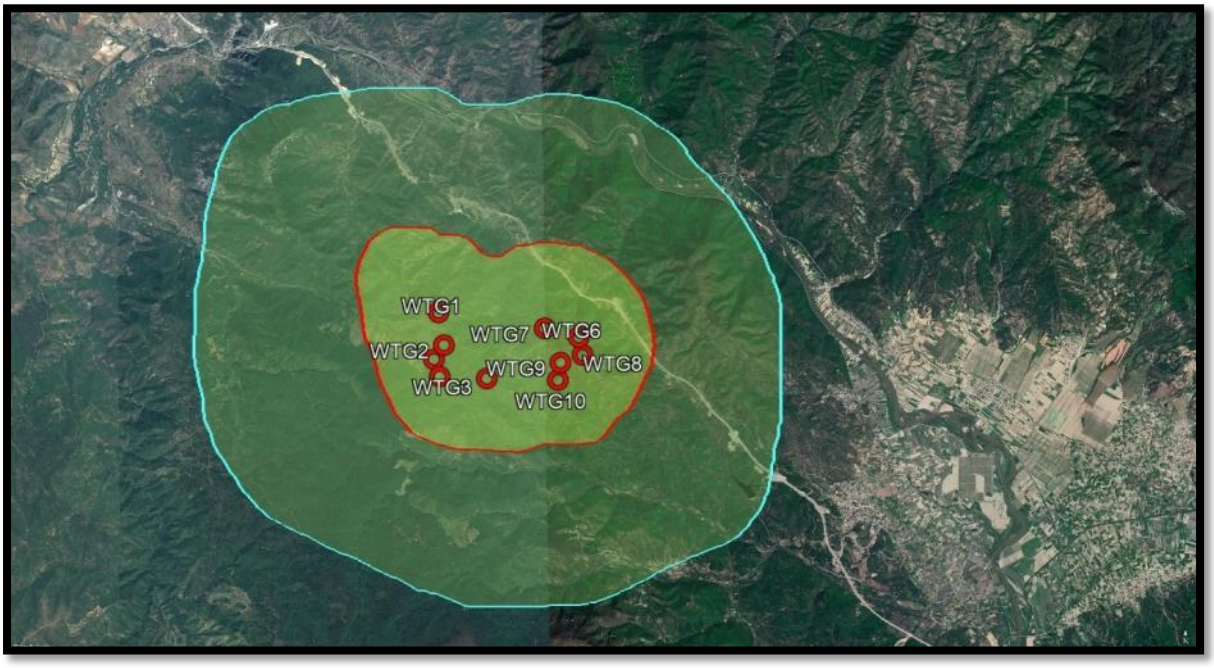

Figure 2-2 – Area covered for breeding raptor surveys at the Wind Park „Dren" site
Note: Depicted area using red line is 2 km border, while blue depicted area represent 6 km area

2.5 Nocturnal Surveys

Species specific surveys were undertaken for nocturnal bird species. Nocturnal species probably breeding and present in survey period in the vicinity of project area include:

- Eurasian eagle owl *Bubo bubo*;
- Tawny owl, *Strix aluco*; and
- Little owl *Athene noctua*.

Playback surveys, i.e. the broadcast of recordings of target species calls using audio equipment to illicit a response from birds present in the study area, were conducted at 8 locations (Figure 2-3) within 500 m of the turbine clusters (Prakljačić et al, 2011). Surveys were conducted on field visits in April and May for all target nocturnal species (owls plus *Caprimulgus europaeus*). Additional records of nocturnal birds from bat surveys will also be incorporated into the survey records.

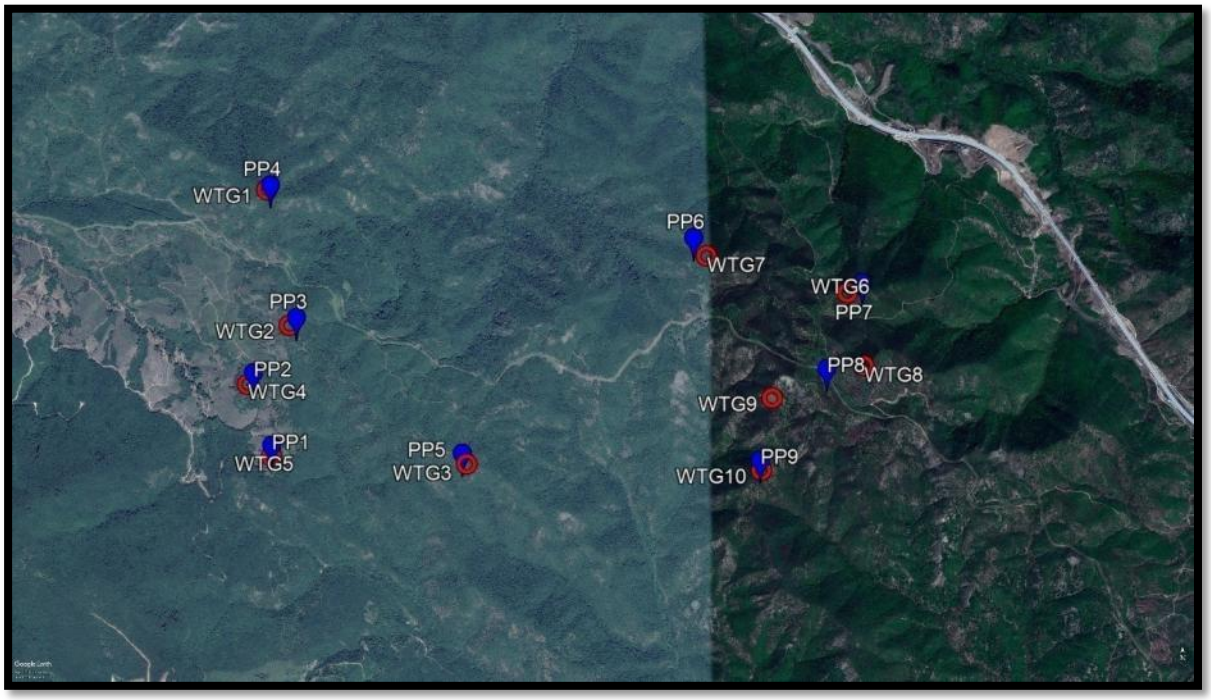

Figure 2-3 – Playback points to survey nocturnal species within the borders of Wind Park "Dren" site

2.6 Breeding Bird Surveys

Breeding bird surveys involved walking four transect routes (Figure 3-1) three times, with each visit to a specific transect spaced evenly across the breeding season in the period April to June aiming to record mainly passerines and other small birds breeding in the area.

Surveys started at sunrise, and the starting point and direction of the transect route varied each time to ensure that there is no tendency for any part of the survey area to be visited earlier or later in the day. Surveys, where practicable, were undertaken in fair weather conditions (i.e. not in heavy rain, poor visibility or strong wind).

All birds were identified by sight and sound within two distance bands of the transect line (within 50m, and over 50m) were recorded. This yielded estimates of density (birds per km^2) calculated in software Distance 7.1. The length, start/finish times, weather conditions and the proportion of each broad habitat type were also recorded for each transect survey.

3 BAT SURVEY METHODS

3.1 Overview

The section 3 describes the approach to bat surveys. Firstly, the criteria used to identify target species for survey are identified. The surveys for the target species comprises of two methodologies: manual and automated bat detector surveys.

3.2 Target Species

All bat species are protected in Europe by the EU Habitats Directive. The primary focus of the research will be directed to species with high and medium risk of collision damage with wind turbines (Rodrigues et al. 2014), which may potentially be present in the wider project area:

(1) High Risk:
- Noctule *Nyctalusnoctula*;
- Common Pipistrelle Bat *Pipistrellus pipistrellus*;
- Nathusius' Pipistrelle Bat *Pipistrellus nathusii*; and
- Soprano Pipistrelle*Pipistrellus pygmaeus*.

(2) Medium Risk:
- Serotine Bat *Eptesicus serotinus*; and
- European Free -Tailed Bat *Tadarida teniotis*

Secondary target species will include all other bats species (i.e. those rated low risk). In the vicinity of Wind park area there are several recorded species of bats including:

- *Myotis emarginatus*
- *M. mystacinus*
- *Rhinolophus hipposideros*
- *Rhinolophus blasii*
- *Miniopterus schreibersii*

3.3 Manual Bat Detector Surveys on the Ground

Manual bat detector surveys on the ground were conducted by transects based on Bat Conservation Trust guidelines (Hundt, 2012).

Transects were performed at a consistent speed of 2 km/h. Echolocation calls were continually recorded by a detector at a 45 degree angle to the direction of walk. A time expansion, full spectrum or frequency division detector was used for the recording, and the data was subsequently analysed to identify bat calls. Bat activity was recorded using a Manual bat detector (Pettersson D240X), which has heterodyne and frequency division with frequency range: 10-120 kHz (min.) and with a digital recorder. The locations at which bats pass were recorded using Global Positioning System (GPS) reference. Manual survey effort (to determine a site specific bat activity index (number of bat contacts per hour)) is as follows: two survey visit (transects) (Figure 3-1) in months from March till November, first half of night from half an hour before dusk for two hours will be performed.

3.4 Automated Bat Detector Surveys on the Ground

One automated bat detector per cluster (total 8 clusters) was installed on the ground (Figure 3-2). The time for which the detectors recorded the activity of the bats was used to calculate the bat activity index (number of contacts per hour). Automated bat detectors (Ciel CDP 102 R3 box) were used in each cluster position. This type of detector has been specifically designed for long-term surveys. It features HD-sound, external microphones and the stereo/dual option. It has the extended frequency range from 15 to 130 kHz and it is able to record all bat sounds in clear audio. These are stationary automatic detectors. Recorded bat calls were analysed using Batsound 4.1 software. Specific bat activity index was calculated as number of bat contacts per hour. Recorded bats are grouped according to the level of collision risk with wind turbines (Table 3-1). The used criteria to estimate the bat activity indexes are shown in Table 3-2.

High risk	Medium risk	Low risk	Unknown
Nyctalus spp.	*Eptesicus* spp.	*Myotis* spp.**	*Rousettus aegyptiacus*
Pipistrellus spp.	*Barbastella* spp.	*Plecotus* spp.	*Taphozousnudiventris*
Vespertilio murinus	*Myotis dasycneme**	*Rhinolophus* spp.	*Otonycterishemprichii*
Hypsugosavii			*Miniopterus pallidus*
Miniopteruss chreibersi			
Tadaridateniotis			

* in water rich area, ** exclusive *Myotis dasycneme* in water rich area

Table 3-1 - Level of collision risk with wind turbines (not micro- and small-wind turbines) for European and Mediterranean bat species to which EUROBATS applies (state of knowledge: September 2014) (Rodrigues et al., 2015)

Bat activity index	Assessment of activity
<1,6	Low activity
1,6-3,5	Medium activity
3,6-5,9	High activity
>6,0	Very high activity

Table 3-2 - Criteria of bat activity indexes to study impact of wind turbines (Dürr 2007)

3.5 Bat Roost Surveys

There are some houses and barns in the settlements around the proposed wind park which were surveyed. However, landscape at the immediate wind park area and closer vicinity does not have numerous trees with cavities with the potential for supporting roosting bats. Potential bat roosts within 500 m of each turbine location were surveyed, where found, by manual bat detector surveys in an attempt to identify bats leaving or entering the roosts. Additionally all known caves in the close proximity of wind park area were surveyed and also close by farms and abounded houses.

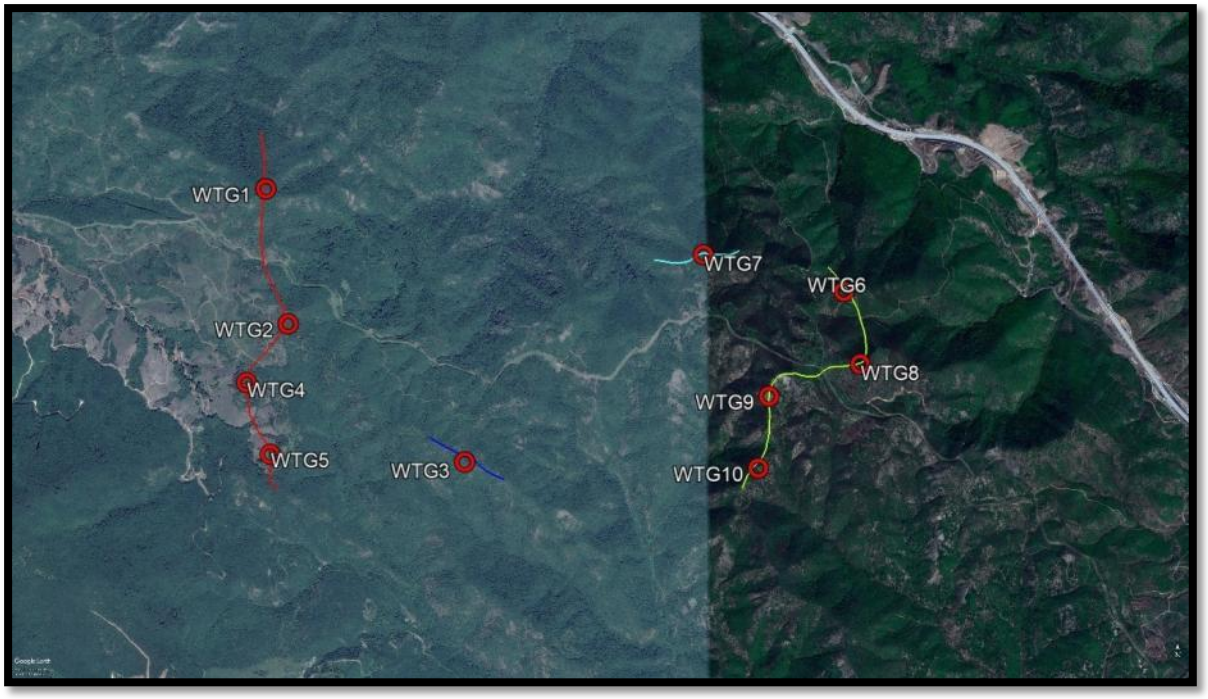

Figure 3-1 - Transects for manual bat surveys from the ground and breeding birds at the Wind Park "Dren" site

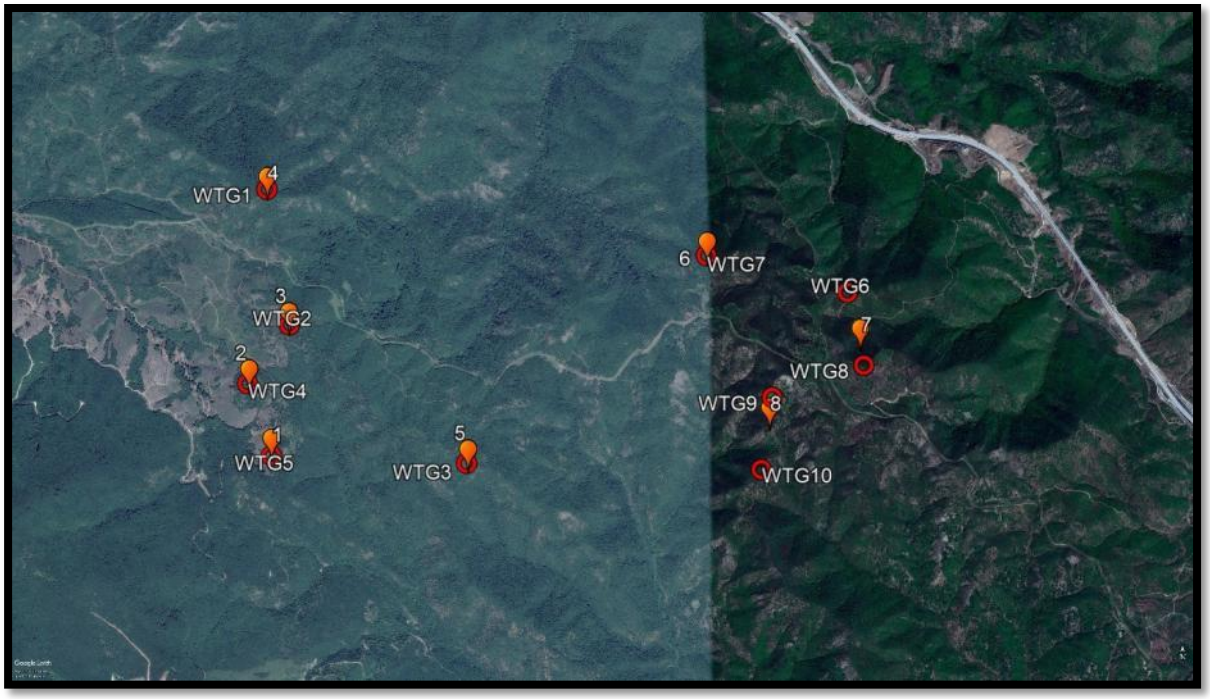

Figure 3-2 - Locations of automated bat detectors at the Wind Park "Dren" site

4 HABITATS IN THE STUDY AREA

The Project site is situated in the climazonal thermophilous forest belt of Pubescent oak and Oriental hornbeam. There are three habitat types in the study area:

1. Forests of Pubescent oak and Oriental hornbeam (Oak forests). This habitat is dominant in the area. It is represented by the forest community *Querco-Carpinetum orientalis*. This thermophyllous and xerophyllous community develops on skeletal cinnamon soils. The dominant (edifier) species is Oriental hornbeam (*Carpinus orientalis*) with high presence of the Pubescent oak (*Quercus pubescens*). Other tree species are also frequent in this habitat type: *Fraxinus ornus, Colutea arborescens, Coronilla emeroides, Acer monspessulanum, Rhamnus rhodopaea*. In some of the forests (especially in valleys in the project area) elements of the evergreen vegetation of the pseudomaquis can be found.

   The best preserved oak forests can be found in the ravines and small valleys of the project area. However, the majority of this habitat is represented by different degradation stadiums due to the historical exploitation by people in the area.

   This association is widespread in the submediterranean region of the Balkans. In Vardar and its tributaries it is climazonally distributed up to about 600 m a.s.l. and on southern slopes it is climbing up to 1000 m altitude. In the project area it covers the largest surfaces.

2. Greek Juniper community. Dominant species is *Juniperus excelsa*. Other important species of this community are *Prunus webbii, Phillyrea media, Prunus mahaleb, Pistacia terebinthus, Fraxinus ornus, Paliurus spina-christi, Asphodeline lutea* etc. The Greek juniper habitat is represented by the plant association Pruno webbii-Juniperetum excelsae. In the project area it is represented by very small and degraded scrub. It usually develops on eroded cinnamon soils in the project area (or on limestone rocky ground in the broader area of the Demir Kapija gorge).

   This habitat has scattered distribution in Macedonia, mainly in the river Vardar valley (south of Negotino), with enclave in the Badar gorge (south of Katlanovo). In the project area it has scattered distribution i.e. it is presented as very small patches in the matrix of oak forest.

3. Dry grasslands (hill pastures). Hill pastures have secondary origin in the area. They were formed by degradation and deforestation of the dominant oak forest habitat. It is presented by the plant association of Tunico-Trisetetum myrianthi Mic. 1972. These grasslands are consisted of therophyte plant species which dry-out in the beginning of the summer. In Macedonia, these habitats are distributed in the lowlands of the river Vardar valley. In the project area they are distributed in small patches (forest clearings) which are scattered and not connected.

The most important habitat from the conservation point of view (EU Habitats Directive) is the Greek Juniper community. However, the micro-sites of the WTGs and existing access roads in the area indicate that the project construction will not pose direct impact to the Greek Juniper community.

Habitat	Reference to EU Habitats Directive	Reference to Palaearctic Habitats
Forests of Pubescent oak and Oriental hornbeam (Oak forests)	/	41.82 Oriental hornbeam woods
	/	32.71 Helleno-Balcanic pseudomaquis
Greek Juniper community	9560 *Endemic forests with *Juniperus* spp.	42.A3 Grecian juniper woods (*Juniperetum excelsae*)
Dry grasslands	/	34.532 Helleno-Balcanic short grass and therophyte communities

Table 4-1 - Overview of the habitat types in the project area and their significance according to the EU Habitats Directive

5 RESULTS OF BIRD SURVEYS

5.1 Vantage Point Surveys

Ten target species were recorded during the research between April and June 2019, and they are summarized in Table 5-1.

Species	European Red List	Status
Accipiter brevipes (Levant Sparrowhawk)	LC – Least Concern	Summer
Accipiter gentiles (Goshawk)	LC – Least Concern	Resident
Accipiter nisus (Sparrowhawk)	LC – Least Concern	Resident
Buteo buteo (Buzzard)	LC – Least Concern	Resident
Buteo rufinus (Long-legged Buzzard)	LC – Least Concern	Resident
Circus aeruginosus (Marsh Harrier)	LC – Least Concern	Migrant
Circus cyaneus (Hen Harrier)	NT – Near Threatened	Wintering
Falco vespertinus (Red-footed Falcon)	NT – Near Threatened	Migrant
Gyps fulvus (Griffon Vulture)	LC – Least Concern	Resident
Milvus migrans (Black Kite)	LC – Least Concern	Migrant

Table 5-1 - Target species of birds recorded at the area of the Wind Park "Dren"

Total flight time spent on different height categories in minutes during the period from April to June 2019 are presented in Table 5-2.

Species	No. of observed birds	Total flight time spent on different height categories in minutes		
		0-50 m	50-180 m	> 180 m
Accipiter brevipes	1		1:00	
Accipiter gentiles	7		6:00	10:30
Accipiter nisus	14	11:00	4:15	0:30
Buteo buteo	60	17:00	22:30	55:00
Buteo rufinus	11	6:45	4:45	10:15
Circus aeruginosus	11	5:45	6:30	4:15
Circus cyaneus	4	7:45	2:15	
Falco vespertinus	2			1:45
Gyps fulvus	15			22:45
Milvus migrans	1			2:15

Table 5-2 - Total flight time spent on different height categories (in minutes)

Out of 10 observed target species in the research area, seven were present in collision risk window (see Table 5-2) and for these seven species collision risk assessment was calculated using formula established by Band (2007). The Collision Risk Model (CRM) demonstrates a relatively low annual collision rate when adjusted for avoidance (Table 5-3). The highest collision rates can be found amongst the three most frequently encountered species *Buteo buteo*, *Buteo rufinus* and *Circus aeruginosus*. Assuming an avoidance rate of 98% for all three species (SNH, 2010) the collision rate is similar and is around 1 dead bird per species every year. The rest of observed species had very low CRM rates.

Species	Avoiding action				
	None	90%	95%	98%	99%
Accipiter brevipes	1.08	0.11	0.05	0.02	0.01
Accipiter gentilis	8.19	0.82	0.41	0.16	0.08
Accipiter nisus	7.11	0.71	0.35	0.14	0.07
Buteo buteo	69.28	6.93	3.46	1.38	0.69
Buteo rufinus	35.18	3.52	1.76	0.70	0.35

Circus aeruginosus	33.54	3.35	1.68	0.66	0.33
Circus cyaneus	2.18	0.22	0.07	0.04	0.02

Table 5-3 - Estimated annual collision risk for Wind Park "Dren"

All other non target species observed at VP points are given in Table 5-4.

Scientific name	English name	All combined VP observations											
		Month											
		X	XI	XII	I	II	III	IV	V	VI	VII	VI	IX
Columba palumbus	Common Wood-pigeon	X	X	X	X	X	X	X		X	X	X	X
Lanius collurio	Red-backed Shrike								X	X	X	X	
Lanius excubitor	Great Gray Shrike			X	X		X						
Troglodytes troglodytes	Winter Wren	X	X	X	X	X	X	X			X	X	
Turdus merula	Eurasian Blackbird	X	X	X	X	X	X	X	X	X	X	X	X
Turdus viscivorus	Mistle Thrush	X		X	X	X	X	X			X	X	X
Turdus philomelos	Song Thrush							X	X	X	X	X	X
Turdus pilaris	Fieldfare		X	X	X	X	X						
Erithacus rubecula	European Robin	X	X	X	X	X	X	X	X	X	X	X	X
Phoenicurus ochruros	Black Redstart	X	X	X	X	X	X	X					X
Phylloscopus sibilatrix	Wood Warbler							X					X
Phylloscopus collybita	Common Chiffchaff	X					X	X	X	X	X	X	X
Phylloscopus trochilus	Willow Warbler	X					X						
Aegithalos caudatus	Long-tailed Tit	X	X	X	X	X	X	X	X	X	X	X	X
Parus palustris	Marsh Tit	X		X		X			X		X	X	X
Parus major	Great Tit	X	X	X	X	X	X	X	X	X	X	X	X
Parus caeruleus	Blue Tit	X	X	X	X	X	X	X	X	X	X	X	X
Emberiza cia	Rock Bunting		X			X	X						
Fringilla coelebs	Chaffinch	X	X	X	X	X	X	X	X	X	X	X	X
Fringilla montifringilla	Brambling		X	X	X	X	X						
Carduelis chloris	European Greenfinch	X	X	X		X	X	X	X	X	X	X	X
Carduelis carduelis	European Goldfinch	X		X		X	X	X	X	X	X	X	X
Carduelis cannabina	Linnet		X	X		X							
Carduelis spinus	Siskin		X	X	X	X							
Coccothraustes coccothraustes	Hawfinch	X	X	X	X	X	X	X	X	X	X	X	X
Sturnus vulgaris	Common Starling	X					X	X					X
Garrulus glandarius	Eurasian Jay	X	X	X	X	X	X	X	X	X	X	X	X
Corvus corone cornix	Carrion Crow	X			X	X	X	X	X	X	X	X	X
Corvus corax	Common Raven	X	X	X	X	X	X	X		X	X	X	X
Hirundo rustica	Barn Swallow	X					X	X		X		X	X
Sylvia curruca	Lesser Whitethroat	X					X		X	X	X	X	X
Ptyonoprogne rupestris	Eurasian Crag Martin	X					X	X			X	X	X

Sylvia atricapilla	Blackcap	X	X			X		X	X	X	X	X	X
Columba livia	Feral Pigeon	X			X	X	X	X	X	X	X	X	X
Parus lugubris	Sombre Tit					X	X	X	X	X	X	X	X
Turdus philomelos	Song Thrush						X						
Emberiza citrinella	Yellowhammer					X	X						
Alauda arvensis	Skylark						X						
Lullula arborea	Woodlark						X	X	X	X	X	X	X
Delichon urbicum	Common House Martin						X	X				X	X
Sitta europaea	Nuthatch				X	X	X	X	X	X	X	X	X
Certhia brachydactyla	Short-toed treecreeper							X				X	X
Certhia familiaris	Eurasian treecreeper					X							
Dendrocopos major	Great Spotted Woodpecker				X	X	X	X	X	X	X	X	X
Dryocopus martius	Black Woodpecker				X								
Anthus pratensis	Meadow Pipit					X							
Anthus spinoletta	Water Pipit				X	X							
Anthus trivialis	Tree Pipit						X	X	X	X	X	X	X
Motacilla alba	White Wagtail						X			X	X	X	X
Sylvia cantillans	Subalpine Warbler							X	X	X	X	X	X
Emberiza cirlus	Cirl Bunting							X	X	X	X	X	X
Cecropis daurica	Red-rumped Swallow							X			X	X	X
Apus apus	Common Swift											X	
Anthus campestris	Tawny Pipit												X
Sylvia borin	Garden Warbler											X	X
Oriolus oriolus	Golden Oriole												X
Picus viridis	Green Woodpecker												X
Phoenicurus phoenicurus	Common Redstart											X	X
Ficedula parva	Red-breasted Flycatcher											X	
Oenanthe oenanthe	Northern Wheatear											X	

Table 5-4 – All observed species per month in the Wind Park "Dren" area

5.2 Breeding Raptor Surveys

In accordance with the methodology presented in the this report, during April and May a survey of larger birds of prey in the wider area around the project site (from two up to six kilometres) were conducted.

Since, in the wider area of the proposed wind park, there is a presence of several raptor species (e.g. Common Buzzard, Sparrowhawk, Goshawk) it was expected that breeding territories of these species in nearby areas to be registered. However, during thes e surveys, no nests of any smaller species in the surrounding areas, except same territories of Common Buzzard (Figure 5-1) were found. Additionally one potential territory of Levant Sparrowhawk (*Accipiter brevipes*) was found during the survey in May.

Regarding larger species, in big rock formation near village Klisura there is breeding colony of Griffon Vulture (Figure 5-2) approximately 5.2 km northwest from nearest WTG. During April and May there were still two active pairs stayed to breed and few more individuals on nearby vulture feeding restaurant (up to six at once).

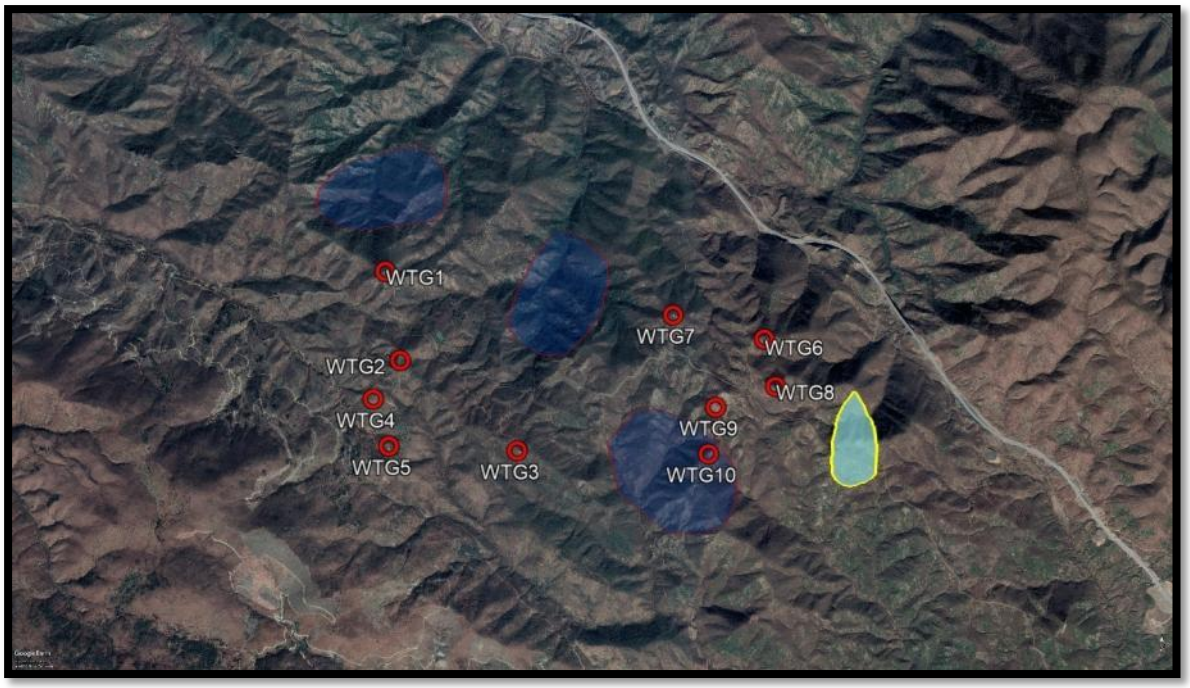

Figure 5-1 - Locations of breeding territories of Common Buzzard (*Buteo buteo* - areas depicted with red line) and Levan Sparrowhawk (*Accipiter brevipes* - area depicted with yellow line) at the area of the Wind Park "Dren"

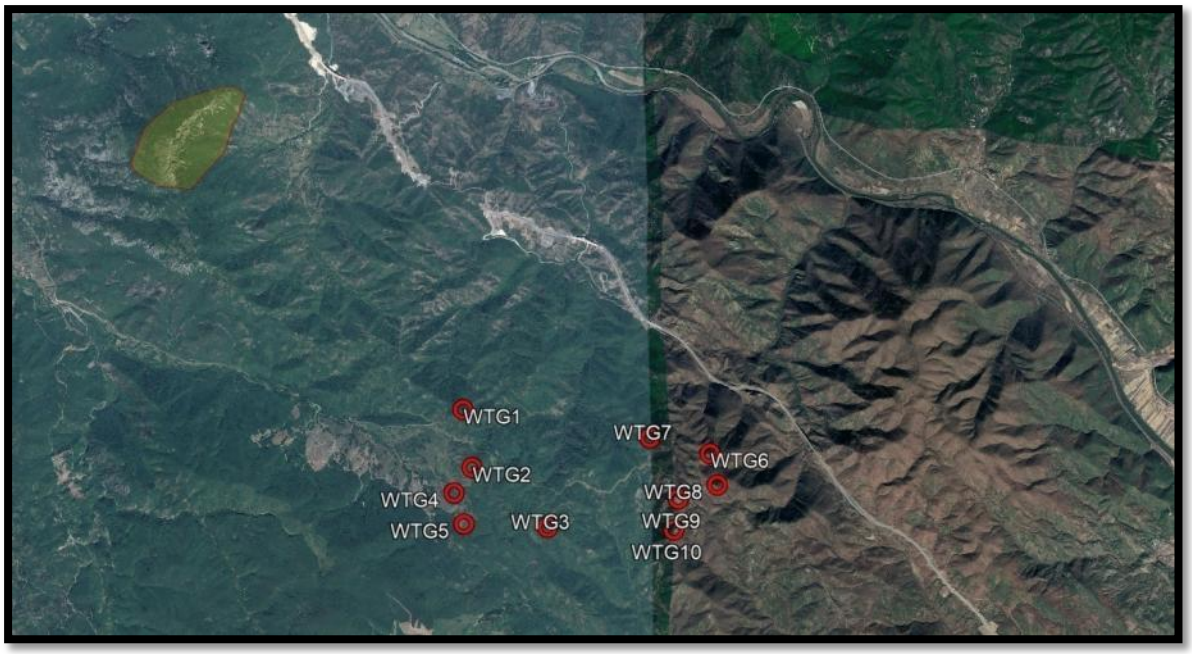

Figure 5-2 - Locations of Griffon Vulture nests in 6 km radius around the Wind Park "Dren"

5.3 Nocturnal Surveys

During nocturnal surveys in October 2018 and April 2019, three species of owls - Scops Owl (*Otus scops*), Eagle owl (*Bubo bubo*) and Tawny Owl (*Strix aluco*) as well as Nightjar (*Caprimulgus europaeus*) were recorded.

During October, a response of Eagle owl on PP8 (male and female call) has been recorded, as well as a response of two pairs of Tawny owl (both male and female) on PP2 and PP4 (Figure 5-3). It is likely that this pair of Eagle owl is having a territory on the rocky areas nearby PP8. Two pairs of Tawny owl are probably also nesting in forests around Wind Park "Dren".

Figure 5-3 - Findings of different species of owls in surroundings of the Wind Park "Dren" area during October 2018

During nocturnal surveys in April, three species of owls - Scops Owl (*Otus scops*), Eagle owl (*Bubo bubo*), and Tawny Owl (*Strix aluco*) were recorded. One male of Scops Owl responded on PP1, as well as of Eagle owl on PP8 (male and female call), in the same spot like in October. Two pairs of Tawny owl (both male and female) responded on PP4 and PP5 (Figure 5-4). It is assumed that this pair of Eagle owl is having a territory on the rocky areas nearby PP8. Two pairs of Tawny owl and one pair of Scops Owl are probably also nesting in forests around the Wind Park "Dren" site.

During bat transects, no owl was encountered at transects routes, which could implicit that owl species do not use wind park area extensively.

Additionally, during playback for Nightjar (*Caprimulgus europaeus*), four territorial males were found (Figure 5-5).

Figure 5-4 - Findings of different species of Owls in surroundings of the Wind Park "Dren" area during April 2019

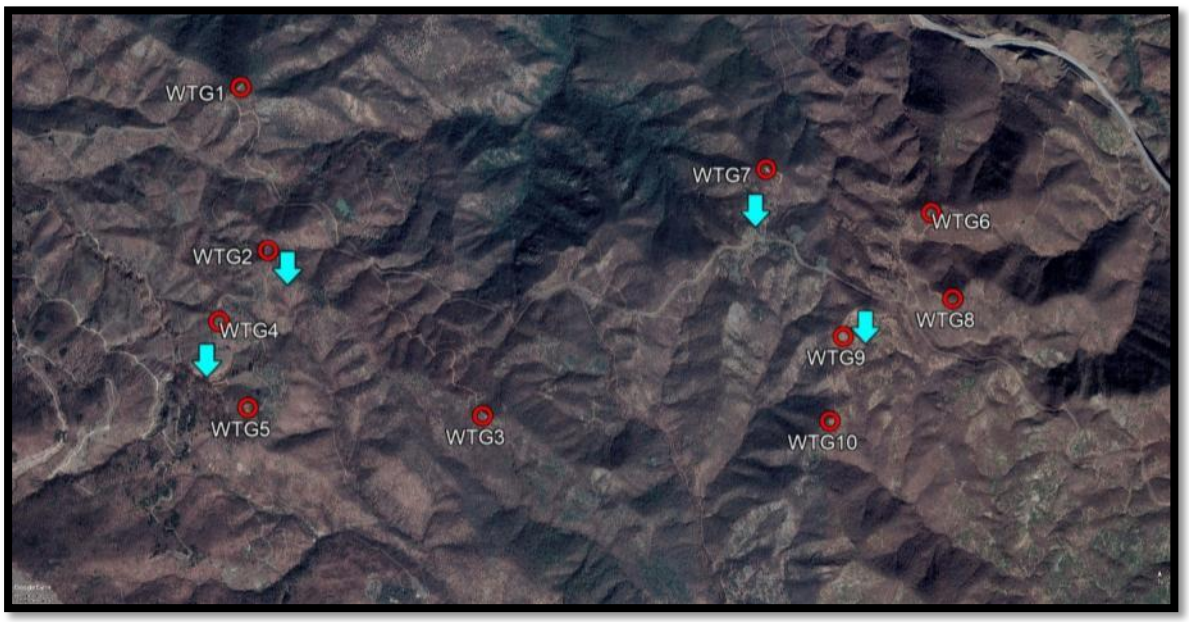

Figure 5-5 - Findings of different territories of Nightjar in surroundings of the Wind Park "Dren" area during April 2019

5.4 Breeding Bird Surveys

A total of 20 species, excluding raptors, owls and nightjar were recorded in the turbine cluster areas during the breeding bird surveys (Tables from 5-5 to 5-8). Species richness was highest in the Transect 1 area (n=17), then Transect 4 area (n=15), then Transect 3 area (n=9) and on the end Transect 2 area (n=8). Details of transects are given below (Table 5-9).

Transect 1	
Species	Density (pairs/ha)
Fringilla coelebs	4.64
Troglodytes troglodytes	1.44
Parus major	3.87
Parus caeruleus	2.48
Parus lugubris	2.03
Emberiza cirlus	4.31
Phylloscopus collybita	3.57
Sylvia atricapilla	2.94
Sylvia curruca	2.15
Coccothraustes coccothraustes	1.69
Garrulus glandarius	2.08
Lullula arborea	2.12
Sylvia cantillans	3.54
Carduelis chloris	2.06
Turdus merula	4.19
Sitta europaea	0.15
Turdus philomelos	1.25

Table 5-5 - Breeding bird species with densities on Transect 1

Transect 2	
Species	Density (pairs/ha)
Fringilla coelebs	3.15
Parus major	3.75
Parus caeruleus	2.56
Emberiza cirlus	3.99
Phylloscopus collybita	3.10
Sylvia atricapilla	2.16
Turdus merula	4.01
Turdus philomelos	0.19

Table 5-6 - Breeding bird species with densities on Transect 2

Transect 3	
Species	Density (pairs/ha)
Fringilla coelebs	1.78
Parus major	2.34
Parus lugubris	1.18
Emberiza cirlus	3.17
Phylloscopus collybita	3.91
Sylvia atricapilla	2.16
Sylvia curruca	1.66
Sylvia cantillans	2.14
Turdus merula	3.33

Table 5-7 - Breeding bird species with densities on Transect 3

Transect 4	
Species	Density (pairs/ha)
Fringilla coelebs	2.87
Anthus trivialis	1.61
Parus major	3.14
Parus lugubris	2.52
Emberiza cirlus	3.47
Phylloscopus collybita	2.53
Sylvia atricapilla	2.32
Sylvia curruca	1.96
Coccothraustes coccothraustes	0.45
Sylvia communis	2.21
Lullula arborea	1.65
Sylvia cantillans	3.11
Turdus merula	2.94
Lanius collurio	1.37
Turdus philomelos	1.24

Table 5-8 - Breeding bird species with densities on Transect 4

Transect	Lenght
Transect 1 (red)	2.21 km
Transect 2 (dark blue)	0.50 km
Transect 3 (light blue)	0.51 km
Transect 4 (yellow)	1.82 km

Table 5-9 - Transect details

6 RESULTS OF BAT SURVEYS

Ten bat species were registered during one year monitoring (October 2018 – September 2019) of bats at the Wind Park "Dren" area, using manual and automatic bat detectors. During the searches for bats roosts, no actual or potential bat roost in the wind park area and its proximity has been found.

6.1 Manual Bat Detector Surveys on the Ground

Seven bat species were registered during one year monitoring using manual detector. Details about presence of bats registered by manual bat detector are presented in Table 6-1. Additionally details of number of bat passes and values of Bat Activity Index (BAI) are given in Table 6-2.

Species	Transect 1	Transect 2	Transect 3	Transect 4
Pipistrellus pipistrellus	X	X	X	X
Pipistrellus pygmaeus	X			
Myotis blythii	X	X		
Myotise marginatus		X	X	
Myotis sp.	X	X	X	X
Rhinolophus hipposideros	X			
Vespertilio murinus	X		X	X

Table 6-1 - Presence of bat species registered using manual detector on transect lines

Date (Month)	Parameter	Transect 1	Transect 2	Transect 3	Transect 4
October	Nt (BAI)	4 (1.6)	3 (1.25)	1(1.42)	1(1.25)
		3 (1.25)	2 (0.83)	1(1.42)	1(1.25)
November	Nt (BAI)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
		0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
April	Nt (BAI)	1 (0.75)	0 (0.0)	0 (0.0)	1 (1,06)
		2 (1.5)	0 (0.00)	0 (0.0)	1 (1.06)
May	Nt (BAI)	2 (1.45)	1 (1.81)	0 (0.00)	3 (2,38)
		3 (2.17)	1 (1.8)	1 (1.5)	2 (1.53)
June	Nt (BAI)	2 (1.43)	1 (1.66)	2 (2.7)	3 (2.29)
		1 (0.71)	0 (0.00)	0 (0.00)	1 (0.78)
July	Nt (BAI)	2 (1.6)	1 (1.25)	0 (0.00)	0 (0.00)
		1 (0.87)	1 (1.33)	1 (1.81)	1 (1.75)
August	Nt (BAI)	2 (1.74)	2 (2.11)	1 (1.66)	0 (0.00)
		3 (2.4)	1 (1.05)	2 (3.07)	1 (1.67)
September	Nt (BAI)	3 (2.22)	2 (2.35)	1 (1.54)	2 (2.56)
		1 (0.8)	0 (0.00)	0 (0.00)	0 (0.00)

Nt: 'total number of registered bats'

Table 6-2 -Number of bat passes and Bat Activity Index on transect lines obtained by using manual bat detector surveys from ground

Bat activity indexes obtained using manual bat detector from the ground varied from 0.71 – 3.07 during months with bat activity. Between May and September, bat activity was reported on several occasions corresponding to a moderate index. However, in most cases the recorded values of BAI corresponded to low activity of bats in the surveyed area.

6.2 Automated Bat Detector Surveys on the Ground

Eight bat species were registered during one year monitoring using automated detector. Details about presence of bats species registered by automated bat detector are presented in Table 6-3. Additionally

details of number of bat passes, values of BAI and recorded bat species during this one-year period (October 2018 – September 2019) are given in Table 6-4.

Species	1	2	3	4	5	6	7	8
Pipistrellus pipistrellus	X	X	X	X	X	X	X	X
Plecotus austriacus			X					
Plecotus auritus	X		X		X	X		
Myotise marginatus	X			X	X		X	
Myoti ssp.		X			X			X
Rhinolophus euryale				X		X		
Miniopteruss chreibersii		X	X			X	X	
Vespertilio murinus		X		X	X			X

Table 6-3 -Presence of bat species registered using automated (static) detectors

Date	Param.	1	2	3	4	5	6	7	8
October (27.10.)	Nt (BAI)	4 (0.4)	5 (0.5)	4 (0.4)	3 (0.3)	2 (0.2)	5 (0.5)	6 (0.6)	3 (0.3)
October (28.10)		2 (0.2)	3 (0.32)	2 (0.21)	2 (0.22)	4 (0.42)	3 (0.32)	4 (0.42)	4 (0.42)
November (24.11.)	Nt (BAI)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
November (25.11.)		0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
April (19.04.)	Nt (BAI)	3 (0.29)	2 (0.19)	2 (0.19)	1 (0.1)	2 (0.2)	4 (0.38)	2 (0.2)	3 (0.3)
April (20.04.)		5 (0.48)	3 (0.29)	3 (0.3)	2 (0.19)	4 (0.39)	3 (0.3)	1 (0.1)	0 (0,00)
May (10.05.)	Nt (BAI)	6 (0.66)	5 (0.55)	5 (0.55)	8 (0.78)	3 (0.32)	6 (0.65)	5 (0.54)	8 (0.87)
May (11.05.)		4 (0.43)	7 (0.76)	8 (0.88)	6 (0.59)	5 (0.55)	6 (0.66)	7 (0.77)	3 (0.32)
June (15.06.)	Nt (BAI)	10(1.18)	7 (0.82)	11(1.29)	13(1.53)	10(1.18)	5 (0.59)	6 (0.71)	8 (0.94)
June (16.06.)		7 (0.82)	11(1.29)	15(1.76)	8 (0.94)	4 (0.47)	10(1.17)	7 (0.82)	11(1.29)
July (18.07.)	Nt (BAI)	8 (0.98)	12(1.47)	15(1.84)	11(1.35)	7 (0.86)	18(2.21)	12(1.47)	7 (0.82)
July (20.07.)		9 (1.10)	11(1.35)	10(1.23)	14(1.72)	6 (0.74)	11(1.31)	10(1.20)	4 (0.49)
August (16.08.)	Nt (BAI)	10(0.93)	7 (0.65)	14(1.30)	12(1.11)	8 (0.74)	10(0.95)	11(1.05)	7 (0.67)
August (18.08.)		12(1.10)	8 (0.73)	9 (0.82)	11(1.00)	11(1.00)	8 (0.73)	8 (0.73)	8 (0.73)
September(13.09.)	Nt (BAI)	6 (0.52)	11(0.96)	9 (0.78)	5 (0.43)	4 (0.35)	11(0.92)	10(0.84)	3 (0.25)
September(14.09.)		5 (0.43)	4 (0.35)	5 (0.42)	3 (0.26)	5 (0.44)	5 (0.44)	4 (0.35)	1 (0.09)

Nt: total number of registered bats.

Table 6-4 - Number of bat passes and Bat Activity Index obtained by using static detector surveys from ground

Bat activity indexes obtained using automated (static) bat detector from the ground varied from 0.1-1.84 during the survey period. These values are corresponding with low activity of bats in surveyed areas. Only on position 3 and 4 in June and July activity of bats (1.76, 1.84; 1.72) was recorded, which is corresponding to moderate activity values. In most cases, the recorded BAI values in almost all clusters corresponded to the low activity of bats in the study area.

7 CRITICAL HABITAT & LEGALLY PROTECTED AREAS OR INTERNATIONALLY RECOGNISED AREAS

The Project site is not located:

- within a legally protected area or an area proposed for legal protection by the respective Macedonian regulatory framework[2];
- within internationally recognized area[3] of biodiversity value, or
- within trans-boundary protected area.

Therefore, the Project will not adversely affect or compromise the integrity, conservation objectives or biodiversity importance of any legally protected area or internationally recognised area.

The closest sensitive area of biodiversity value to the Project is the gorge Demir Kapija, located at approximate relative distance of 6 km from the Project site. This area is proclaimed as protected area – Natural Monument[4] (NM) 'Demir Kapija' (1960). In addition, the area around the gorge Demir Kapija is:

- Nominated as Emerald site of Special Conservation Interest 'Demir Kapija' (2004, site code MK0000005). Emerald ecological network is developed in the framework of the Berne Convention[5] and is formally regarded as preparation for application of the EU Habitats Directive. The Emerald Network is based on the same principles as EU's NATURA 2000 ecological network and represents its extension to non-EU countries.
- Important Bird Area (IBA) 'Demir Kapija Gorge'[6] (2010, site code MK008), meeting the IBA criteria A1, A3, B2. Following IFC guidelines on determining critical habitat for IBA 'Demir Kapija Gorge', this area is not considered to meet the relevant criteria for all qualifying species, with the exception of Egyptian vulture (*Neophron percnopterus*), classified as endangered on the IUCN Red List. In last few decades, the population of this species has been declining in Macedonia and its nesting in IBA 'Demir Kapija Gorge' has not been regularly recorded. Population of this species in this IBA is estimated on 2-3 individuals[7], which is approx. 10% of the total population in Macedonia (estimated to 28-32 individuals[8]).

[2] Law on Nature Protection of R. Macedonia

[3] Sites identified under international conventions or agreements, e.g.:
- UNESCO Natural World Heritage Sites or UNESCO Man-and-Biosphere Reserves, under UN Convention Concerning the Protection of the World Cultural and Natural Heritage – UNESCO World Heritage Convention (Paris, 1972)
- the Ramsar List of Wetlands of International Importance, under UN Convention on Wetlands of International Importance – Ramsar Convention, (Ramsar, Iran, 1971), and
- Emerald sites, under Berne Convention on the Conservation of European Wildlife and Natural Habitat, and
- Sites identified as Important Plant Area (IPA), Important Bird Area (IBA) or Prime Butterfly Area (PBA)).

[4] According to the Macedonian Law on Nature Protection, Natural Monument is a protected area of category III and is fully compliant with the respective IUCN categorization of protected areas [Ref. "Development of representative protected areas network"; Macedonian Ecological Society, March 2011; supported by UNDP and the Ministry of Environment and Physical Planning]

[5] Convention on the Conservation of European Wildlife and Natural Habitats – Berne Convention

[6] http://datazone.birdlife.org/site/factsheet/demir-kapija-gorge-iba-north-macedonia (Bird Life International (2019) Important Bird Areas fact sheet: Demir Kapija Gorge. Downloaded from http://www.birdlife.org on 20/11/2019)

[7] Velevski, M., Hallmann, B., Grubač, B., Lisičanec, T., Stoynov, E., Lisičanec, E., Avukatov, V., Božič, L. and Stumberger, B., 2010. *Important Bird Areas in Macedonia: Sites of Global and European Importance*. Acrocephalus, 31 (147): 181-282.

[8] Velevski, M., Hallmann, B., Grubač, B., Lisičanec, T., Stoynov, E., Lisičanec, E., Avukatov, V., Božič, L. and Stumberger, B., 2010. *Important Bird Areas in Macedonia: Sites of Global and European Importance*. Acrocephalus, 31 (147): 181-282.

This species, classified as endangered on the IUCN Red List, has the potential to trigger critical habitat requirements if the Project site harbors habitats of significant importance for the species and if it is considered to support nationally or regionally important populations. However, no significant habitat for this endangered species that would trigger critical habitat requirements was identified at the Project site (see section 4). In addition, this species was not recorded during the one-year monitoring surveys at the Project site as well as in the wider project area during the monitoring of birds of prey (see section 5.2).

It is therefore considered that, based on the findings of the one-year monitoring surveys for birds, adverse project related impacts on bird species could be managed through appropriate mitigation.

8 CONCLUSIONS & RECOMMENDATIONS

8.1 Key Findings

Birds

Weather conditions in Macedonia were typical during the one year reporting period (autumn 2018 – summer 2019) and the vantage point surveys can therefore be considered to be representative for the study area.

During the one year monitoring period, ten target species were recorded, but only seven within collision risk window. There is indication of a light passage of both spring and autumn migration of species vulnerable to collision with wind turbines, in particular raptors. *Milvus migrans and Falco vespertinus* were recorded at low frequency and in small numbers, flying above collision risk window. These were the only target species considered to be passage migrants.

Target species recorded at low frequency and in relatively small numbers included *Accipiter nisus, Accipiter brevipes, Accipiter gentiles* and *Circus cyaneus*. Additionally, three the most numerous species which were observed in collision risk window are *Buteo buteo, Buteo rufinus* and *Circus aeruginosus.* Not a single specimen of *Gyps fulvus* were recorded in the collision risk window, even it was observed frequently during vantage observations.

According to the findings of the surveys performed, there is no evidence to indicate that there is a significant risk of collision with respect to the target species.

The Collision Risk Model (CRM) indicates a relatively low annual collision risk for all species recorded during the surveys. In respect of migratory species, no specific mitigation or further monitoring is currently considered necessary.

Given the presence of three species of owls (*Strix aluco, Bubo bubo* and *Otuss cops*) and Nightjar (*Caprimulgus europaeus*) and the fact that nocturnal activity may pose greater hazards for birds (SNH, 2015), monitoring for owl species is recommended as part of the operational monitoring of the Project. Monitoring will identify the need for corrective operational mitigation measures, if required.

The breeding bird community of the site is typical of the submediterranen habitats present with no species of European conservation concern being present.

Breeding raptors are present within the project area and the wider Dren area. Although none of these species are considered to be of European conservation concern, Griffon Vulture (*Gyps fulvus*) is nationally protected and just few pairs are currently breeding in Macedonia. Colony (two pairs) in village Klisura around 5 km distance to nearest WTG and this should be monitored carefully. Whilst the CRM indicates a relatively low annual collision risk for resident breeding raptor species, it is considered appropriate in the light of the potential significance of the populations to undertake operational monitoring. This monitoring should take the form of breeding raptor surveys to quantify the number of breeding pairs within the wider project area as well as carcass searches for collision victims in accordance with Scottish National Heritage guidance (SNH, 2009). Monitoring should take place in years 1, 2, 3, 5, 7, 10 and 15 of operation in accordance with Scottish National Heritage guidance (SNH, 2014). If the annual rate of collision is higher than predicted, corrective mitigation measures should be implemented to reduce the collision risk during operation of the proposed Wind Park "Dren".

Bats

During the hibernation periods (January-March and November-December) no bats shelters were registered in the wider project area. The period of post-hibernation and spring migration (April-June) is characterized by low activity of bats in this area. During the summer months (July-September), which

represent the activity of the local population, increased activity of the bats is registered in wider area. The values of the Bat Activity Index (BAI) correspond with low to moderate values. At the beginning of the autumn migration, the activity value is also moderate and falls to low during the pre-hibernation period (October-November). The values of the BAI in the immediate project area during the whole period of the survey were mostly at the low values level. These findings indicate that the area intended for the construction of the proposed Wind Park "Dren" does not represent an area of particular importance for bats.

8.2 Recommendations

Following supplementary mitigation measures are proposed based on the key findings from the monitoring surveys conducted during one-year cycle, from October 2018 to September 2019:

(1) During construction stage

- Employ qualified biodiversity specialist with responsibility to supervise the implementation and efficiency of the mitigation plans as well as to:
  - liaise and consult with relevant environmental authorities as needed to establish rules for protection;
  - carry out pre-construction checks of vegetation and trees during the breeding season to ensure avoidance of nesting birds and bats, inclusive to enable clearance during this period;
  - monitor that there is no unnecessary damage to habitats and other natural resources from construction works and access roads.
- Minimize disturbance by reducing construction activities during the main breeding season. In this respect, no auxiliary facilities (e.g. access roads, work camps, storage areas, borrow pits, etc.) or activities (e.g. construction traffic) associated with the project construction should be allowed within or in vicinity to the area of the Demir Kapija Gorge[9] despite the fact that it is distant from the project site and will not be directly affected during the construction works.
- Ensure that all personnel are informed and aware of the importance to protect species, habitats, fauna and flora and are informed about wildlife encounter procedures. Ensure that information and awareness training is documented.
- Brief all site staff on procedures to be implemented if any nest or nesting birds are found within the construction area. Stop the work in the area until biodiversity specialist advice is sought and implemented.
- Report injured animals (bird, bat, etc.) or any sighting or finding of dead wildlife (bird, bat, etc.) killed by the construction works to appropriate environmental authority.
- Designate smoking areas as this may pose serious fire hazard (summer season).
- Limit workers to construction sites and prohibit disturbance of local flora and fauna. Specifically, do not allow disturbance of natural habitats outside of construction zones, as well as disturbance of animals and hunting of game, birds, etc.; collection of bird eggs; etc.
- Only use designated roads or paths and abide by speed limits.

(2) During operational stage

- Reduce the risk of collision of birds with WTGs and bird fatality by increasing their visibility by painting the turbines' blades. This is considered as primary mitigation that needs to be built

[9] The area of Demir Kapija gorge is:
- Nationally protected area as Natural Monument
- Internationally recognised area: Emerald site and Important Bird Area

into the project technical design and further discussed with relevant environmental authorities.

- Regular clearance of vegetation around WTGs to minimize the attractiveness of preys of predatory birds and discourage of birds from perching near the turbines.
- Design and implement an operational monitoring programme to assess eventual bird mortality due to collision with the WTGs. This survey will be carried out in accordance with the Scottish National Heritage guidance (SNH, 2014) or equivalent standards, during first three years of the project operation as well as in years 5, 7, 10 and 15 of the wind park operation. These surveys should be conducted by qualified ornithologists according to adopted and approved methodology.
- Significant maintenance activities which have the potential to cause disturbance to breeding birds will not be undertaken within the bird breeding season, apart from where this could compromise security of electricity supply or safety.

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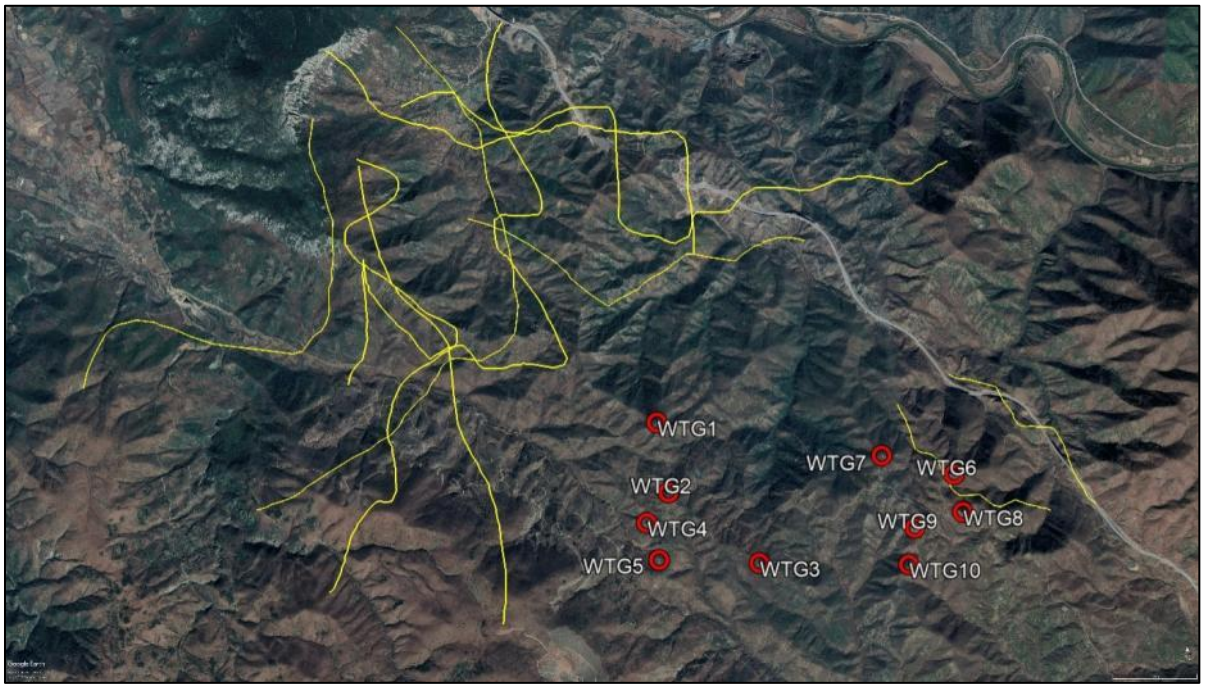
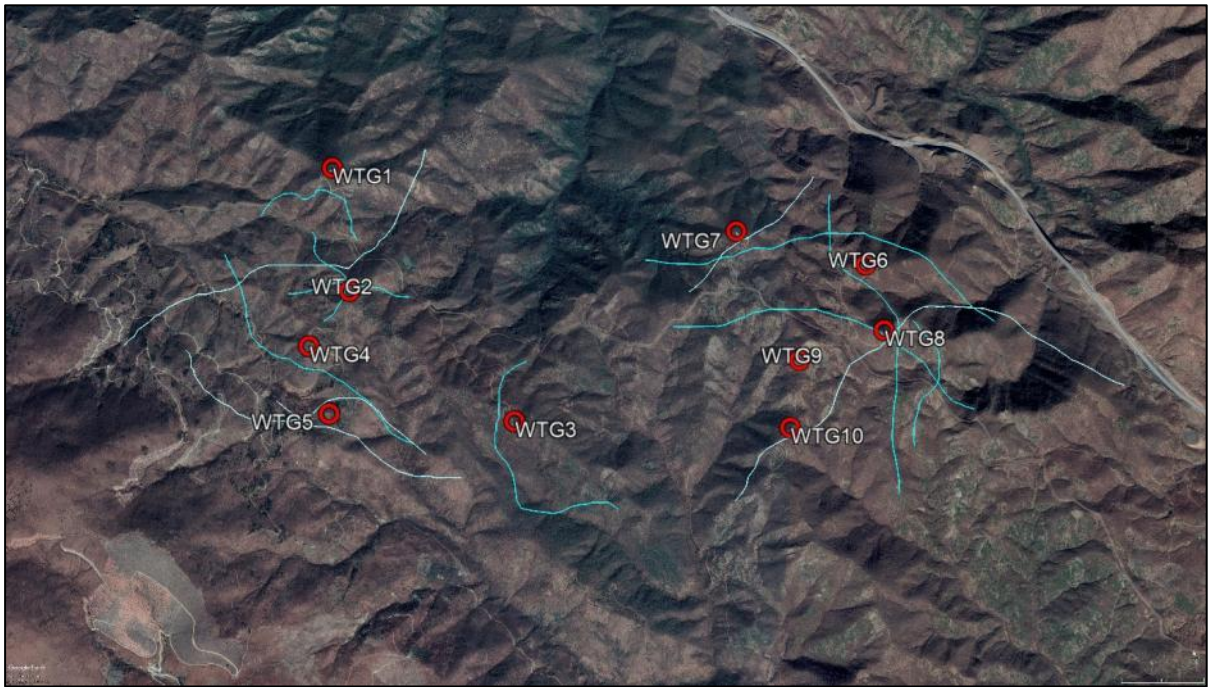
APPENDICES

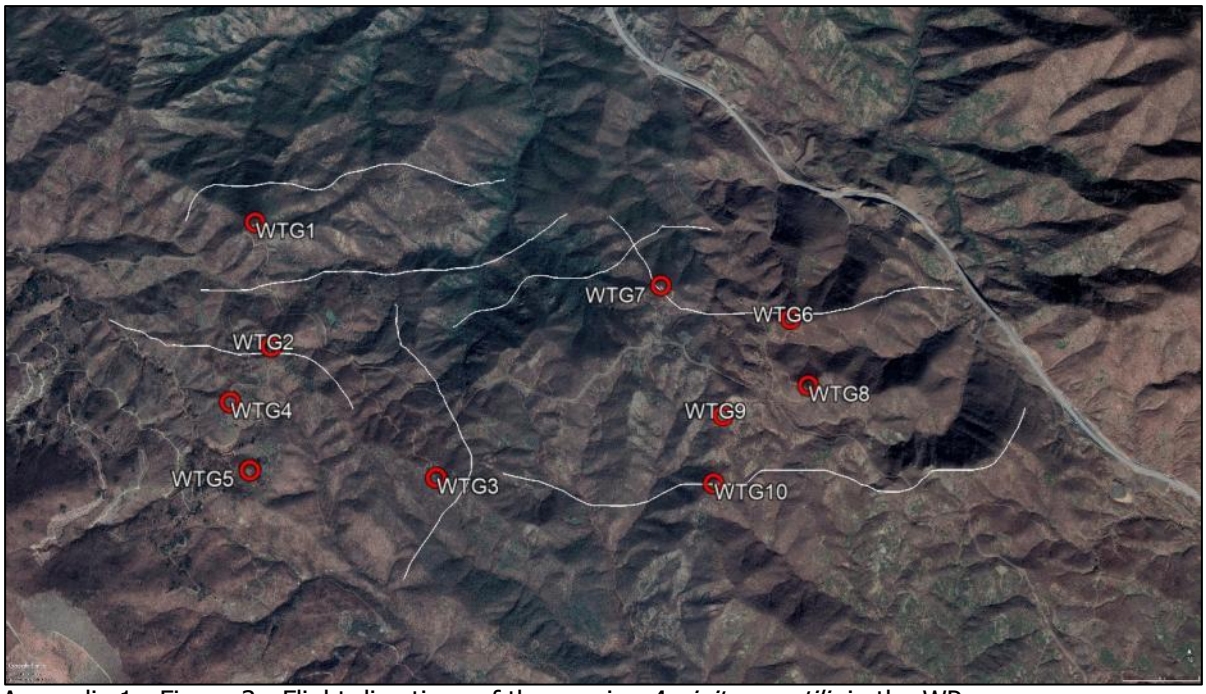
Appendix 1 – Flights of Target Species at the Wind Park "Dren" Area



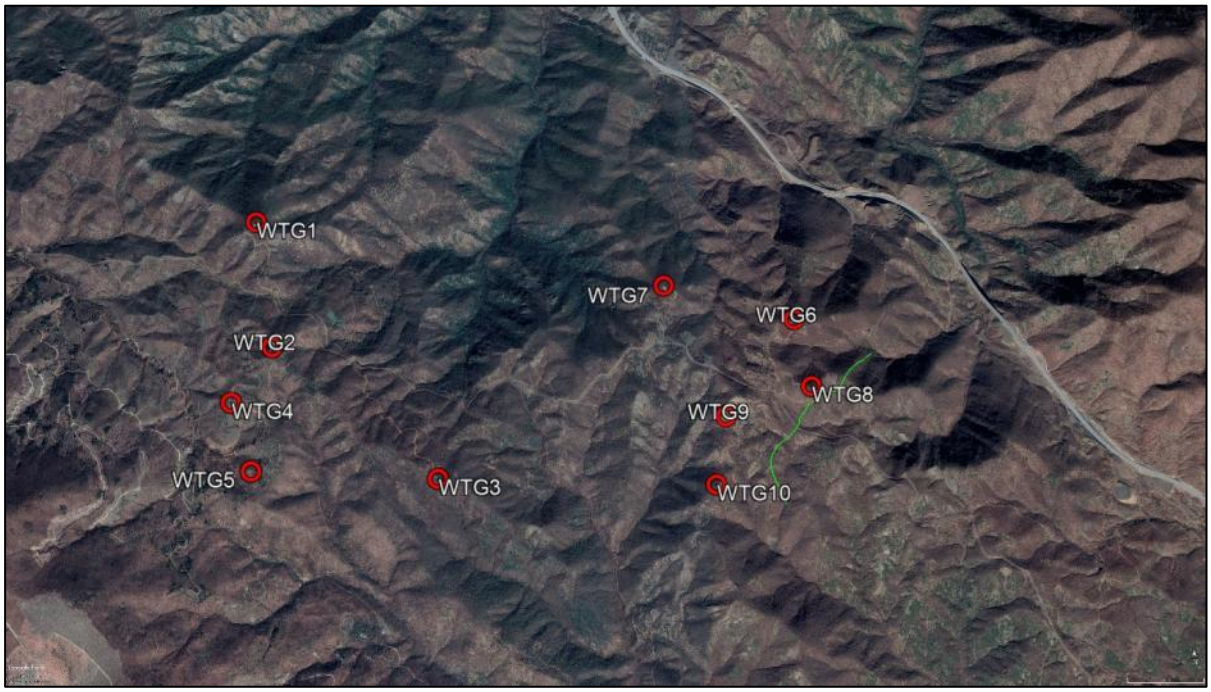
Appendix 1 - Figure 1 - Flight directions of the species *Gyps fulvus* in the WP area



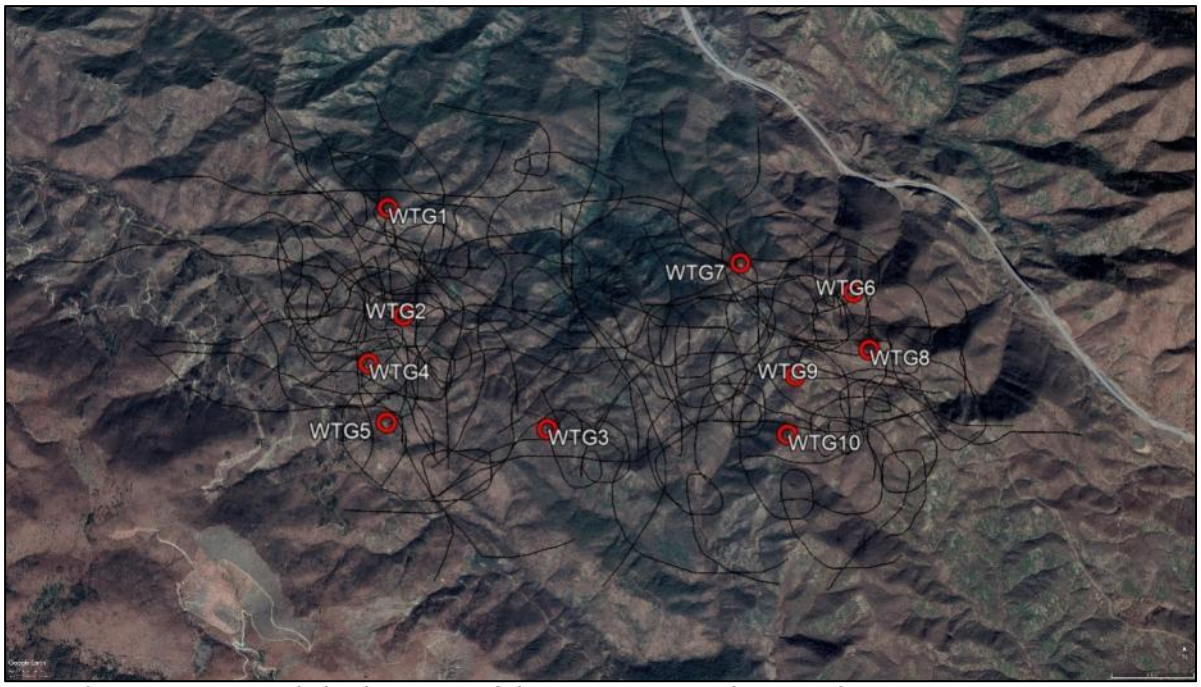
Appendix 1 - Figure 2 - Flight directions of the species *Accipiter nisus* in the WP area



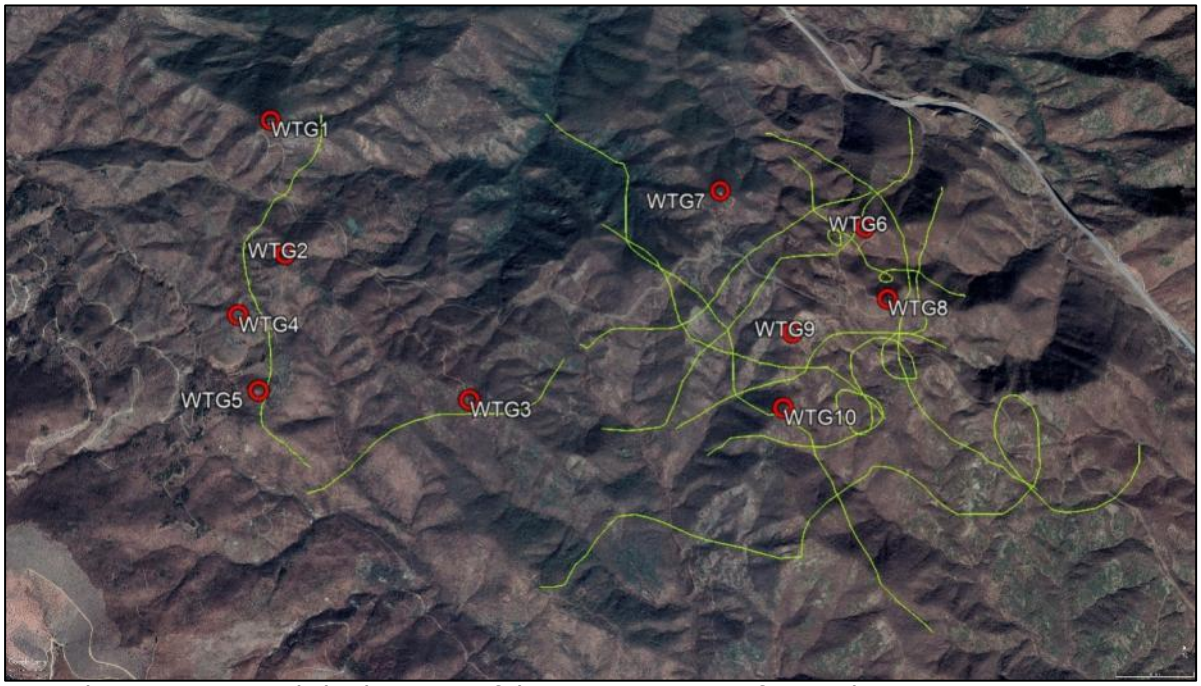
Appendix 1 - Figure 3 - Flight directions of the species *Accipiter gentilis* in the WP area



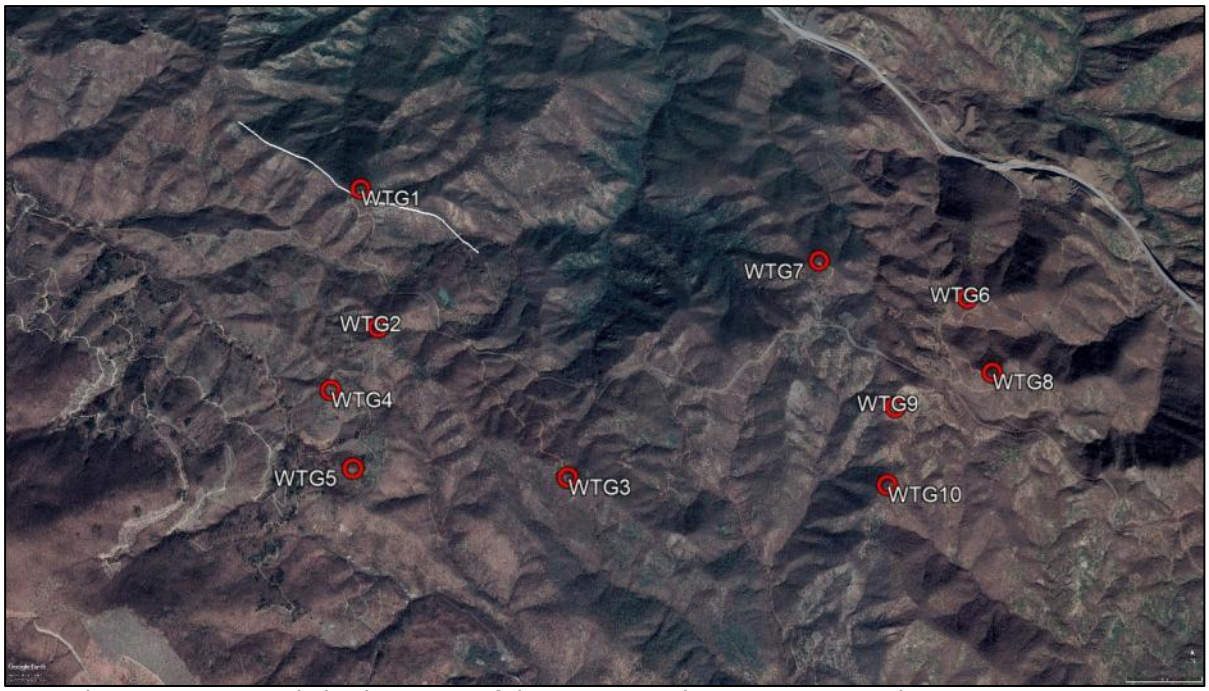
Appendix 1 - Figure 4 - Flight directions of the species *Accipiter brevipes* in the WP area



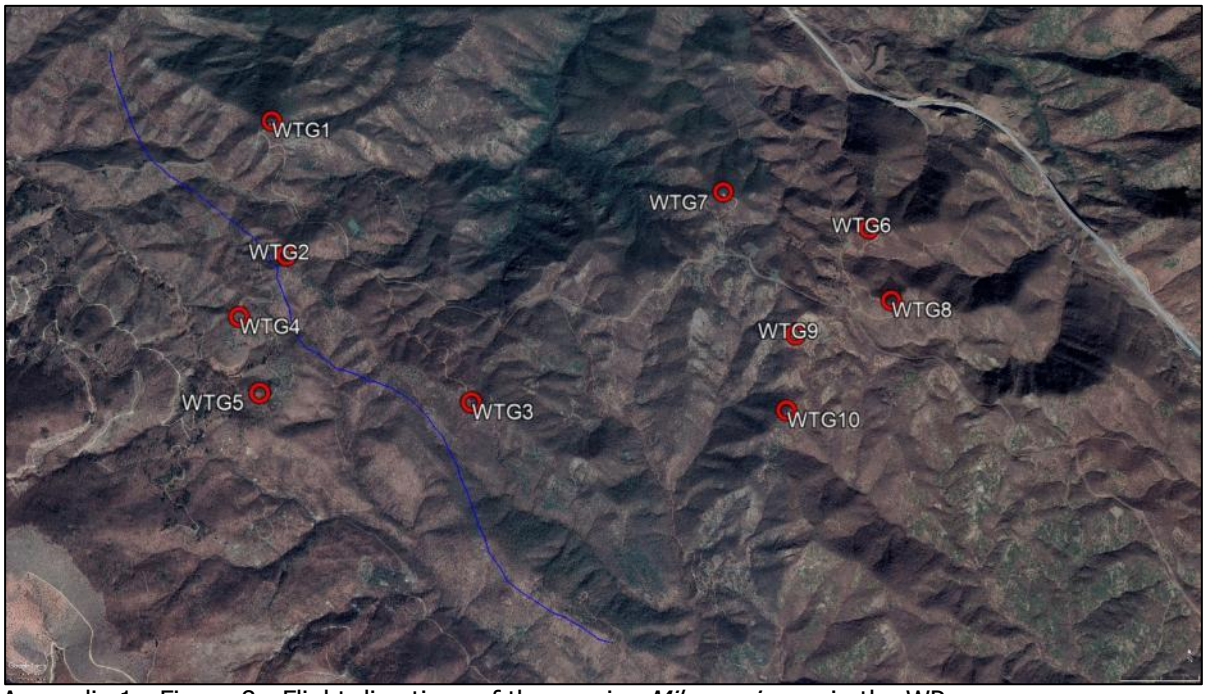
Appendix 1 - Figure 5 - Flight directions of the species *Buteo buteo* in the WP area



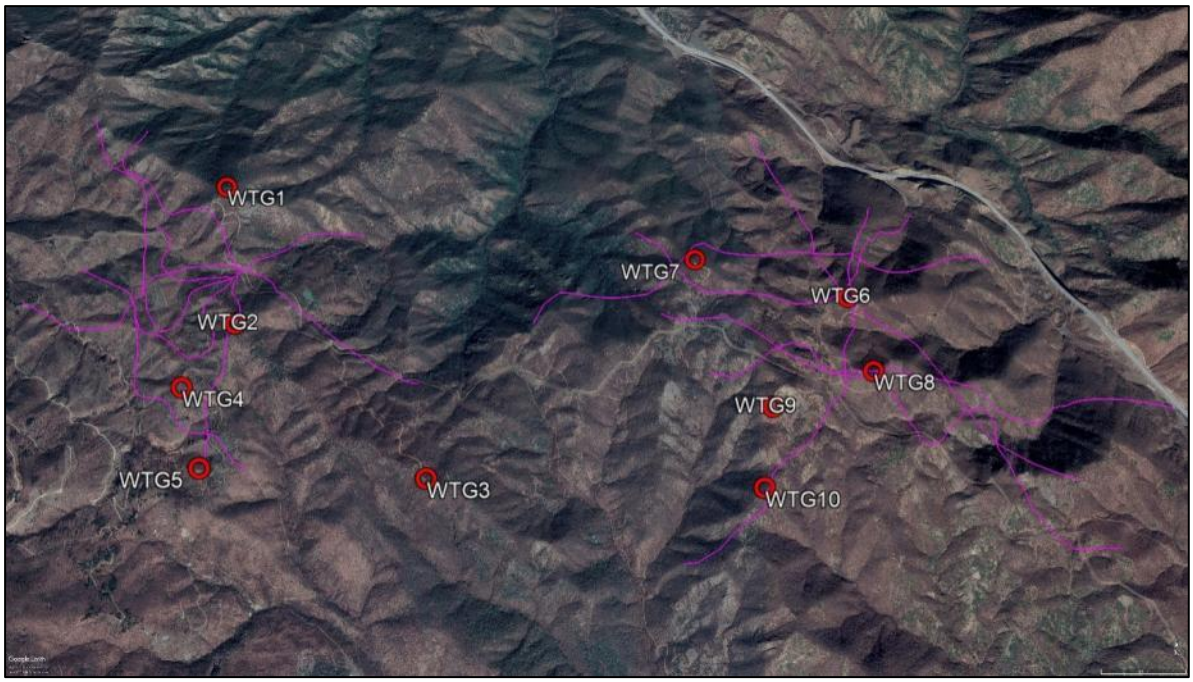
Appendix 1 - Figure 6 - Flight directions of the species *Buteo rufinus* in the WP area



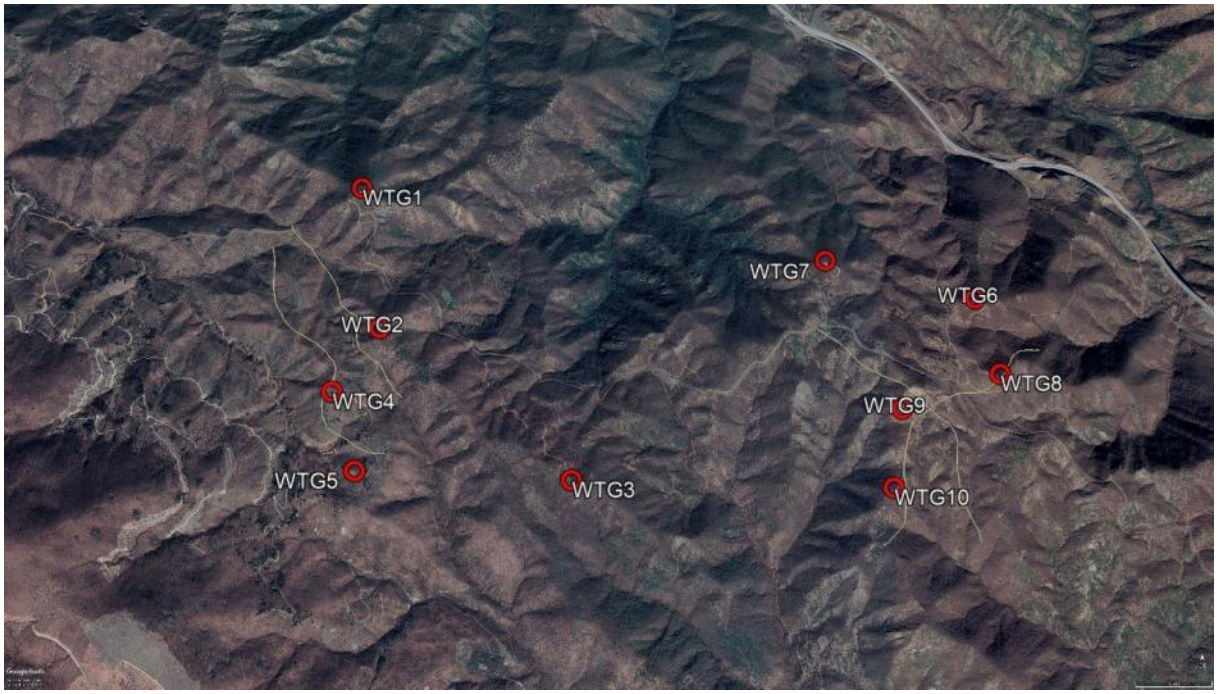
Appendix 1 - Figure 7 - Flight directions of the species *Falco vespertinus* in the WP area



Appendix 1 - Figure 8 - Flight directions of the species *Milvus migrans* in the WP area



Appendix 1 - Figure 9 - Flight directions of the species *Circus aeruginosus* in the WP area



Appendix 1 - Figure 10 - Flight directions of the species *Circus cyaneus* in the WP area