Area 1 Wind Farm Project
Absheron Region
Azerbaijan

Environmental & Social Impact Assessment (ESIA) Report - Addendum for Biodiversity Updates

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LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
ADB	Asian Development Bank
BAP	Biodiversity Action Plan
BBFMP	Bird and Bat Fatality Monitoring Plan
BOP	Biodiversity Offset Plan
CESMP	Construction Environmental and Social Management Plan
CHA	Critical Habitat Assessment
CRM	Collision Risk Modelling
CRMP	Collision Risk Management Plan
EAAA	Appropriate Area of Analysis
EBRD	European Bank for Reconstruction and Development
EP	Equator Principles
EPC	Engineering, Procurement and Construction
EPFI	Equator Principle Financial Institutions
ESIA	Environmental & Social Impact Assessment
IBAs	Important Bird Areas
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature (IUCN)
LDA	Laydown Area
LEA	Lenders Environmental Advisors
MoE	Ministry of Energy
NG	Net Gain
NNL	No Net Loss
OHTL	Overhead Transmission Line
PBF	Priority Biodiversity Features
PRs	Performance Requirement
PS	Performance Standards
RDB	Red Data Book
SDOD	Shut-Down On Demand
SPS	Safeguard Policy Statement
VP	Vantage Point
5 Capitals	5 Capitals Environmental & Management Consultancy

1 INTRODUCTION

ACWA Power signed an implementation agreement with the Ministry of Energy (MoE) in Azerbaijan for developing, building and operating a 240 MW wind power project. The Project will include the following:

- Khizi 3 Wind Farm (WF): Capacity up to 162.5 MW and will be generated using 25 x 6.5 MW Wind Turbine Generators (WTG), located in Khizi region; and
- Area 1 WF: Capacity up to 78 MW and will be generated using 12 x 6.5 MW WTGs, located at Absheron region.

Figure 1-1 Project Area

Approximately 80 km Overhead transmission lines (OHTL) will connect Khizi 3 WF to Area 1 WFs and to the national grid.

Note: *The responsibility for developing, constructing, commissioning and operating the OHTL lies with the Project off-taker. Azerenergi Open Joint Stock Company (Azerenergi), and as such, the OHTL is considered an 'Associated Facility' to the Project; as it is not being directly funded under the loan agreement with lenders. Therefore, all assessment findings and recommendations relating to the OTHL are being passed on to the off-taker.*

This report is an **Addendum** to the existing Environmental and Social Impact Assessment (**ESIA**) prepared by 5 Capitals for the **Area 1 WF Project, which was disclosed on May 2022**. Following disclosure additional studies were undertaken as follows:

- Additional Vantage Point (VP) surveying during Spring 2022 to capture more detailed migration data;
- Collision Risk Modelling (CRM) inclusive of Spring 2022 dataset;
- Breeding Bird Surveys during Spring 2022; and
- Updated analysis of Critical Habitat Assessment (CHA)).

This addendum has been prepared to include the findings of the additional surveys, subsequent analyses as well as updates to the Biodiversity Chapter of the ESIA based on comments received from EBRD and the Lenders Environmental Advisors (LEA) during the review process as requested by the LEA.

Specifically, the following changes have been made as result of further assessment:

- The Greek Tortoise/Common Tortoise/Mediterranean Tortoise will be referred to as Mediterranean Spur-thighed Tortoise consistently across all documents relating to the project.
- European Pond Turtle will not be relocated as it is not considered as a PBF. The Reptile Relocation Plan will include relocation efforts solely for the Mediterranean Spur-thighed Tortoise.
- During the operation phase of the project, the automated Shut Down on Demand (SDOD) system Identiflight will be installed, and upfront curtailment will be implemented for Steppe Eagle, Egyptian Vulture, Cinereous Vulture and Griffon Vulture. Further detail is provided in the Collision Risk Management Plan (CRMP).
- The time period for Upfront Experimental Cut-in Speed Curtailment for mitigation of turbine collision to bats will be from August 1 – September 15. This is further detailed in the CRMP.
- Operational acoustic monitoring will be conducted at 2m above ground level.
- Fatality monitoring during the operations phase will be continued for up to 5 years or until the risk to bird and bats is considered negligible in consultation with the lenders. This mitigation is detailed in the Bird and Bat Fatality Monitoring Plan (BBFMP) previously termed as the Post-Construction Fatality Monitoring Plan (PCFM).
- The Biodiversity Action Plan will showcase the strategy to achieve No Net Loss (NNL) for PBF species. The project is not required to achieve Net Gains for any biodiversity element of concern as the project does not contain Critical Habitat (CH).
- Compensatory/Offset measures will not be implemented for Steppe Eagle as this species does not trigger CH and does not require Net Gain for the population in the project area. NNL will be achieved throughout the mitigation strategy outlined in the BAP.

- Compensatory/Offset measure in the form of a Nest Box Program will be implemented to ensure NNL for Lesser Kestrel. This will be outlined in the Biodiversity Offset Plan (BOP) previously termed as the Compensation Offset Plan (COP).
- The OHTL was always an associated facility, and the design, construction and operation are the responsibility and remit of the off-taker. Risks and impacts have been identified for which mitigation measures (to ensure NNL) have been compiled and provided as recommendations to the off-taker. The updates made in the ESIA addendum include removal of language that commits to OHTL mitigation as this will be the responsibility of the off-taker.

This Addendum excludes sections of the ESIA which did not require any material changes. Where changes have been made, the full section has been retained to provide context. Therefore, this addendum should be read in conjunction with the original ESIA, however all information in this Addendum which has been changed supersedes the original ESIA.

Section 4 of this addendum shows biodiversity related updates in the E&S Management Plans and Procedures Section of ESIA Volume 3

Section 5 of this addendum shows biodiversity related updates in the Cumulative Impact Section of ESIA

2 STANDARDS AND REGULATORY REQUIREMENTS

2.1 National Requirements

National laws that govern protection of biodiversity include:

- Law of the Azerbaijan Republic on Specially Protected Natural Territories and Objects No. 840-IQ.
- Law of Azerbaijan Republic on Fauna No. 675-IQ.
- Law of the Republic of Azerbaijan on Fauna;
- Law of the Republic of Azerbaijan on Specially Protected Natural Areas and Objects;
- Law of the Republic of Azerbaijan on Addition to the Law of the Republic of Azerbaijan "On Specially Protected Natural Areas and Objects"; and
- Law of the Republic of Azerbaijan on accession to the European Convention for the Protection of Wildlife and the Natural Environment of Europe;
- UNEP EUROBATS Guidelines for consideration of bats in wind farm projects Revision 2014 (awaiting formal adoption).

2.2 Lenders Requirements

2.2.1 EBRD

EBRD PR6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources establishes general requirements for the conservation of biodiversity and sustainable management of living natural resources covering aspects such as the assessment of issues and impacts on biodiversity.

Where applicable, the Project will follow the EBRD's E&S Eligibility Criteria for On-Shore Wind Power Projects. Baseline studies will conclude with a critical habitat assessment to determine if any features in the project area qualify as priority biodiversity features or critical habitat. This assessment answers the basic question, "how important is the study area for conservation and what PR6 requirements will apply?" and does not consider specific impacts at this stage of analysis.

PR6 defines critical habitat and priority biodiversity features as:

Critical Habitat: The most sensitive biodiversity features; which comprise one of the following: (i) highly threatened or unique ecosystems; (ii) habitats of significant importance to endangered or critically endangered species; (iii) habitats of significant importance to endemic or geographically restricted species; (iv) habitats supporting globally significant migratory or congregatory species; (iv) areas associated with key evolutionary processes; or

(v) ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph

Priority Biodiversity Features (PBF) : This concept replaces the previous definition of natural habitat used by the EBRD (in the 2008 ESP) and encompasses a sub-set of biodiversity that is particularly irreplaceable or vulnerable, but at a lower priority level than critical habitats; which include (i) threatened habitats; (ii) vulnerable species; (iii) significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas); and (iv) ecological structure and functions needed to maintain the viability of priority biodiversity features.

The criteria used by the EBRD's PR6 to define critical habitat built on and are closely aligned with those used by the International Finance Corporation Performance Standard 6 (IFC PS6). PR6 also explicitly includes ecological functions that are vital for maintaining the viability of critical habitat features.

2.2.2 EPFI'S

The assessment of impacts upon terrestrial ecology will be made with due reference to the IFC Performance Standard 6 on Biodiversity Conservation and Sustainable Natural Resource Management which establishes requirements for protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources. When avoidance of impacts is not possible, measures to minimise impacts and restore biodiversity and ecosystem services should be implemented. Specifically, it is necessary to determine baseline conditions and categorise the projects habitats as 'critical', 'modified' or 'natural' to undertake the necessary assessment. The Performance Standard defines the different habitats as follows:

- Natural Habitat: "Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition";
- Critical Habitat: "Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes"; and
- Modified Habitat: "Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed6 coastal zones, and reclaimed wetlands".

3 BIODIVERSITY

3.1 Critical Habitat Assessment

'Critical Habitat' is a concept applicable to several international financial lending institutions, designed to enable the identification of areas of high biodiversity value in which development would be particularly sensitive and require special attention. The concept has been developed in consultation with numerous international conservation organisations and thus takes into account many pre-existing conservation approaches, such as Key Biodiversity Areas, Important Bird Areas, and Alliance for Zero Extinction Sites. This comprehensive approach has meant that it has seen high levels of interest and uptake.

The concept is further defined in the following documents:

- European Bank for Reconstruction and Development (EBRD) Performance Requirement 6 (PR6) Biodiversity Conservation and Sustainable Management of Living Natural Resources
- International Finance Corporation (IFC) IFC Performance Standard 6 (PS6) on Biodiversity Conservation and Sustainable Management of Living Resources.
- Asian Development Bank (ADB) Safeguard Policy Statement (SPS) 2009, ADB Environment Safeguards a Good Practice Sourcebook Draft Working Document
- A number of multilateral banks have policies closely aligned with PS6, and more than 75 private banks signed up to the Equator Principles have an implicit commitment to PS6.

The objective of undertaking a Critical Habitat Assessment (CHA) is to arrive at definitive conclusions regarding whether or not the area where a development has been proposed meets the definitions of a Critical Habitat, per the classifications set out in EBRD PR6, IFC PS6, and ADB guidelines following the criteria and processes for CHA described therein.

A CHA was undertaken utilizing a multi-stage approach:

- Stage One: CHA Screening Report, which screened for all possible species and ecological elements that may be present in the project region; it was determined that five potential species of concern merited further review, Steppe Eagle, Eastern Imperial Eagle, Egyptian Vulture, Saker Falcon, and Sociable Lapwing.
- Stage Two: CHA Final Report, which investigated in-depth information on the identified species of concern and extrapolated population quantities to determine if criticality was triggered. It was determined that CH was not triggered in the study area. A number of biodiversity elements were classified as Priority Biodiversity Features.

Recommendations to fulfil CHA Requirements Presentation, which was provided to the project proponent. This included design and operation mitigation recommendations for the wind

turbines as well as recommendations relevant to the OHTL offtaker. The same mitigation measures have been incorporated into the ESIA.

Refer to the full CHA reports and presentation.

The outcomes of the CHA indicated that there are a number of priority biodiversity features (refer to CHA Reports for details). As a result, a Biodiversity Action Plan must be prepared, which will include:

- Identification of the full list of Priority Biodiversity Features, along with the strategy to ensure No Net Loss (NNL) requirements are met for all PBFs; and
- Biodiversity Monitoring and Evaluation Programme; which provides the overview of the various monitoring and reporting mechanisms that will be in place to track the progress of various management measures that are in place to achieve NNL and NG.

3.2 Area of Influence

The area of influence is the area within which project activities may affect receptors. As different aspects carry differing spatial extents, the AoI varies considerably.

The area of influence for **Habitat Loss** impacts is inclusive of the full project construction and operation footprint, including associated facilities, laydown areas, and any existing or new roads utilised for incoming and outbound transport.

The area of influence for **Direct Mortality** impacts is inclusive of the full project construction and operation footprint, including associated facilities, laydown areas, and any existing or new roads utilized for incoming and outbound transport, as well as the airspace of the wind farm.

The area of influence for **Habitat Fragmentation and Disturbance** impacts extends beyond the footprint of the project inclusive of 1km buffer for terrestrial biodiversity elements and a 20km buffer for birds and bats, to account for the phenomenon of barrier effect.

The area of influence for **Displacement** impacts extends beyond the footprint of the project inclusive of a 1km buffer for terrestrial biodiversity elements and a 20km buffer for birds and bats, to account for the secondary impacts of displaced wildlife into adjacent territories.

The area of influence for **Introduced Species / Proliferation of Species** impacts extends beyond the footprint of the project inclusive of a 1km buffer, to account for (1) potential invasive spread and (2) secondary impacts caused by displacement of less competitive fauna into adjacent areas.

The area of influence for dust, gaseous emissions, noise and vibration, external lighting and accidental spills (contamination) are described in the relevant Sections of this ESIA Report.

3.3 Observation and Baseline Conditions

Azerbaijan lies at biogeographic crossroads where the flora and fauna of at least three biogeographic provinces converge, resulting in high levels of biodiversity; representatives include species typical of Europe, Central Asia, and Asia Minor. The varied terrain and climatic conditions contribute to a diversity of ecosystems and species.

The Caucasus region has been identified by the World Wide Fund for Nature as one of the Global 200 Ecoregions based on criteria such as species richness, levels of endemism, taxonomic uniqueness, unusual evolutionary phenomena, and global rarity of major habitat types. It has been identified by Conservation International as a global "hotspot" — one of the 25 most biologically rich and most endangered terrestrial ecosystems in the world.

3.3.1 Ecosystems, Habitats and Plant Communities

REGIONAL CONTEXT

Azerbaijan can be divided into the following five broad ecosystem complexes, all of which contribute to the high levels of biodiversity represented in the country (Unknown, 2014):

- Forest ecosystems;
- Freshwater, wetland and swamp ecosystems;
- Grassland and semi-desert ecosystems;
- High mountain ecosystems; and
- Marine and coastal ecosystems.

The project site lies within the Absheron peninsula in eastern Azerbaijan. The land cover is characterized by a mix of mountain ridges, crests, plateaus interspersed with lowlands. Vegetation near the project area is mainly grasses and low-relief shrubs, and highly seasonal.

Azerbaijan has more than 4,500 plant species, which represents 66% of all those found in the Caucasus (Flora, 2020).

Semi-desert habitats are dominated by wormwood (Artemisia fragrans), either alone or associated with saltwort (*Salsola* spp) or *Bothriochloa* spp. Pockets of more typical desert vegetation also occur in this area.

Steppe vegetation occurs in the lowlands and foothills around 300 to 700 m and is largely the result of human influence on woodland and shrub habitats. The dominant species are grasses (Bothriochloa spp). Rich floristic communities have developed in the *Bothriochloa ischaemum/ Glycyrrhiza glabra* steppes of the lowlands. On the foothill slopes, *Bothriochloa ephemerosa* is mixed with other grasses such as *Festuca sulcata* and *Stipa* spp. Thorny shrubs, notably Christ's Thorn (*Paliurus spina-christii*), are typical.

Ephemeras prevail in the plant varieties in this section of the Caucasian mountains in March – April. There are well-known rare and near-extinct varieties among them. The following table lists the species of threatened plants known for Azerbaijan.

Table 3-1 Azerbaijan Species on IUCN Red List of Threatened Plants

Family	Species	Status
Alliaceae	*Nectaroscordum tripedale*	I
	Nectaroscordum dioscoridis	I
Orchidaceae	*Ophrys caucasica*	I
	Ophrys oestrifa	I
	Himantoglossum formosum	I
Cruciferae	*Pseudoresicaria digitata*	I
Labiatae	*Stachys talyschensis*	En/Ex
Rosaceae	*Pyrus raddeana*	I
Umbelliferae	*Smyrniopsis aucheri*	I
Compositae	*Cladochaeta candidissimus*	I
	Steptorhamphus czerepanovii	I
Leguminosae	*Vavilova formosa*	I
	Astralagus bakuensis	I
Graminae	*Triticum araraticum*	I
	Secale vavilovii	I
	Stipa pelita	I
Buxaceae	*Buxus colchica*	I
Polygonaceae	*Caligonum bakuense*	I
Liliaceae	*Fritillaria grandiflora*	I
	Lilium ledebourii	I
Gentianaceae	*Gentiana lagodechiana*	R
Iridaceae	*Iris acutiloba*	En
	Iris camillae	I
	Iris iberica	I
Hyacinthaceae	*Ornithogalum arcuatum*	I
	Ornithogalum hyrcanum	I
Pinaceae	*Pinus brutia var. eldarica*	R
Primulaceae	*Primula juliae*	I

I = Indeterminate; R = Rare; En = Endangered; En/Ex = Endangered/Extinct

SURVEY METHODOLOGY

In order to provide site-specific baseline information on habitats and flora species, ecology surveys were carried out as per the below.

Surveying Techniques:

- The botany survey included a project site walkover, including 'zigzag' transects, focusing especially on areas sheltered from direct wind with less grazing pressure which are more likely to have rare and endemic specimens. Identification was performed utilizing reference publications.
- Habitat mapping was done via remote sensing of satellite imagery and ground-truthed during botany survey.
- Each segment of the OHTL alignment was surveyed along the proposed routes using transects 12-25 km

Coverage Dates and Timings:

- Area 1 WF area was surveyed in May, 2020;
- Area 1 BOP area was surveyed in April and May, 2021; and
- Khizi – Yashma OHTL Route (12km) was surveyed in June 2021
- Khizi-Pirakashkul OHTL Route (25km) was surveyed in June & July 2021
- Pirakashkul-Gobu OHTL Route (25km) was surveyed in June 2021

RESULTS

Habitats

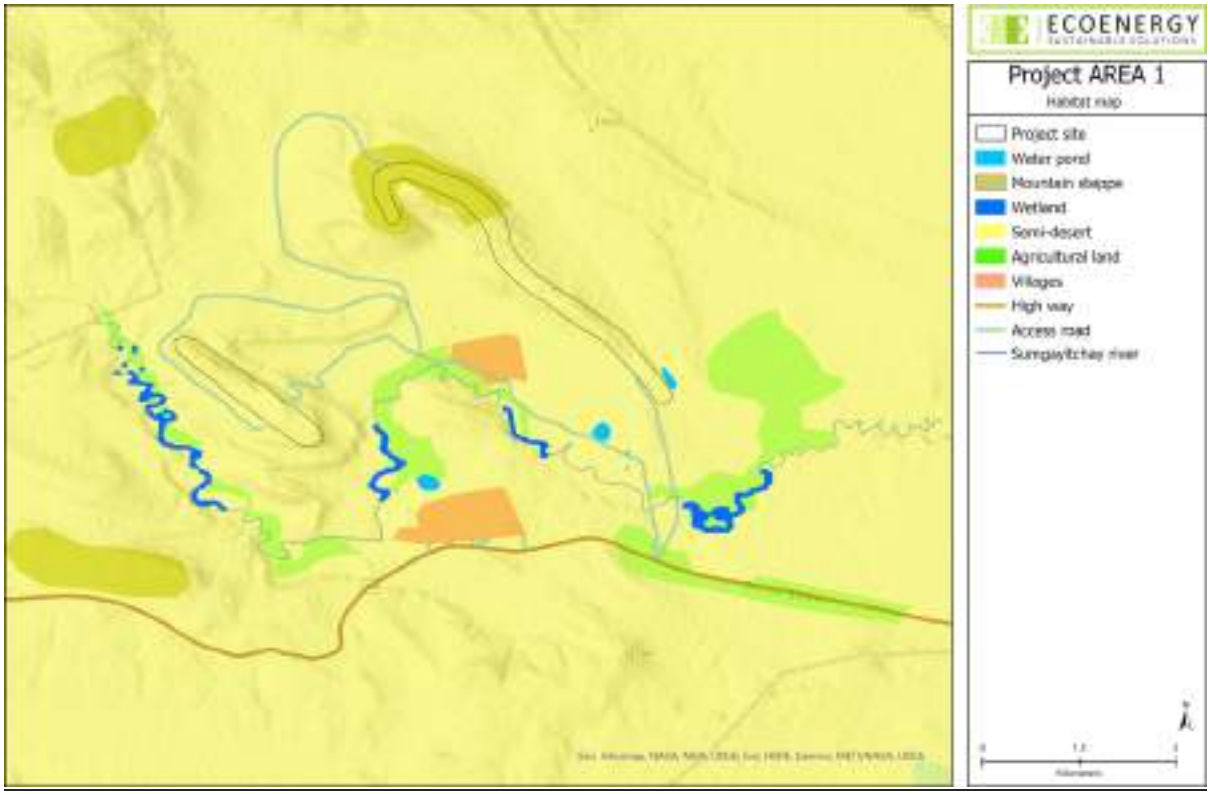
The ecosystems that the WF, BOP and Laydown footprints encompass include:

- Lowland steppe, characterized by a mix of common flora species and occasional rare and endemic ephemeral specimens;
- Highland mountain habitat, characterized by semi-arid climatic conditions;
- Salt depressions/ salt ponds, which can provide potential mudflat/wetland-like habitat

Additionally, the associated OHTL corridors passes through:

- Modified agricultural habitat.

Figure 3-1 Habitat Map



WF/ BoP/ Laydown Area (LDA) Flora

At the cumulation of surveying, over 250 species were recorded in the Wind Farm area, BoP and the LDA. Two IUCN Endangered species; Theodor's Saint John's Wort (*Hypericum theodori*) Albanian Astragalus (*Astragalus albanicus)* were recorded on site as reported within the "Complete Botany Data Set" excel file provided by the surveying botanist.

Theodor's Saint John's Wort was recorded in the wind farm site and BoP whereas Albanian Astragalus was recorded in the LDA. The number of individual specimens of each species were not recorded, but the density and occurrence recorded on site was listed as "Rare" as per the DAFOR scale (Dominant, Abundant, Frequent, Occasional, Rare). The CHA analysis found that these species do not trigger criticality but qualify as Priority Biodiversity Features (PBF).

A number of species listed within the Azerbaijan Red Data Book (RDB) were encountered at least once throughout the baseline surveys. The National RDB of Azerbaijan was not prepared following IUCN status categories and criteria. However, a national expert was consulted to "translate" the national RDB status of each species into rough equivalency with IUCN status categories. None of the RDB CR/EN species recorded were considered to be occurring in high enough concentration to trigger criticality. Species listed as VU in the Red Data Book cannot trigger criticality. RDB CR/EN/VU species recorded in the project area are considered as PBFs.

During the botany surveys of the project a number of regionally endemic were recorded and are classified as PBFs by the CHA. As per IFC designation, range-restricted species are defined as those species that have an EOO less than 50,000 km^2. Therefore, no other plant species are considered to be range restricted and trigger criticality. However, regionally endemic species recorded are considered as PBFs.

The following table lists the internationally threatened, nationally threatened and regionally endemic species recorded in the WF Area, BoP and LDA area of the project site.

Table 3-2 Summary of Threatened Species and Regional Endemics

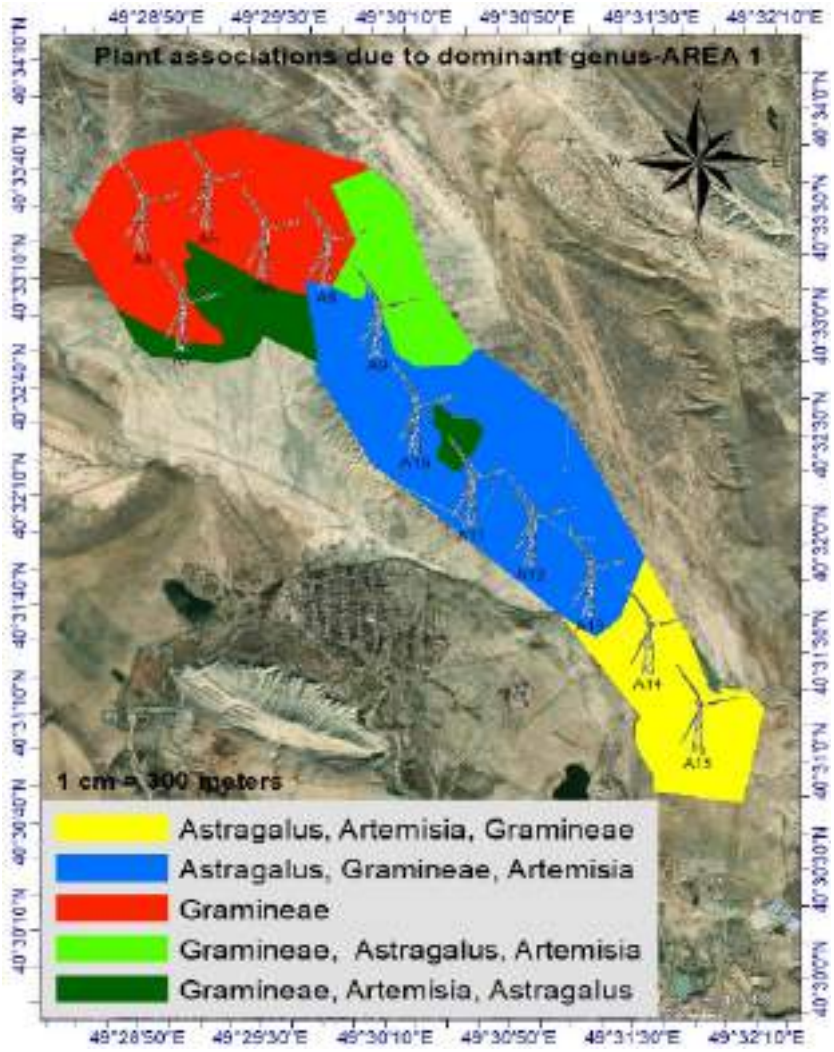
Species	Abundance	Status	Notes
Hypericum theodori	Rare	IUCN EN	Total EOO of 100km2 and AOO of 16km2.
Astragalus albanicus	Rare	IUCN EN	EOO and AOO estimated to be c. 370 km2 and 16 km2, respectively
Anabasis salsa (C.A.M.) Bnth.	Occasional	RDB VU A2cd+3cd	Occasional on site. Xinjiang. Total EOO > 10 mil km2. Total AOO unknown.
Anogramma leptophyllum L.	Rare	RDB EN B1ab (i,ii,iii,iv)+2ab (i,ii,iii,iv)	Rare on site. Listed as EN on AzRDB. Worldwide distribution
Astragalus bakuensis Bunge.	Rare	RDB CR B1ab (i,ii,iii,iv,v) Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1 million km2. Total AOO unknown
Bellevalia fominii Woronow.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran and Turkey. Total EOO > 2 million km2. Total AOO unknown;
Cotoneaster saxatilis Pojark.	Rare	RDB EN B2ab(ii,iii,iv,v)	Occasional on site.
Cousinia orientalis	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown;
Crocus speciosus M.B.Fl.	Rare	RDB CR B1ab (i,ii,v)+2ab(i,ii,v)	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1 million km2. Total AOO unknown
Dianthus schemachensis Schishk.	Rare	RDB EN B1ab (iii,iv,v) c(iii,iv)+2ab (ii)c(ii,iii) Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Russia and Turkey. Total EOO > 2 million km2. Total AOO unknown.

Species	Abundance	Status	Notes
Erodium schemachense A.Grossh.	Rare	Regional Endemic	Present in Azerbaijan and Georgia. Total EOO < 150,000 km2. Total AOO unknown
Ferula persica Willd	Occasional	RDB VU A2c+3c; B1ab(iii)	Present in Azerbaijan, Armenia, Georgia and Iran. Total EOO > 2 million km2. Total AOO unknown.
Gypsophila capitata M.B.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown
Iris acutiloba C.A.Verz.	Rare	RDB EN B2ab(iii) c(v)	Present in North Caucus, Transcaucus, Iran, Turmenistan, and Turkey. Total EOO > 2 million km2. Total AOO unknown.
Iris grossheimii Woronov.	Rare	RDB VU2c+3cd Regional Endemic	Present in Azerbaijan, Armenia and Georgia. Total EOO < 200,000 km2. Total AOO unknown.
Linaria schirvanica Fom.	Rare	RDB VU B1 ab(i,ii,iii) +2ab(ii,iii,iv) Regional Endemic	Rare on site. Present in Azerbaijan, Armenia and Georgia. Total EOO > 200,000 km2. Total AOO unknown.
Merendera eichleri Boiss.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Russia, Iran, and Turkey. Total EOO > 2 million km2. Total AOO unknown;
Onobrychis biebersteinii G.Sir.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown;
Onobrychis petraea Fisch.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown;
Pinus eldarica Medw.	Frequent	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran and Iraq. Total EOO > 2 million km2. Total AOO unknown;
Platanthera chlorantha Cust	Rare	RDB VU D2	Rare on site. Worldwide distribution
Pyrus salicifolia Pall.	Occasional	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Russia, Iran, and Turkey. Total EOO

Species	Abundance	Status	Notes
			> 2 million km2. Total AOO unknown;
Silene grossheimii Schischk.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Iran and Georgia. Total EOO < 1million km2. Total AOO unknown
Stachys fruticulosa M.BFl.	Occasional	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Russia, Iran, and Turkey. Total EOO > 2 million km2. Total AOO unknown
Thesium szowitsii A.DC.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Iran and Georgia. Total EOO < 1million km2. Total AOO unknown
Sternbergia fischeriana Roem.	Rare	RDB EN A2c+3c; B2ab(i,ii,iii,v)	Rare on site. Worldwide distribution
Tulipa biebersteiniana Schult. et Schult.	Rare	RDB VU A2c+3c	Rare on site. Worldwide distribution
Tulipa biflora Pall.	Rare	RDB VU A2c+3c & LC	Rare on site. Worldwide distribution

All other species recorded are considered to be common, and the majority of accessible areas have been degraded due to grazing pressures. The below figures provide the general spatial distribution of the vegetation associations.

Figure 3-2 Vegetation Maps



OHTL Flora – Segment 1 Khizi -Yashma

A total of 45 species were recorded in Segment 1 Khizi- Yashma, of which a number of species are considered as Nationally threatened and/or Regionally Endemic. The following table lists the nationally threatened species and regional endemics recorded in the Khizi-Yashma OHTL segment of the OHTL. These species are also classified as PBFs as per the CHA.

Table 3-3 Summary of Threatened Species and Regional Endemics in Segment 1

SPECIES	ABUNDANCE	STATUS	NOTES
Acantholimon schemachense	Rare	RDB VU D2 Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown;
Alcea kusariensis	Rare	RDB VU D2 Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO <

Species	Abundance	Status	Notes
			1million km2. Total AOO unknown;
Anabasis salsa (C.A.M.) Bnth.	Occasional	RDB VU A2cd+3cd	Total EOO > 10 million km2. Total AOO unknown;
Astragalus caspicus	Frequent	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran, Iraq and Turkey. Total EOO > 2 million km2. Total AOO unknown
Astragalus schemachensis	Frequent	Regional Endemic	Present in Transcaucasus and Iran. Total EOO < 1million km2. Total AOO unknown
Centaurea reflexa	Occasional	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran and Turkey. Total EOO > 2 million km2. Total AOO unknown
Cousinia orientalis	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown
Thymus hadzhievii	Rare	Regional Endemic	Endemic to North Caucus. EOO < 200,000 km2. AOO unknown;

Figure 3-3 Species of Interest Recorded along Segment 1

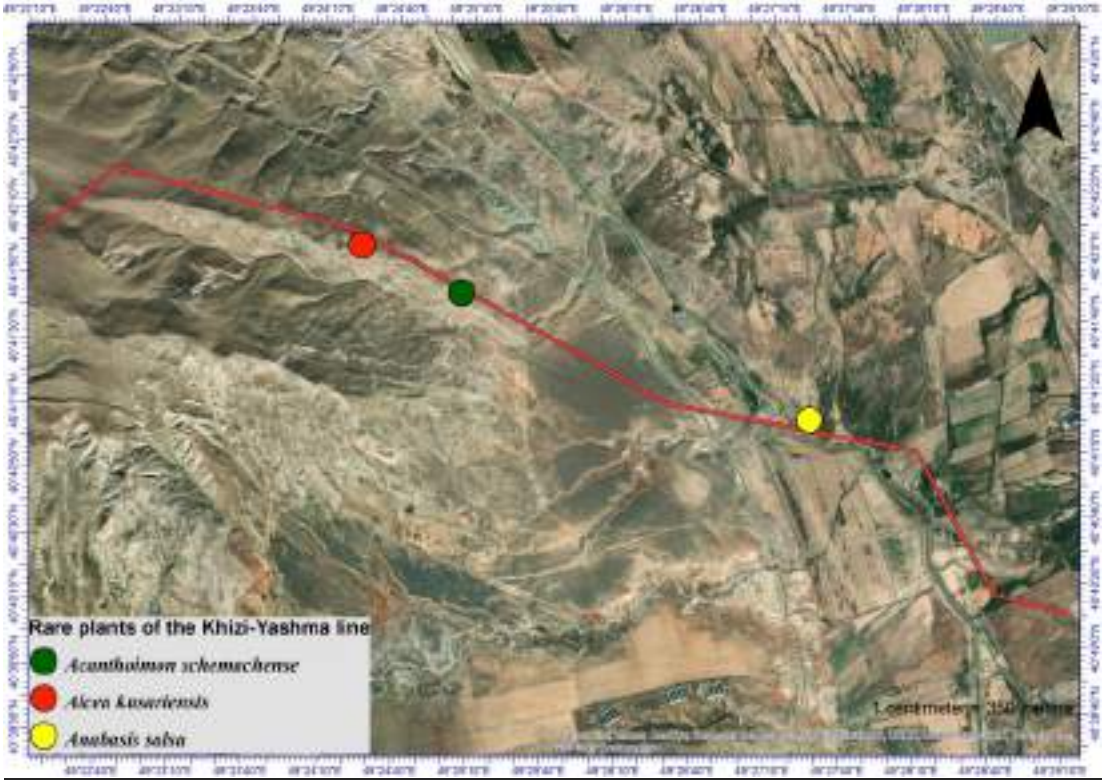
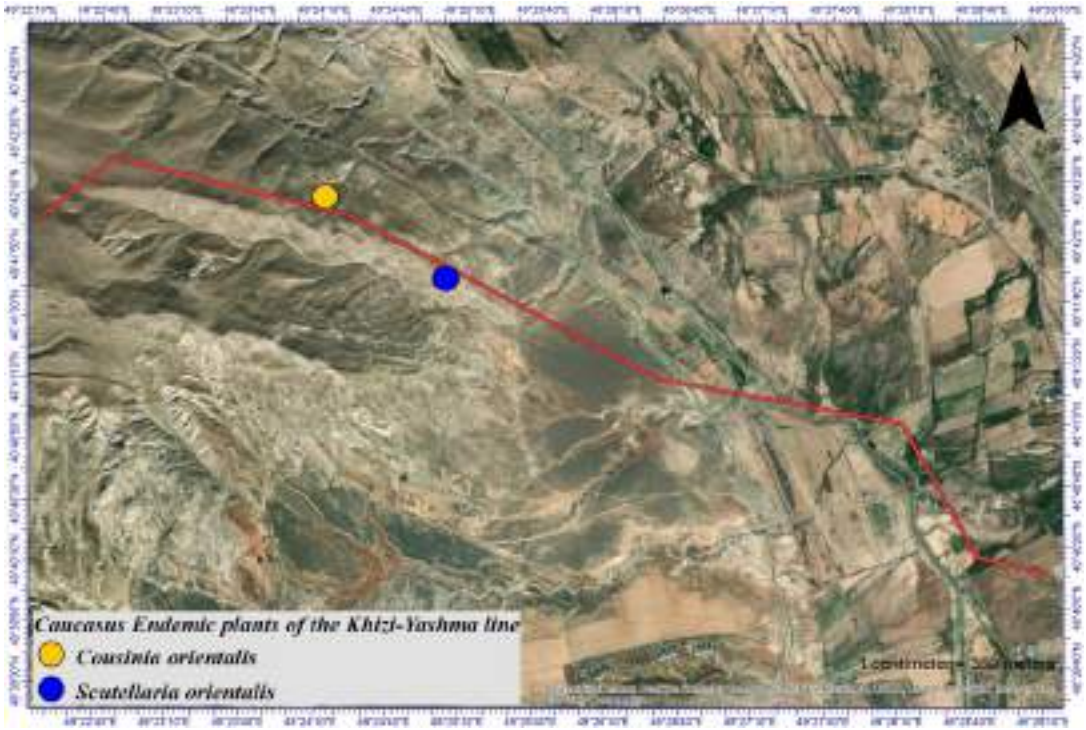


Figure 3-4 Flora Species of Interest along Segment 1



OHTL Flora – Segment 2 (Khizi-Pirakashkul)

A total of 45 species were recorded in Segment 2 (Khizi- Pirakashkul), of which a number of species are considered as Nationally threatened and/or Regionally Endemic. The following table lists the nationally threatened species and regional endemics recorded in the Khizi-Pirakashkul OHTL segment of the OHTL. These species are also classified as PBFs as per the CHA.

Table 3-4 Summary of Threatened Species and Regional Endemic in Segment 2

SPECIES	ABUNDANCE	STATUS	LISTING REFERENCE
Acantholimon schemachense	Rare	RDB VU D2 Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown;
Alcea kusariensis	Rare	RDB EN B1ab(v)+B2ab(v)	Present in Azerbaijan, Armenia and Georgia. Total EOO > 200,000 km2. Total AOO unknown
Astragalus caspicus	Frequent	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran, Iraq and Turkey. Total EOO > 2 million km2. Total AOO unknown
Centaurea reflexa	Occasional	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran and Turkey. Total EOO > 2 million km2. Total AOO unknown
Cousinia orientalis	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown
Ferula persica Willd	Occasional	RDB VU A2c+3c; B1ab(iii)	Present in Azerbaijan, Armenia, Georgia and Iran. Total EOO > 1 million km2. Total AOO unknown.
Thymus hadzhievii	Rare	Regional Endemic	Endemic to North Caucus. EOO < 200,000 km2. AOO unknown;

Figure 3-5 Species of Interest Recorded along Segment 2

Figure 3-6 Location of Flora Species of Interest along Segment 2

Figure 3-7 Flora Species of Interest along Segment 2

OHTL Flora – Segment 3 (Pirakashkul-Gobu)

A total of 57 species were recorded along the OHTL segment 3 (Pirakashkul-Gobu), of which of which a number of species are considered as Nationally threatened and/or Regionally Endemic. The following table lists the nationally threatened species and regional endemics recorded in the Pirakashkul-Gobu segment of the OHTL. These species are also classified as PBFs as per the CHA.

Table 3-5 Summary of Threatened Species and Regional Endemics in Segment 3

SPECIES	ABUNDANCE	STATUS	NOTES
Anabasis salsa	Occasional	RDB VU A2cd+3cd	Total EOO > 10 million km2. Total AOO unknown;
Astragalus shemachensis	Frequent	Regional Endemic	Present in Transcaucasus and Iran. Total EOO < 1million km2. Total AOO unknown
Centaurea reflexa	Occasional	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran and Turkey. Total EOO > 2 million km2. Total AOO unknown;
Cousinia orientalis	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown
Thymus karjaginii	Occasional	Regional Endemic	Present in Azerbaijan, Armenia and Georgia. Total EOO > 200,000 km2. Total AOO unknown

Figure 3-8 Species of Interest Recorded along Segment 3

Figure 3-9 Location of Flora Species of Interest along Segment 3

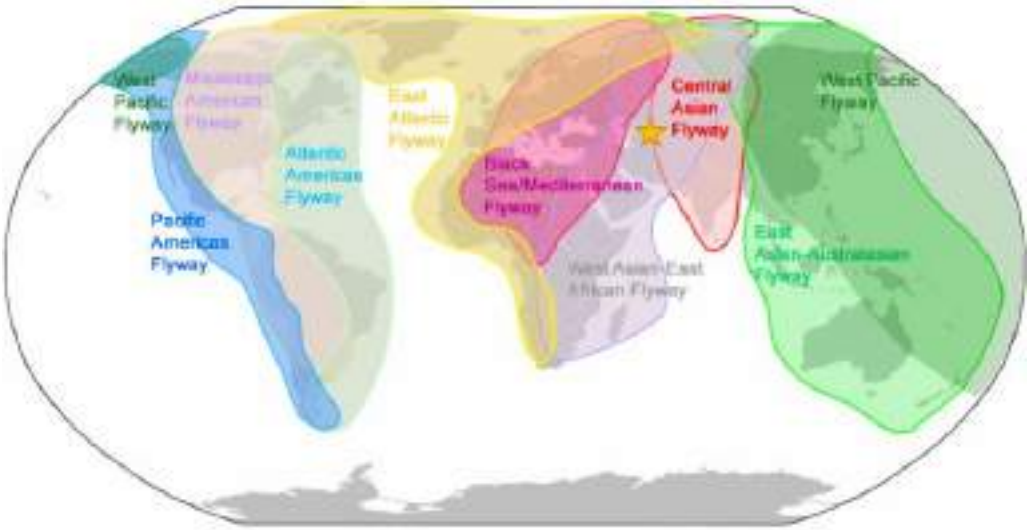
Figure 3-10 Location of Flora Species of Interest

3.3.2 Birds

REGIONAL CONTEXT

The project lies within the Black Sea/Mediterranean Flyway and West Asian-East African Flyway.

Figure 3-11 Global Migratory Flyways



Additionally, three Important Bird Areas (IBAs) are within 15-25 km of the project site. These include:

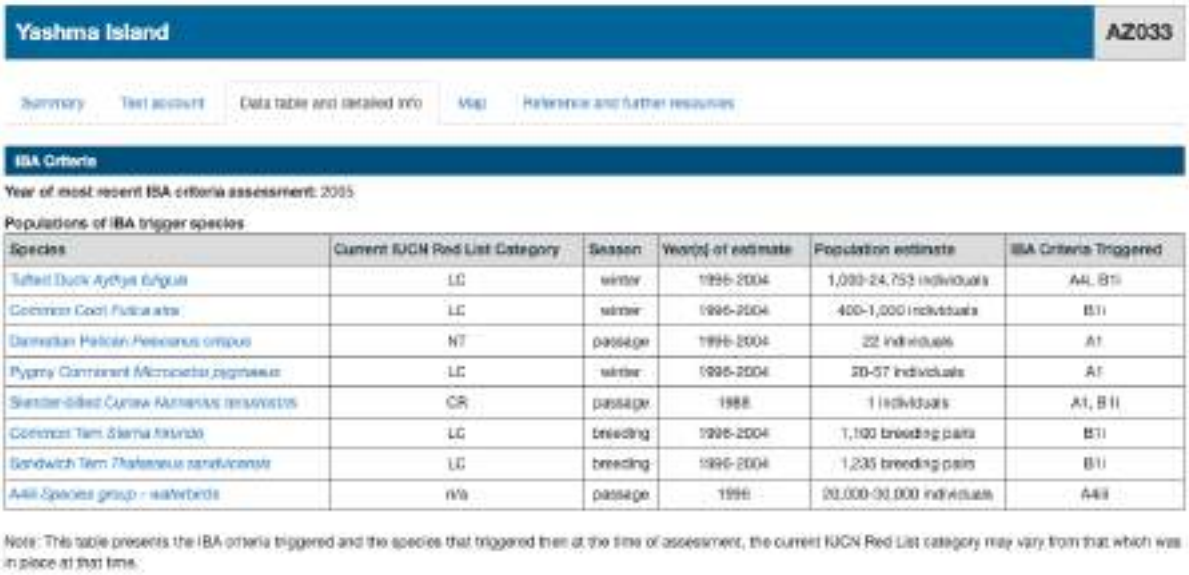
- Yashma Island
- Alty Agach area
- Mount Kargabazar and Mount Gush-gaya

Figure 3-12 IBAs within 30km

These IBAs are known for migratory birds and breeding raptors of high conservation status. In particular, Yashma Island consists of species staging areas which indicates that these species may pass through the project site during the migratory periods.

These IBAs are known for migratory birds and breeding raptors of high conservation status. In particular, Yashma Island consists of species staging areas which indicates that these species may pass through the project site during the migratory periods.

Figure 3-13 IBA Trigger Criteria – Yashma Island



Yashma Island AZ033

Summary | Text account | Data table and detailed info | Map | Reference and further resources

IBA Criteria

Year of most recent IBA criteria assessment: 2005

Populations of IBA trigger species

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Tufted Duck Aythya fuligula	LC	winter	1996-2004	1,000-24,753 individuals	A4i, B1i
Common Coot Fulica atra	LC	winter	1996-2004	400-1,000 individuals	B1i
Dalmatian Pelican Pelecanus crispus	NT	passage	1996-2004	22 individuals	A1
Pygmy Cormorant Microcarbo pygmaeus	LC	winter	1996-2004	20-57 individuals	A1
Slender-billed Curlew Numenius tenuirostris	CR	passage	1988	1 individuals	A1, B1i
Common Tern Sterna hirundo	LC	breeding	1996-2004	1,100 breeding pairs	B1i
Sandwich Tern Thalasseus sandvicensis	LC	breeding	1996-2004	1,235 breeding pairs	B1i
A4iii Species group - waterbirds	n/a	passage	1996	20,000-30,000 individuals	A4iii

Note: This table presents the IBA criteria triggered and the species that triggered them at the time of assessment, the current IUCN Red List category may vary from that which was in place at that time.

Figure 3-14 IBA Trigger Criteria – Alty Agach National Park

Alty Agach area This is an IBA in danger! AZ027

Summary | Text account | Data table and detailed info | Map | Reference and further resources

IBA Criteria

Year of most recent IBA criteria assessment: 2000

Populations of IBA trigger species

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Eastern Imperial Eagle Aquila heliaca	VU	breeding	1996	present	A1
Booted Eagle Hieraaetus pennatus	LC	breeding	1996	6 breeding pairs	B2

Note: This table presents the IBA criteria triggered and the species that triggered them at the time of assessment, the current IUCN Red List category may vary from that which was in place at that time.

Figure 3-15 IBA Trigger Criteria – Mount Kargabazar and Mount Gush-gaya

Mount Kargabazar and Mount Gush-gaya AZ037

Summary | Text account | Data table and detailed info | Map | Reference and further resources

IBA Criteria

Year of most recent IBA criteria assessment: 2000

Populations of IBA trigger species

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Lesser Kestrel Falco naumanni	LC	breeding	1996	5-10 breeding pairs	A1

Note: This table presents the IBA criteria triggered and the species that triggered them at the time of assessment, the current IUCN Red List category may vary from that which was in place at that time.

A number of species are listed as CR, EN as per the Global IUCN Red List, and have spatial distributions which overlap with the site. Migratory and congregating species such as migratory shorebirds and waterbirds are anticipated to potentially occur based on the migratory flyway as well as presence of IBAs within 100km of the project site. Over 270 species of birds are

possibly present based on spatial distribution data, many of which are migratory and 14 of which are listed as Vulnerable or Near Threatened.

Table 3-6 Threatened Species Potentially Occurring in Project Region (as per IUCN Red List)

Common Name	Latin Name	IUCN Global Red List Category	Azerbaijan Red Book Category
Egyptian Vulture	*Neophron percnopterus*	Endangered	
Steppe Eagle	*Aquila nipalensis*	Endangered	Endangered
White-headed Duck	*Oxyura leucocephala*	Endangered	
Sociable Lapwing	*Vanellus gregarius*	Critically Endangered	
Saker Falcon	*Falco cherrug*	Endangered	
Cinereous Vulture	*Aegypius monachus*	Near Threatened	Near Threatened
Eastern Imperial Eagle	*Aquila heliaca*	Vulnerable	Vulnerable
Greater Spotted Eagle	*Clanga clanga*	Vulnerable	
Pallid Harrier	*Circus macrourus*	Near Threatened	
Common Pochard	*Aythya ferina*	Vulnerable	
Ferruginous Duck	*Aythya nyroca*	Near Threatened	
Lesser White-fronted Goose	*Anser erythropus*	Vulnerable	
Marbled Teal	*Marmaronetta angustirostris*	Vulnerable	
Red-breasted Goose	*Branta ruficollis*	Vulnerable	
Velvet Scoter	*Melanitta fusca*	Vulnerable	
Northern Lapwing	*Vanellus vanellus*	Near Threatened	
European Turtle-dove	*Streptopelia turtur*	Vulnerable	
Eurasian Oystercatcher	*Haematopus ostralegus*	Near Threatened	
Meadow Pipit	*Anthus pratensis*	Near Threatened	
Great Bustard	*Otis tarda*	Vulnerable	
Little Bustard	*Tetrax tetrax*	Near Threatened	
Dalmatian Pelican	*Pelecanus crispus*	Near Threatened	Vulnerable
Caucasian Grouse	*Lyrurus mlokosiewiczi*	Near Threatened	
Black-tailed Godwit	*Limosa limosa*	Near Threatened	
Eurasian Curlew	*Numenius arquata*	Near Threatened	

Common Name	Latin Name	IUCN Global Red List Category	Azerbaijan Red Book Category
Great Snipe	*Gallinago media*	Near Threatened	
Redwing	*Turdus iliacus*	Near Threatened	
Black Kite	*Milvus migrans*	Least Concern	Vulnerable
Booted Eagle	*Hieraaetus pennatus*	Least Concern	Near Threatened
Golden Eagle	*Aquila chrysaetos*	Least Concern	Vulnerable
Griffon Vulture	*Gyps fulvus*	Least Concern	Vulnerable
Long-legged Buzzard	*Buteo rufinus*	Least Concern	Vulnerable
White-tailed Sea-eagle	*Haliaeetus albicilla*	Least Concern	Vulnerable
Lesser Kestrel	*Falco naumanni*	Least Concern	Vulnerable
Bearded Vulture	*Gypaetus barbatus*	Near Threatened	Near Threatened
Lesser Spotted Eagle	*Clanga pomarina*	Least Concern	Vulnerable

Survey Methodology

Given the potential for threatened species and the sensitivity of birds to wind farm developments, baseline surveying was undertaken utilising the Scottish Natural Heritage (SNH) guideline methods to provide adequate data for numerical collision risk modelling. This included year-round coverage to ensure seasonal changes due to migration and breeding were captured as well.

Surveying Techniques:

- Vantage Point (VP) surveying: Methodology is based on the best international practice in the sector particularly referring to the guidelines of Scottish National Heritage for birds' survey. Selection of VPs was based on the visibility criteria to provide at least 2 km radius of visibility for survey team particularly over WTGs. At each visit to VP, three (3) hour of monitoring was carried out at each VP with four (4) people watching the birds' activities. Visibility area at each VP is divided into 2 arcs with 2 persons covering each arc during the sessions. Following data and behaviour of birds are recorded during the sessions:
  - Weather conditions (air temperature, wind direction and speed);
  - The list of registered species;
  - Quantity of each species;
  - Direction of flight;
  - Flight mode (Gliding or Flapping);
  - Time of exposure within the risk zone;
  - Time duration outside the risk zone;
  - Time counting of birds presence in risk zone with 15 second intervals; and

- Height and direction of flight of birds in VP zone.

- Breeding Bird surveying, including nest searches comprised breeding bird walkover mapping survey to quantify bird flight activity. The survey areas were chosen to include all areas within the potential zone of ornithological influence of the Development. The breeding bird survey areas included a corridor wide along the proposed route of electrical connections and the site boundaries of wind turbines, and plus a 500m buffer for the main breeding bird surveys (the core breeding bird survey area), where possible and no terrain constraints (ie the steep terrain limiting access and posing safety risk to the surveyors). All birds heard or seen in the survey areas were recorded and any evidence of breeding activity was documented. Large birds like raptors seen at a distance up to approximately 500m from the survey areas were recorded too. During the survey, each watch, two recording methods are used to record data: focal bird sampling and activity summaries.
- OHTL segments were surveyed at 6 vantage points (VP). In addition to VP surveying of the three segments of the OHTL alignment, transects of 4km each were also employed. The width of each line transect was between 100 (for small like Passerine birds) and 500 m (for larger birds). 252 hours of VP survey and 56 hours of line transect survey were undertaken over the three segments of the OHTL alignment.

Coverage & Timing/Dates:

- Area 1 WF and BOP area was surveyed via VP survey during Spring (2020 and 2021), Autumn 2020, and Winter 2020. Nest searches were undertaken during Summer 2020.
- Khizi – Yashma OHTL Route was surveyed in June 2021
- Khizi-Pirakashkul OHTL Route was surveyed in June & July 2021
- Pirakashkul-Gobu OHTL Route was surveyed in June 2021
- Further breeding surveys were completed throughout the Spring 2022 period to cover more extensively the WF area as well as a 5km buffer. The nest search was undertaken in a minimum of three rounds, covering the following timeframes:
    - Early nest season – March 15 through April 5
    - Mid nest season – April 6 through May 1
    - Late nest season – May 2-31
- Additional VP surveys have been completed throughout Spring 2022 to capture more detailed migration data and the CRM was subsequently updated once the season has been completed. VP locations are provided in the figure below.

Table 3-7 Bird Surveys (2020 – 2022)

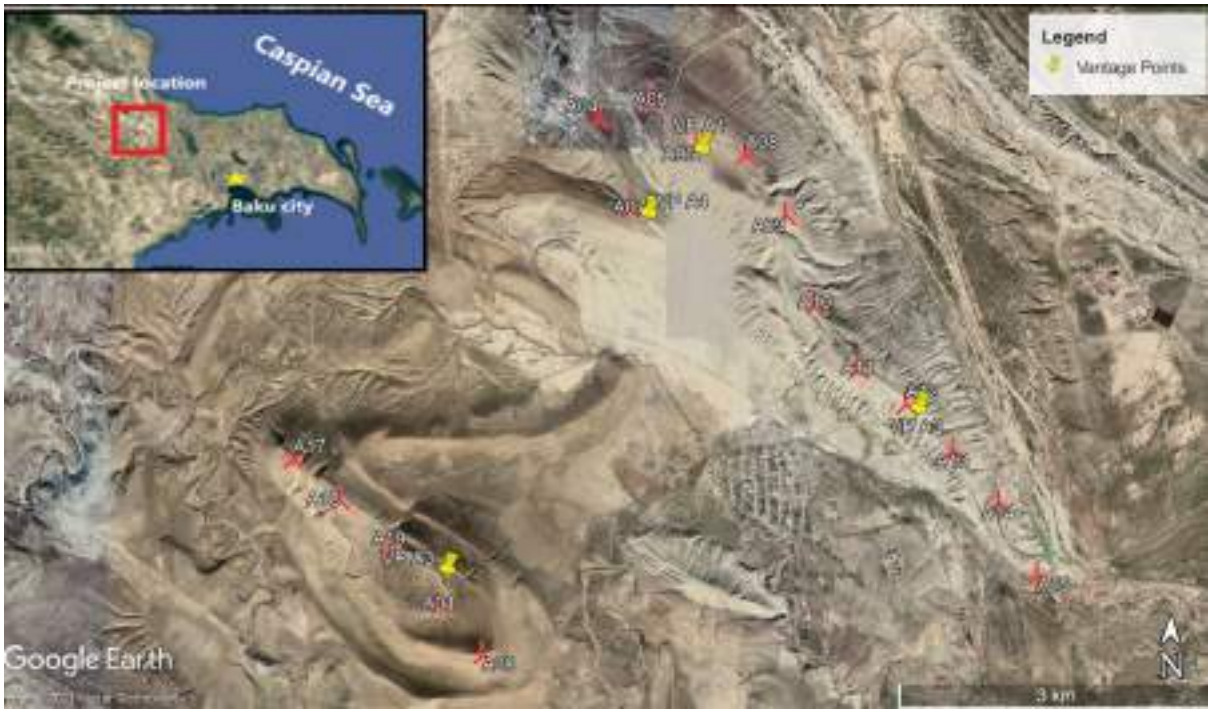
SURVEY	MONITORING PERIOD	SURVEY EFFORT
Bird Spring Migration Survey (2020) – WF VP Survey	27 March to 8 May 2020	VP Survey: 70.5 hours
Bird Breeding Survey (2020) – Area WF area	May & June 2020 (28 and 29 May and 03 June 2020)	Transect Survey: 16 hours

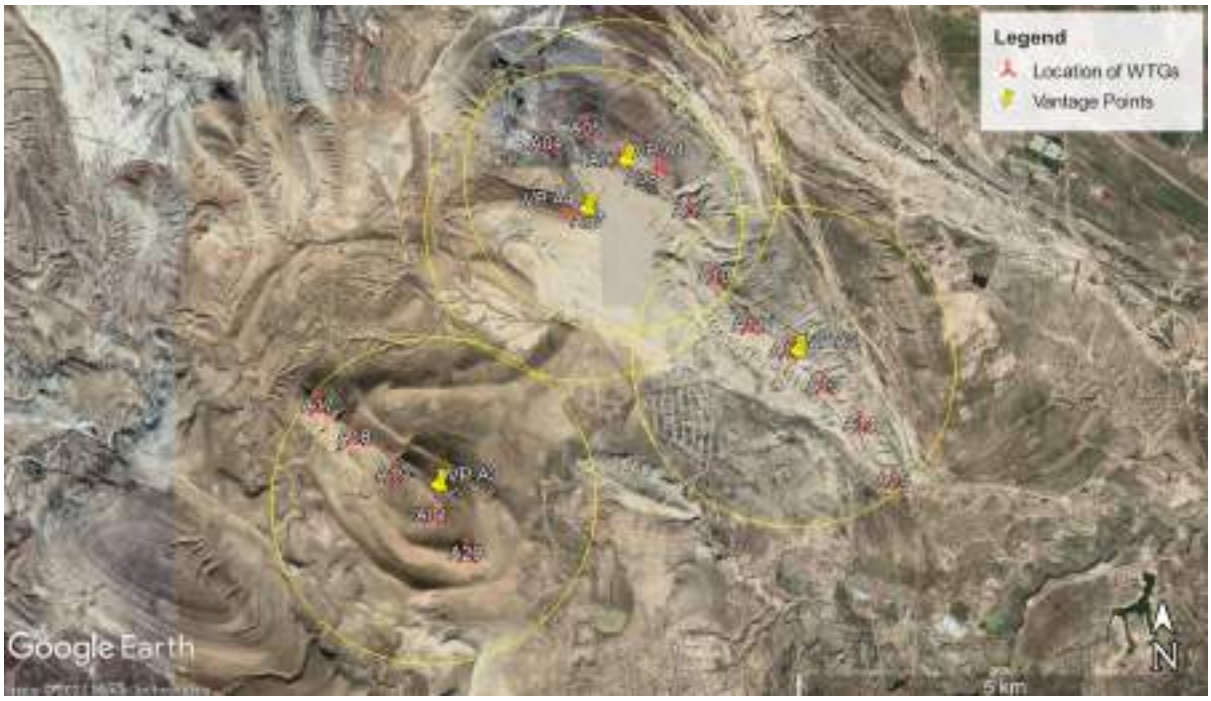
Survey	Monitoring Period	Survey Effort
Bird Autumn Migration Survey (2020) – WF VP Survey	10 September to 07 December 2020	VP Survey: 75 hours
Bird Winter Survey (2021) – WF VP Survey	9 January 2021 to 9 March 2021	VP Survey: 108 hours
Bird Spring Migration Survey (2021)- WF VP Survey	19 March to 24 April 2021	VP Survey: 63 hours
Bird Breeding Survey (2021) – Area 1 WF, BOP	26 June and 01 July 2021	Transect Survey: 10 hours
Bird Summer 2021 WF VP Survey	09 May to 21 June	VP Survey: 72 hours
Bird Surveys along OHTL Route (VP Survey and transects)	July – August 2021	VP Survey -252 hours; Line transect – 56 hours
	September - December 2021	VP Survey -252 hours; Line transect – 48.5 hours
Bird Spring Migration Survey (2022) – WF VP Survey	March- May 2022	VP Survey- 108 hours
Bird Breeding Survey (2022) – Area 1 WF area	March - June 2022	Nesting Survey

Surveying Locations:

The selected VPs are shown in the figures below, including VP A1, VP A2, and VP A4.

Figure 3-16 Maps of Vantage Point Locations and View Sheds



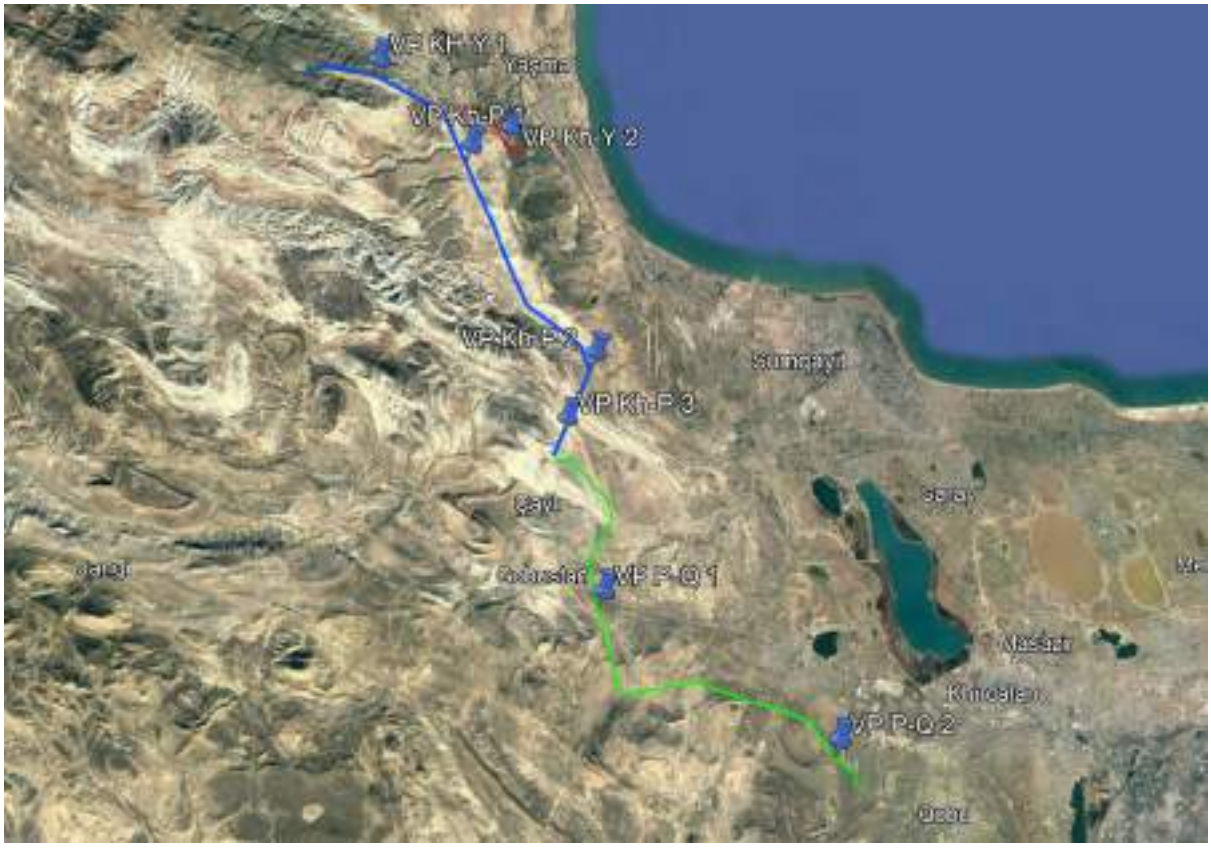


VP A3 was originally part of the earlier surveys; however, as the updated design layout WTGs have been removed from the extension area where VP A3 covers, VP A3 has been removed as a vantage point.

Figure 3-17 Spring 2022 VP Survey Location

OHTL Locations:

Figure 3-18 VP Locations along OHTL Segments 1 Khizi-Yashma (Red), Segment 2 Khizi-Pirakashkul (Blue) & Segment 3 Gobu-Pirakeshkul (Green)



RESULTS

The below provides a summary of the findings.

Wind Farm- Vantage Point Monitoring

In total, 256 hours of surveying was undertaken, over 3 Vantage Points and 5 seasons. VP surveys were undertaken for an additional season during Spring 2022 at 3 points where 36 survey hours were completed at each vantage point.

A total of 6 species of elevated global status were recorded as well as 13 additional species with elevated national status.

Two species are globally listed as endangered: Steppe Eagle and Egyptian Vulture.

The following table provides a summary for nationally and globally listed (threatened) species that were recorded occurring during VP surveys of Area 1.

Table 3-8 VP Survey Results All Seasons

Scientific Name	English Common Name	Azbjn status	IUCN status	VP Observations					
				Spring			Summer 2021	Autumn 2020	Winter 2021
				2020	2021	2022			
Tier 1									
Neophron percnopterus	Egyptian Vulture	VU	EN	3	4	12	10		
Aquila nipalensis	Steppe Eagle	CR	EN	43	12	21	5	5	
Tier 2									
Tetrax tetrax	Little Bustard	NT	NT						15
Ciconia nigra	Black Stork	CR			1				
Pelecanus onocrotalus	Great White Pelican	LC		35					
Pelecanus crispus	Dalmatian Pelican	VU	NT	85					
Pernis apivorus	European Honey-Buzzard	VU			2	1	17		
Aegypius monachus	Cinereous Vulture	NT	NT	3	149	105	6	34	349
Gyps fulvus	Eurasian Griffon	VU		45	104	97		104	183
Gyps or Aegypius	Unidentified Vulture			10		214[1]		65	101
Circaetus gallicus	Short-toed Snake-Eagle	LC			2	2	3		
Hieraaetus pennatus	Booted Eagle	NT		4	3	1	2		
Aquila heliaca	Imperial Eagle	VU	VU		1	1			1
Aquila chrysaetos	Golden Eagle	VU		6		7	2		
Milvus migrans	Black Kite	VU			4	5			
Haliaeetus albicilla	White-tailed Eagle	LC						1	1
Buteo rufinus	Long-legged Buzzard	EN		16	6	80	75	1	2
Falco naumanni	Lesser Kestrel	VU		111	46	151	118	18	
Accipiter gentilis	Northern Goshawk	LC				1			
Milvus milvus	Red Kite	LC				3			
Falco subbuteo	Eurasian Hobby	LC				2			
Tier 3									

[1] Inclusive of all spring VP observations of *Gyps fulvus*, *Aegypius monachus*, and "vulture sp."

Scientific Name	English Common Name	Azbjn status	IUCN status	VP Observations					
				Spring			Summer 2021	Autumn 2020	Winter 2021
				2020	2021	2022			
Clanga pomarina	Lesser Spotted Eagle			7		1			2
Circus aeruginosus	Eurasian Marsh-Harrier			1	5	12	6	4	4
Circus cyaneus	Hen Harrier				4	5			
Circus pygargus	Montagu's Harrier			7	1				
Accipiter nisus	Eurasian Sparrowhawk				2				2
Buteo buteo	Common Buzzard			1	9				1
Asio flammeus	Short-eared Owl				2				
Falco tinnunculus	Eurasian Kestrel			20	22	2		5	4

A total of 86 Steppe Eagles were recorded over the six seasons. Steppe Eagles were registered with highest occurrence rates during the spring seasons, with the least birds per survey hour registered during the summer and autumn seasons, and none registered during the winter season indicating that this species is unlikely to winter here. The average number of birds per survey hour were 3-4x higher in spring seasons. Although this species did not occur in abundance high enough to trigger criticality, this species qualifies as a PBF as per the CHA criteria.

A total of 29 Egyptian Vultures were recorded over the six seasons with highest occurrence rates during the summer and spring and none in the Autumn and Winter possibly indicating that this species breeds locally. Although this species did not occur in abundance high enough to trigger criticality, this species qualifies as a PBF as per the CHA criteria.

A total of three Imperial Eagles were recorded over the six seasons, once in winter and twice in spring. This species is listed as VU on the IUCN red list and satisfies the conditions for PBF.

A total of 646 Cinereous Vultures were recorded over the six seasons. The highest occurrence rates were during spring and winter, with the fewest birds per survey hour recorded in the summer. A total of 85 Dalmatian Pelicans were recorded, all of which occurred in one spring season. No other seasons recorded Dalmatian Pelican.

A total of 15 Little Bustards were recorded, all of which occurred in one winter season. No other seasons recorded Little Bustard.

Of the remaining species which are considered LC globally but are listed on the Azerbaijan Red Data Book:

- A total of 180 Long-legged Buzzards were recorded; summer seasons had the highest occurrence rates, with low numbers of bird/survey hour during all other seasons.
- A total of 444 Lesser Kestrels were recorded; high numbers of birds/survey hour were recorded in summer and spring, followed by autumn, with none recorded in the winter period.
- A total of 533 Griffon Vultures were recorded; none were recorded in summer, with high occurrence rates across all other seasons.
- A total of 20 European Honey Buzzards were recorded, with highest occurrence rates in the summer and least in the spring season. None were recorded during other seasons.

Although it is highly species-specific, the data supports the regional desk-based assessment that spring activity is generally higher than other seasons for the area, which could possibly be attributed to migratory behaviour.

CHA findings show that though the Steppe Eagle, Egyptian Vulture, Pallas's Fish Eagle and Saker Falcon occur in the project area, these species do not occur at abundances high enough to trigger criticality for endangered species in the project area. However, as per EBRD PR6 GN6, these species satisfy Criterion ii for Priority Biodiversity Feature (supports <0.5% of global population of an EN species;) for which mitigation will be addressed in the ecological impact assessment.

All species recorded during the baseline surveys listed as Vulnerable and above on the IUCN Red List and on the Azerbaijan Red Data Book qualify as PBF's. Additional species that were not recorded during the baseline surveys have also been considered as PBFs. Refer to the Final CHA Report for the detailed qualification criteria (provided in Appendix A). The following list provides PBFs:

- Lesser White-fronted Goose
- Marbled Teal
- Common Pochard
- White-headed Duck
- Sociable Lapwing
- Black Stork
- Great White Pelican
- Dalmatian Pelican
- Osprey
- Short-toed Snake-Eagle
- Pallas' Fish-eagle
- Golden Eagle
- Greater Spotted Eagle
- White-tailed Eagle
- Steppe Eagle
- Imperial Eagle
- Peregrine Falcon
- Saker Falcon
- Eurasian Griffon Vulture
- European Honey-Buzzard
- Red-footed Falcon
- Pallid Harrier

- Lanner Falcon
- Egyptian Vulture
- Bearded Vulture
- Cinereous Vulture
- Long-legged Buzzard
- Booted Eagle
- Little Bustard
- Levant Sparrowhawk
- Black Kite
- Merlin
- Eurasian Hobby
- Lesser Kestrel
- European Turtle-dove

Breeding Bird

Nest search surveys were undertaken in March, April and May 2022. This was an intensive raptor nesting survey which included survey efforts in the 'core' area considered as the project area and 1km radius; as well as the 'buffer' area of up to 5km away from the project location.

The following nests were recorded during the nest surveys of 2022:

- Lesser Kestrel colony (8 pairs) located 130m from nearest turbine (G3) and 110m from the storage yard.
- Lesser Kestrel colony (1 pair) located 560m from nearest turbine (G12) and 230m from the access road.

An additional Egyptian Vulture nests and 3 Lesser Kestrel colonies were identified; however, all of these locations fall over 4km away from the project and thus will not be considered in need of protection.

Breeding Bird surveys were undertaken in late May 2020 and early June, 2020 as well as June 2021 and July 2021. The survey method used for breeding birds included walking a route that covered the entire site boundary and 6km buffer zone.

The following nests were recorded during the nest surveys of 2020/2021:

- One Lesser Kestrel *Falco naumanni* colony and one Chough *Pyrrhocorax pyrrhocorax* colony were found within the project site's 1km buffer zone.
- The Lesser Kestrel colony is located 185m from Turbine G2 and 320 m from Turbine G12. Additionally, it is located 82m from an existing track which will be upgraded into a permanent access road.
- The Chough colony is located 270m from Turbine G3 and 26m from the temporary construction laydown area.

Two Egyptian Vulture nests and 3 Lesser Kestrel colonies were confirmed or are suspected; however, all of these locations fall over 2km away from the project.

It is important to note that previous year's breeding colonies were not located in the same areas in subsequent years, indicating that these species are not utilizing the same nesting spots year in-year out.

Figure 3-19 – Locations of Nests (2020-2021 Survey)

Figure 3-20 –Locations of Nests (2020-2021 Survey)

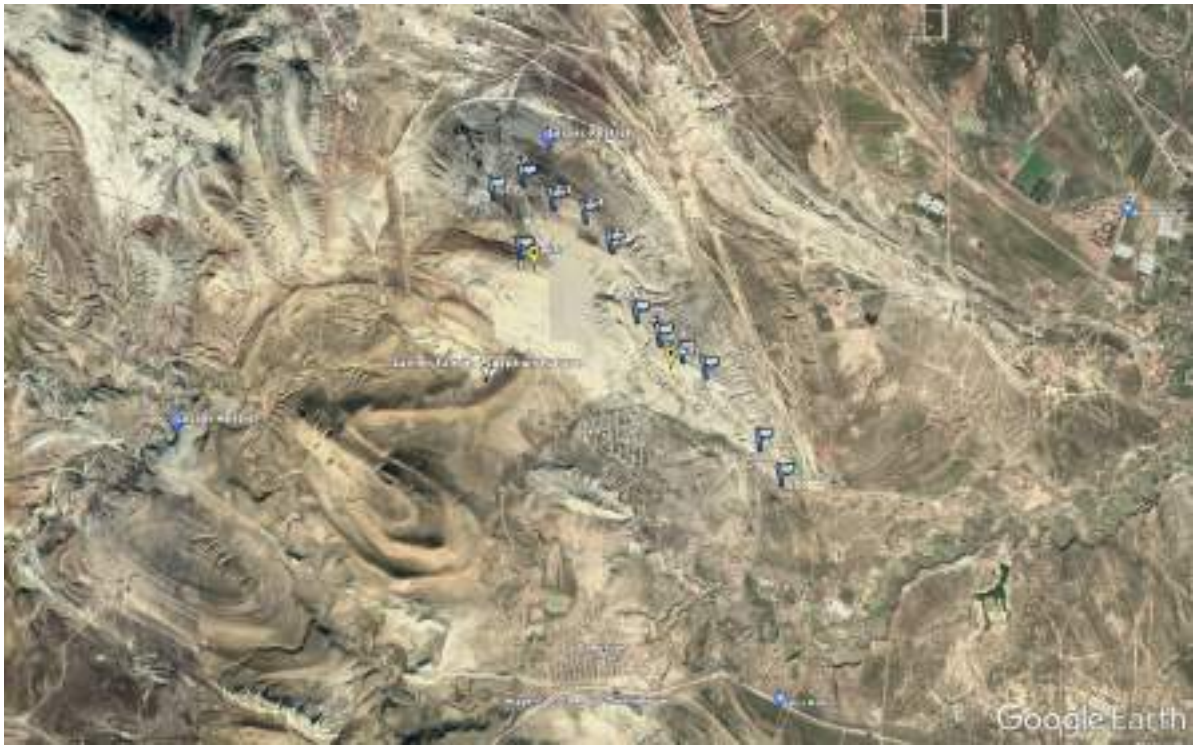


Figure 3-21 Known Nests within 1km of Project (2022 Survey)

OHTL – Segment 1Khizi- Yashma

The following table summarizes the threatened species recorded during VP bird survey undertaken at Segment 1 Khizi-Yashma line.

Refer to the Final CHA report for the list of PBF species. As per EBRD PR6 requirements these species qualify as PBFs for which impacts mitigation and monitoring measures will be provided in the impact assessment.

Table 3-9 VP Survey OHTL Segment 1 (Khizi-Yashma) Threatened Birds

LATIN NAME	ENGLISH NAME	RDB	IUCN	SUMMER	AUTUMN
Ardea purprurea	Purple Heron	LC		2	
Pandion halietus	Osprey	EN		1	
Aegypious monachus	Cinereous Vulture	NT	NT	3	3
Gyps fulvus	Griffon Vulture	VU		4	5
	Vulture sp.				1
Haliaetus albicilla	White tailed eagle	LC			2
Aquila chrysaetos	Golden eagle	LC		2	112
Aquila heliaca	Imperial Eagle	VU	VU		5

LATIN NAME	ENGLISH NAME	RDB	IUCN	SUMMER	AUTUMN
Aquila nipalensis	Steppe eagle	CR	EN		3
Circaetus gallicus	Short-toed Snake Eagle	LC		5	
	Eagle sp.				1
Buteo rufinus	Long-legged buzzard	EN		34	10
Falco naumanni	Lesser Kestrel	VU		81	2
Falco subbuteo	Hobby	LC		1	0
Falco biarmicus	Lanner falcon	LC		14	1

OHTL – Segment 2 Khizi-Pirakashkul

The following table summarizes the threatened species recorded during the VP bird survey undertaken along the Khizi-Pirakashkul route.

Refer to the Final CHA report for the list of PBF species. Further assessment of the project's impacts on these species will provide mitigation, management and monitoring measures aligned with international best practice and CHA requirements

Table 3-10 VP Survey OHTL Segment 2 (Khizi-Perikashkul) Threatened Birds

LATIN NAME	ENGLISH NAME	RDB	IUCN	SUMMER	AUTUMN
Pelecanus crispus	Dalmatian Pelican	VU	NT		42
Pandion halietus	Osprey	EN		4	1
Aegypious monachus	Cinereous Vulture	NT	NT	6	122
Gyps fulvus	Griffon Vulture	VU		0	78
Neophron percnopterus	Egyptian Vulture	VU	EN	15	0
	Vulture sp.				26
Haliaetus albicilla	White tailed eagle	LC			3
Aquila chrysaetos	Golden eagle	LC			6
Aquila heliaca	Imperial Eagle	VU	VU		5
Aquila nipalensis	Steppe eagle	CR	EN	3	21
Circaetus gallicus	Short-toed Snake Eagle	LC		8	3
	Eagle sp.				2
Accipiter gentilis	Goshawk	LC			3
Buteo rufinus	Long-legged buzzard	EN		39	38

LATIN NAME	ENGLISH NAME	RDB	IUCN	SUMMER	AUTUMN
Pernis apivorus	Honey buzzard	VU	LC		5
Falco naumanni	Lesser Kestrel	VU		93	10
Falco subbuteo	Hobby	LC			1
Falco peregrinus	Peregrine Falcon	EN		1	2
Falco biarmicus	Lanner falcon	LC		11	6
Tetrax tetrax	Little Bustard	NT	NT		471

OHTL – Segment 3 Pirakashkul-Gobu

The following table summarizes the threatened species recorded during the VP bird survey undertaken at Segment 3 Pirakashkul-Gobu.

Refer to the Final CHA report for the list of PBF species. Further assessment of the project's impacts on this species will provide mitigation, management and monitoring measures aligned with international best practice and CHA requirements.

Table 3-11 VP Survey OHTL Segment 3 (Pirakashkul-Gobu) Threatened Birds

LATIN NAME	ENGLISH NAME	AZB	IUCN	SUMMER	AUTUMN
Pelecanus onocrotalus	Dalmatian pelican	VU	NT		38
Cignus olor	Mute swan				12
Aegypious monachus	Cinereous Vulture	NT	NT	1	108
Gyps fulvus	Griffon Vulture	VU			59
Neophron percnopterus	Egyptian Vulture	VU	EN	6	0
	Vulture sp.			2	29
Aquila heliaca	Imperial Eagle	VU	VU		3
Aquila nipalensis	Steppe eagle	CR	EN		5
Circaetus gallicus	Short-toed Snake Eagle	LC		1	0
Accipiter gentilis	Goshawk	LC			2
Buteo rufinus	Long-legged buzzard	EN			10
Falco naumanni	Lesser Kestrel	VU		69	0
Falco cherrug	Saker Falcon	EN	EN	5	
Tetrax tetrax	Little Bustard	NT	NT		717
Requrvirostra avosetta	Pied avocet	LC			3

Collisions with Existing Power Lines

During the VP survey of the OHTL alignment, records were made of bird species observed on and around existing OHTLs in the survey area.

A couple of species; Lesser Kestrel and Hooded Crow were observed using different parts of electric pylons for perching and nesting.

During the summer survey, two carcasses were recorded along the Pirkashkul-Gobu segment near the Lake Shoruchtepe; Long Legged Buzzard and a Raven. A wing of a Caspian Gull was also recorded on an existing power line.

During the autumn OHTL survey, 46 carcasses and bird remains were registered along the Pirkashkul-Gobu segment. Among these one Griffon Vulture, one Cinereous Vulture, one unidentified Eagle species, and 5 Common kestrels were recorded. The following tables and map show the location and species observed during the carcass search.

Table 3-12 Location and species of carcasses recorded during autumn OHTL survey

ENGLISH NAME	LATIN NAME	GPS COORDINATES	SUBTOTAL MMW1	GPS COORDINATES	SUBTOTAL MMW-2	TOTAL
Great white Egret	*Ardea alba*			0384009E 4477936N	[1]	1
Cinereous Vulture	*Aegypius monachus*	0376793 4479240	[1]			1
Griffon Vulture	*Gyps fulvus*	379267 4479600	[1]			1
Eagle sp.				0382956 4478433	[1]	1
Kestrel	*Falco tinnunculus*	0376414 4479187 0379104 4479451 0380073 4479621 0379527 4479383 0379766 4479595	[5]			5
Caspian Gull	*Larus cachinnans*	0375602 4479940 0375491 4480343 0379175 4479481 0379293 4479479 0379766 4479595 0378262 4479419	[6]	0386102 4475823 0384219 4477795 0384596 477548 0386000 4475878 0385964 4475878 0386309 4475696 0383886 4477895 0384615 4477791 0384657 4477482 0384611 4477545 0384984 4475719	[13]	19

ENGLISH NAME	LATIN NAME	GPS COORDINATES	SUBTOTAL MMW1	GPS COORDINATES	SUBTOTAL MMW-2	TOTAL
				0385196 0383950 4477965 4476494		
Rock Dove	*Columba livia*	0379199 4479481 0379947 4479617	[2]	0384962 4477018 0384954 4476892	[2]	4
Calandra Lark	*Melanocorypha calandra*	3786134 4479633 0377622 4479451	[2]			2
Lark sp.		0376793 4479240 378892 378892	[2]			2
Rook	*Corvus frugilegus*			0385975 4475934 0383886 4477895	[2]	2
Starling	*Sturnus vulgaris*	0378364 4479623	[1]	384537 4477638	[1]	2
Wader sp.				0384419 4477704	[1]	1
Passerine sp				383839 4477927 0383806 4478001 0384416 4477709	[3]	3
Birds sp.		0379364 4479478 0379883 4479562	[2]			2
Totals			[22]		[24]	**46**

Figure 3-22 Red Line indicates Pirakashkul-Gobu Segment passing by Lake Shoruchteppe (dotted line)

Figure 3-23 Location of bird carcasses and remains recorded during autumn OHTL survey

The following table lists the incidental sightings of birds observed during the Autumn OHTL transect survey for bird mortality due to existing OHTLs.

Table 3-13 Incidental bird sightings during the Autumn OHTL Survey

LATIN NAME	ENGLISH NAME	AZB	IUCN	MMW1	MMW2
Ciconia nigra	Black stork	CR		1	0
Aegypious monachus	Cinereous Vulture	NT	NT	29	2
Gyps fulvus	Griffon Vulture	VU		41	0

LATIN NAME	ENGLISH NAME	AZB	IUCN	MMW1	MMW2
Neophron percnopterus	Egyptian Vulture	VU	EN	0	1
	Vulture sp.			0	1
Aquila heliaca	Imperial Eagle	VU	VU	1	0
Aquila nipalensis	Steppe eagle	CR	EN	2	0
	Eagle sp.			2	0
Milvus migrans	Black Kite	VU		1	0
Buteo rufinus	Long-legged buzzard	EN		2	0

3.3.3 Herptiles

REGIONAL CONTEXT

There are 52 species of reptiles found in Azerbaijan. Most of these species are found in semi-desert areas. Few are found in other lowlands or mountainous areas.

Ten species of amphibians from five families are recorded in Azerbaijan. These amphibian species live in a variety of landscapes, depending on their ability to adapt to harsh environments, and their different nutrient needs. They are commonly found in plains, semi desert habitats and the mountain foothills, where six species occur. Few species are found in deserts, high mountains or alpine meadows.

Table 3-14 List of Rare and Threatened Reptiles and Amphibians of Azerbaijan

Reptiles	ARDB	IUCN	Amphibians	ARDB	IUCN
Testudo graeca iberia	+, U	VU	**Triturus vulgaris**	+	
Testudo horsfieldii		VU	*Triturus cristatus*	+	
Emys orbicularis		Lr/nt	*Pelobates syriacus*	+, U	
Agama ruderata	+, U		*Pelodytes caucasica*	+, U	
Phrynocephalus helioscopus	+, U		*Bufo verrucosissimus*	+	
Mabuya aruata	+		*Hyla arborea*		Lr/nt
Abiepharus bivittatus	+				
Elaphe longissima	+, U				
Elaphe situla		DD			
Natrix megalocephala		VU			
Phyncolamus melanocephalus	+, U				
Vipera kaznakovi		EN			
Vipera xanthina	+, U				

SURVEY METHODOLOGY

In order to provide site-specific baseline information on herptile species, ecology surveys were carried out as per the below.

Surveying Techniques:

- A series of transects and quadrats were undertaken to identify the species present and provide an indication of relative abundance and population density.

- Early morning and evening surveys were conducted in line with highest herptile activity.

Coverage & Timing/Dates:

- Area 1 WF area was surveyed during May/June 2020 and September/October 2020.
- Area 1 BOP was surveyed during May and June 2021.
- OHTL Segments were surveyed during June-July 2021

RESULTS

Wind Farm and BOP Area

The Vulnerable Mediterranean Spur-thighed Tortoise was registered, along with 1 amphibian, 4 lizards and 4 snake species. The tortoise is classified as a PBF as per EBRD PR6 requirements.

Table 3-15 List of Reptiles (WF and BOP)

SCIENTIFIC NAME	TYPE	STATUS IUCN (2020)	ABUNDANCE
Butofes variabilis	Frog	LC	1
Testudo graeca	Turtle	VU	3
Tenuidactylus caspius	Lizard	LC	6
Paralaudakia caucasia	Lizard	LC	3
Eremias arguta	Lizard	LC	4
Ophisops elegans	Lizard	LC	24
Eirenis collaris	Snake	LC	2
Xerotyphlops vermicularis	Snake	LC	1
Malpolon insignitus	Snake	LC	3
Macrovipera lebetina	Snake	LC	

Reptile activity is typically highest in early summer, from late-May to mid-July.

OHTL Segment 1 Khizi – Yashma

A total of 4 reptile species and one amphibian were recorded over the OHTL survey of the segment Khizi-Yashma. All species, except one are recorded are listed as LC on the IUCN Red List as well as the Azerbaijan Red Data Book. The exception, a testudine species; European Pond Turtle *Emys orbicularis* is recorded as NT on the IUCN Red list. The following table summarizes the findings from the herptile survey undertaken along Segment 1 of the OHTL.

Table 3-16 List of Reptiles recorded along the OHTL Segment 1 Khizi - Yashma

SCIENTIFIC NAME	TYPE	IUCN	NATIONAL STATUS	NUMBER OF INDIVIDUALS
Ophisops elegans	Snake-eyed Lizard	LC	-	2
Malpolon insignitus	Eastern Montpellier Snake	LC	-	1

Pelophylax ridibundus	Marsh Frog	LC	-	2
Emys orbicularis	European Pond Turtle	NT	-	1
Macrovipera lebetina obtusa	Lebetine Viper	LC	-	1

OHTL Segment 2 Khizi – Pirakashkul

A total of 8 reptile species and one amphibian were recorded over the OHTL survey of the segment Khizi – Pirakashkul. Five of the reptile species belonged to the families Lacertidae, Viperidae, Psammophiidae and Columbridae of the order Squamata. All species, except two are recorded are listed as LC on the IUCN Red List as well as the Azerbaijan Red Data Book. The exceptions, two testudine species; European Pond Turtle *Emys orbicularis* recorded as NT and Mediterranean Spur-thighed Tortoise *Testudo graeca* recorded as VU on the IUCN Red list. As per EBRD PR6, Mediterranean Spur-thighed Tortoise qualifies as a PBF. The following table summarizes the findings from the herptile survey undertaken along Segment 2 of the OHTL.

Table 3-17 List of Reptiles recorded along the OHTL Segment 2 Khizi - Pirakashkul

Scientific Name	Type	IUCN	National Status	Number of Individuals
Ophisops elegans	Snake-eyed Lizard	LC	-	6
Malpolon insignitus	Eastern Montpellier Snake	LC	-	1
Pelophylax ridibundus	Marsh Frog	LC	-	4
Emys orbicularis	European Pond Turtle	NT	-	1
Macrovipera lebetinus obtusa	Lebetine Viper	LC	-	2
Eirenis collaris	Collared Dwarf Snake	LC,	-	1
Dolichophis schmidti	Red-bellied Racer	LC	-	2
Testudo graeca	Mediterranean Spur-thighed Tortoise	VU	AzRDB	1

OHTL Segment 3 Pirakashkul – Gobu

A total of 8 reptile species and one amphibian were recorded over the OHTL survey of the segment Pirakashkul – Gobu. Five of the reptile species belonged to the families Lacertidae, Viperidae, Psammophiidae and Columbridae of the order Squamata. All species, except two are recorded are listed as LC on the IUCN Red List as well as the Azerbaijan Red Data Book. The exceptions, two testudine species; European Pond Turtle *Emys orbicularis* recorded as NT and Mediterranean Spur-thighed Tortoise *Testudo graeca* recorded as VU on the IUCN Red list. As per EBRD PR6, Mediterranean Spur-thighed Tortoise qualifies as a PBFs. The following table summarizes the findings from the herptile survey undertaken along Segment 3 of the OHTL.

Table 3-18 List of Reptiles recorded along the OHTL Segment 3 Pirakashkul-Gobu

Scientific Name	Type	IUCN	National Status	Number of Individuals
Ophisops elegans	Snake-eyed Lizard	LC	-	10
Malpolon insignitus	Eastern Montpellier Snake	LC	-	1
Pelophylax ridibundus	Marsh Frog	LC	-	2
Emys orbicularis	European Pond Turtle	NT	-	1
Macrovipera lebetinus obtusa	Lebetine Viper	LC	-	1
Tenuidactylus caspius	Caspian Bent-toed Gecko	LC	-	1
Testudo graeca	Mediterranean Spur-thighed Tortoise	VU	AzRDB	2

3.4 Sensitive Receptors

The following overview table groups the sensitivity / value of ecological receptors that may be impacted by project works.

In order to account for potential species that may be present in as-yet unsurveyed portions (OHTL) the most sensitive group (Birds) had potential sensitive species included as well as recorded species.

All other species recorded during surveys but which are not listed in the sensitive receptor table, are considered to be of Low/lower value.

- Impacts on Low/Lower value species are not anticipated to be significant; and
- Mitigation for higher value receptors will also alleviate impacts on these lower value receptors.

Therefore, these Low/lower value species have not been listed out in detail and the impact assessment section will not include assessments on these receptors.

Table 3-19 Sensitive Receptors (Biodiversity)

GROUP	RECEPTOR(S)	AREA	JUSTIFICATION	VALUE
Habitat	Lowland Steppe	All	Lowland steppe is an integral habitat forming the semi-desert ecosystems of Azerbaijan. It supports a variety of Caucasus region species and is heavily degraded and diminishing regionally.	High
	Highland Mountain (Highland Steppe)	All	Highland Mountain is an integral habitat forming the semi-desert ecosystems of Azerbaijan. It supports a variety of Caucasus region species and is heavily degraded and diminishing regionally.	High
	Salt Ponds / Depressions	All	Salt Ponds provide resources for a variety of fauna as a water source and foraging ground.	High
	Modified agricultural	OHTL	Modified agricultural habitat would typically be considered as Lower value. However, the Sociable Lapwing which is known to migrate through the region is dependent upon modified agricultural habitat. As it is a critically endangered species, modified agricultural habitat in this region is therefore also classed as high value.	Medium
IUCN Endangered Flora (PBF)	*Astralagus albanicus (IUCN EN)* *Hypericum theodori (IUCN EN)*	LDA only WF and BOP only	Listed as Endangered on the IUCN. The species was only recorded either in the LDA area or WF and BoP area. It does not occur at an abundance that triggers criticality; It is classified as a PBF	Very High
Nationally Endangered Flora (PBF)	*Anoqramma leptophyllum L.* *Astralagus bakuensis* *Alcea kusariensis;* *Cotoneaster saxatilis Pojark.* *Crocus speciosus M.B.Fl.*	WF, BOP, OHTL	Listed as endangered in the Azerbaijan Red Data Book. Qualify as PBF as per EBRD PR6 requirements.	Very High

Group	Receptor(s)	Area	Justification	Value
	Dianthus schemachensis Schishk. *Iris acutiloba C.A.Verz.* *Sternbergia fischeriana Roem*			
Vulnerable Flora (PBF)	*Acanthoimon schemachense A.Gross.* *Anabasis salsa (C.A.M.) Bnth.* *Ferula persica Willd.* *Iris grossheimii* *Linaria schirvanica Fom.* *Platanthera chlorantha Cust.* *Tulipa biebersteiniana Schult. et Schult* *Tulipa biflora Pall.*	WF, BOP, OHTL	Listed as vulnerable in the Azerbaijan Red Data Book. Endemic species: *Acanthoimon schemachense, Iris grossheimii, Linaria schirvanica ;* therefore qualify as PBFs	High
Near Threatened Flora	*Iris caucasica Hoffm.* *Iris reticulata M.B.Fl.* *Pyrus salicifolia Pall.* *Veronica amoena Bieb*	WF, BOP	Listed as near threatened in the Azerbaijan Red Data Book.	Medium
Non-Threatened Regionally Endemic Flora (PBF)	*Astragalus schemachensis* *Bellevalia fomini Woronow.* *Cousinia orientalis* *Erodium schemachense A.Grossh.* *Gysophila capitata M.B.* *Merendera eichleri Boiss.* *Onobrychis Biebersteinii G.Sir.* *Onobrychis petraea Fisch.* *Pinus eldarica Medw.* *Pyrus salicifolia Pall.* *Silene grossheimii Schischk.* *Stachys fruticulosa M.BFl.*	WF, BOP	Although not threatened, regionally endemic PBF as per EBRD PR6 requirements.	Medium

Group		Receptor(s)	Area	Justification	Value
		Thesium szowitsii A.DC. *Thymus hadzhievii A.Grossh.* *Thymus karjaginii*			
Endangered Birds	**Highly Sensitive Raptors**	Egyptian Vulture (PBF) Steppe Eagle (PBF) Saker Falcon (PBF)	WF Confirmed Possible in all areas	Listed as critically endangered or endangered on IUCN Red List. Perching raptors and large-bodied birds are particularly vulnerable to wind farm and transmission line developments.	Very High
	Highly Sensitive Waterbirds (PBF)	White-headed Duck (PBF) Sociable Lapwing (PBF)	Not Confirmed but Possible in all areas	Listed as critically endangered or endangered on IUCN Red List; PBF as per EBRD PR6 requirements. Large-bodied birds and gregarious species are particularly vulnerable to wind farm and transmission line developments.	Very High
Threatened Birds	**Sensitive Raptors** (PBF)	Cinereous Vulture (PBF)Eastern Imperial Eagle (PBF) Greater Spotted Eagle (PBF) Pallid Harrier (Not Confirmed)	OHTL Confirmed Possible in all areas	Eastern Imperial Eagle and Greater Spotted Eagle Listed as vulnerable on the IUCN Red List; PBF. Cinereous Vulture is designated a PBF as per EBRD PR6 Criteria (iii) Perching raptors and large-bodied birds are particularly vulnerable to wind farm and transmission line developments.	High
	Sensitive Waterbirds (PBF)	Dalmatian Pelican (PBF) Great White Pelican (PBF) Common Pochard (PBF) Ferruginous Duck Lesser White-fronted Goose (PBF) Marbled Teal (PBF) Red-breasted Goose Velvet Scoter Northern Lapwing Eurasian Oystercatcher Black-tailed Godwit	Not Confirmed but Possible in all areas	Listed as vulnerable on IUCN Red List. Dalmatian Pelican, Common Pochard, Lesser White-fronted Goose, and Marbles qualify as PBF as per EBRD PR6 as migratory/congregatory species and under criterion (iii). Large-bodied birds and gregarious species are particularly vulnerable to wind farm and transmission line developments.	High

Group		Receptor(s)	Area	Justification	Value
		Eurasian Curlew Great Snipe			
	Sensitive Ground birds (PBF)	Great Bustard (PBF) Little Bustard (PBF) Caucasian Grouse	Not Confirmed but Possible in all areas	Listed as vulnerable (PBF as per EBRD PR6 requirements.) or near threatened on IUCN Red List. Poor fliers such as ground birds are particularly vulnerable to wind farm and transmission line developments.	High
	Songbirds/Allies	European Turtle-dove (PBF) Meadow Pipit Redwing	Not Confirmed but Possible in all areas	Listed as vulnerable (PBF as per EBRD PR6 requirements) or near threatened on IUCN Red List. European Turtle-dove Smaller passerines and allies are less sensitive to wind farm and transmission line development comparatively to larger-bodied raptors, waterbirds and ground-birds.	High
	Nationally Threatened Raptors	Osprey (PBF) Long-legged Buzzard (PBF) Peregrine Falcon (PBF)	Not Confirmed but Possible in all areas	Listed as Cr or EN under Azerbaijan Red Data Book. PBF as per EBRD PR6 requirements	High
Non-threatened Raptors (PBF)		Black Kite (PBF) Booted Eagle (PBF) Golden Eagle (PBF) Griffon Vulture (PBF) White-tailed Sea-eagle Lesser Kestrel (PBF) Bearded Vulture (Not Confirmed) (PBF) Lesser-spotted Eagle	WF Confirmed Possible in all areas	Classified as Least Concern on the global IUCN Red List,but listed as vulnerable or near-threatened under Azerbaijan Red Data Book. CHA designates some species as PBF as per EBRD PR6 Criteria (iii) Perching raptors and large-bodied birds are particularly vulnerable to wind farm and transmission line developments.	Medium
Threatened Bats (PBF)		Greater horseshoe bat Geoffroy's bat European free-tailed bat	WF Confirmed Possible in all areas	Bats are known to be particularly vulnerable to wind developments. These species are also listed in the Azerbaijan Red Data Book. These species play an important ecological function the top-	High

Group		Receptor(s)	Area	Justification	Value
				down control of insect population. Keystone Species; classified as PBFs	
Non-threatened Bats (PBF)		Whiskered bat Alcathoe bat Brown long-eared bat Eastern barbastelle Lesser noctule Common noctule Lesser noctule Nathusius's pipistrelle Kuhl's pipistrelle Savii's pipistrelle Particolored bat Serotine bat Soprano Pipistrelle	WF, BOP, OHTL confirmed	Bats are known to be particularly vulnerable to wind developments. These species are also listed in the Azerbaijan Red Data Book. These species play an important ecological function the top-down control of insect population. Keystone Species; classified as PBFs	Medium
Threatened Mammals		Goitered Gazelle (PBF) Marbled Polecat (PBF)	WF/BOP Confirmed	Goitered Gazelle is listed as vulnerable in the Azerbaijan Red Data Book and Vulnerable on the IUCN Red List. The Marbled Polecat is listed as VU on the IUCN red list. Both species classify as PBF's. However, these terrestrial, mobile mammals are not considered to be especially affected by wind developments, as wind farms and turbines have relatively lesser habitat loss and mortality than other types of developments.	High
Non-threatened Mammals	**Carnivores**	Red Fox Golden Jackal Grey Wolf	WF/BOP/OHTL Confirmed	These carnivores act as top-down control on prey populations and help control disease. However these species are not threatened or endemic and are common and widespread.	Medium

Group		Receptor(s)	Area	Justification	Value
	Insectivores	*Erinaceus concolor* *Hemiechinus auritus* *Crocidura guldenstaedti* *Crocidura leucodon*	WF/BOP /OHTL Confirmed	Hedgehogs and other insectivores are an important top-down control for various invertebrate populations. However these species are not threatened or endemic and are common and widespread.	Medium
	Mustelids	European Badger Least Weasel	WF/BOP/ OHTL Confirmed	Mustelids act as top-down control on prey populations and help control disease. However these species are not threatened or endemic and are common and widespread.	Medium
	Rodents	*Hystrix indica* *Mus musculus* *Sylvaemus fulvipectus* *Cricetulus migratorius* *Allactaga elater* *Allactaga williamsi* *Meriones libycus* *Microtus socialis*	WF/BOP/ OHTL Confirmed	Rodents are an important prey species and also contribute to soil health via burrow aeration and vegetation spread via seed banking. However these species are not threatened or endemic and are common and widespread.	Medium
Threatened Herptiles		*Testudo graeca* (PBF)	WF/BOP /OHTL Confirmed	Mediterranean Spur-thighed Tortoise is listed as VU on IUCN Red List; PBF species a per EBRD PR6. As a burrowing reptile, this species will be at risk of earthworks during construction period.	High
Near threatened Herptiles		*Emys orbicularis*	OHTL Confirmed	This turtle is listed as NT on the Azerbaijan Red Data Book and NT on the IUCN Red List As a burrowing reptile, this species will be at risk of earthworks during construction period.	High
Non-threatened Herptiles	**Amphibians**	*Butofes variabilis / Bufotes viridis*	WF/BOP/ OHTL Confirmed	These species are not threatened or endemic and are common and widespread.	Medium
	Lizards	*Tenuidactylus caspius* *Paralaudakia caucasia* *Eremias arguta*	WF/BOP/ OHTL Confirmed	These species are not threatened or endemic and are common and widespread.	Medium

Group		Receptor(s)	Area	Justification	Value
		Ophisops elegans			
	Snakes	*Eirenis collaris* *Xerotyphlops vermicularis* *Malpolon insignitus* *Macrovipera lebetina* *Levantiya viper*	WF/BOP/ OHTL/LDA Confirmed	These species are not threatened or endemic and are common and widespread.	Medium
Threatened Invertebrates		*Saga ephippigera*	OHTL Confirmed	A rare species of giant bush cricket, a carnivorous species that feeds on insects typically harmful to agriculture. Will be listed in the 3rd edition of the Azerbaijan Red Data Book.	High
Non-threatened Invertebrates		Orthoptera (Grasshoppers/Locust/Crickets) Mantodea (Mantis) Hymenoptera (Wasps/Bees/Ants) Coleoptera (Beetles) Lepidoptera (Butterflies/Moths)	WF/BOP/ OHTL Confirmed	Some of the species found are important predators whilst others are important pollinators. However, these species are not threatened or endemic and are common and widespread.	Medium

3.5 Potential Impacts, Mitigation, Management & Residual Impact

3.5.1 Construction Phase

HABITAT LOSS FRAGMENTATION AND DEGRADATION ECOSYSTEM FUNCTION

Habitat Loss

Clearing, grading, excavation and other earthworks during early construction stages results in habitat loss over the full construction footprint of the project, including temporary structures, lay-down areas, and new and existing roads used for incoming and outbound traffic.

Habitat loss affects both vegetation and wildlife species that currently use the affected areas as well as overarching ecosystem function on a wider regional scale. Vegetation cannot re-establish in impermeable paving or compacted soils, and wildlife dependent upon natural features and resources cannot utilize the converted land which restricts available habitat regionally. Ecosystem function likewise will be degraded or lost.

The EPC will be instructed to maintain a strict buffer of 10m for access roads and BoP; a maximum buffer of 30m is allocated for the WTG.

Table 3-20 Modified Habitat Loss

HABITAT	HABITAT LOSS BASED ON 30 M FOR WTGS AND 10 M FOR BOP AND ACCESS ROAD (WORSE CASE)
Modified agricultural habitat	0.005 km2

Table 3-21 Natural Habitat Loss

HABITAT	HABITAT LOSS BASED ON 30 M FOR WTGS AND 10 M FOR BOP AND ACCESS ROAD (WORSE CASE)
Semi Desert / lowland steppe	0.21 km2
Highland mountain / Mountain Steppe	0.19 km2

Habitat loss within the **footprint** of the structures will be **permanent** or at least until the project is eventually decommissioned. Habitat loss is **certain to occur**, however, the **overall magnitude** of habitat loss is anticipated to be relatively minimal compared to the **overall extent** of the available habitats.

Table 3-22 Significance of Habitat Loss

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Semi Desert / lowland steppe	High	Minor	Minor to Moderate
Modified agricultural habitat	Medium	Negligible	Negligible to Minor

Highland mountain / Mountain Steppe	High	Minor	Minor to moderate

However, maintaining strict requirements to **minimize** the construction buffer as much as practicable will reduce the magnitude of habitat loss impact. Further, habitat loss in areas disturbed during construction but falling outside of the physical footprint of the infrastructure is **reversible**.

The EPC contractor **will commit** to the post-construction restoration, potentially via seeding, re-planting, and landscaping with native, high-value species, of all affected areas to natural habitat conditions to achieve No Net Loss post construction. The exact scope and methodology will be detailed in a **Restoration Action Plan**. This reduces the spatial extent of the impact and thus reduces the magnitude of impact where possible. Given that NNL must be achieved for Natural Habitat the residual impact significance is considered to be Neutral.

Table 3-23 Residual Natural Habitat Loss

HABITAT	HABITAT LOSS BASED ON 30 M FOR WTGS AND 10 M FOR BOP AND ACCESS ROAD (WORSE CASE)
Semi Desert / lowland steppe	0.026 km2
Highland mountain / Mountain Steppe	0.051 km2

Table 3-24 Residual Significance of Habitat Loss

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Semi Desert / lowland steppe	High	Negligible	Minor
Modified agricultural habitat	Medium	Negligible	Negligible
Highland mountain / Mountain Steppe	High	Negligible	Minor

BIODIVERSITY LOSS – DIRECT MORTALITY, LOWERED REPRODUCTION AND SURVIVORSHIP

Clearing, Excavation, Earthworks

Clearing of existing vegetation results in direct loss and mortality of removed specimens. Further, wildlife such as burrowing rodents and herptiles may be directly crushed during earthworks, or may suffer stress-induced mortality.

he Mediterranean Spur-thighed Tortoise (VU) is a burrowing species considered as a PBF at the project site. The tortoise spends majority of the year in a dormant state in burrows below ground which makes it all the more susceptible to earthworks.

This impact covers the full **spatial extent** of the construction footprint and is **irreversible and permanent**. For vegetation is it **certain** to occur while for burrowing fauna it is **possible** to occur.

Thus, the magnitude of impact is considered as **Moderate**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

Table 3-25 Significance of Construction Earthworks Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Moderate	Major
Threatened Flora	High	Moderate	Moderate to Major
Near-threatened Flora	Medium	Moderate	Moderate
Non-threatened Flora	Medium	Moderate	Moderate
Threatened Herptiles	High	Moderate	Moderate to Major
Non-threatened Herptiles	Medium	Moderate	Moderate
Non-threatened Inverts	Medium	Moderate	Moderate
Non-threatened Rodents	Medium	Moderate	Moderate

However, the following mitigation measures **will be implemented**:

- Pre-construction survey and translocation of endangered and threatened flora. The timings and exact methodology for relevant species is defined in the **Flora Conservation Action Plan**.
- Seed-collection of endangered and threatened flora for use in restoration activities post-construction. The timings and exact methodology for relevant species is defined in the **Flora Conservation Action Plan.**
- Post-construction restoration via seeding, re-planting, and landscaping with native, high-value species. Details will be provided in the **Restoration Action Plan**.
- The **Biodiversity Action Plan (BAP)** provides the strategy for NNL for sensitive flora species classified as PBFs.
- Relocation of threatened reptile species, Mediterranean Spur-thighed Tortoise away from the construction corridor. This will be undertaken via pre-construction survey to identify viable release sites and relocation efforts during the optimal season (late spring/early summer) as per the detailed methodology provided in the **Reptile Relocation Plan** (RRP).
- For non-threatened species such as other herptiles and small mammals, a biodiversity chance-find procedure will be included within the CESMP to provide general guidance on dealing with animals found in the active construction area. There will be a **full-time Ecologist** on site as part of the EPC Contractor's team to carry out any such required translocations (as well as implement and supervise all biodiversity related construction management and monitoring measures).

With the above measures, the **residual** significance is presented in the following table.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	Minor
Threatened Flora	High	Negligible	Minor

Receptor	Value/Sensitivity	Magnitude	Residual
Near-threatened Flora	Medium	Negligible	Negligible to minor
Non-threatened Flora	Medium	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor
Non-threatened Herptiles	Medium	Minor	Minor
Non-threatened Inverts	Medium	Minor	Minor
Non-threatened Rodents	Medium	Minor	Minor

Vehicle Collisions

Wildlife can be runover or collide with, motorized vehicles and equipment.

Vehicle-related death from trucks and machinery are less of a concern for larger mammals such as Gazelle, Wolf, Fox and Jackal which are more likely to disperse in time to avoid collision (as the site vehicles will be traveling under speed restrictions (20km/hr) and large equipment movement such as cranes and turbine parts will be very slow).

Small to medium sized wildlife such as to hare, hedgehog and rodents, tortoise, lizards, snakes and amphibians as well as invertebrates have a higher chance of mortality from vehicular and machinery collisions. This could also apply to ground birds as well as endangered, threatened and non-threatened raptors which may scavenge from road-kill.

This impact is **direct**, a **low intensity** of change, with a **spatial extent** covering the construction footprint; it is **irreversible** with a **long-term duration**. It is considered as **possible** to occur.

Thus, the magnitude of impact is considered as **Minor to Negligible**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

Receptor Group	Value/Sensitivity	Magnitude	Significance
Endangered Raptors	Very High	Minor	Moderate to Major
Threatened Raptors	High	Minor	Minor to moderate
Threatened Ground birds	High	Minor	Minor to moderate
Non-threatened Raptors	Medium	Minor	Minor
Threatened Mammals	High	Negligible	Minor
Non-threatened Carnivores	Medium	Negligible	Negligible to minor
Non-threatened Mammals (non-carnivores)	Medium	Minor	Minor
Threatened Herptiles	High	Minor	Minor to moderate
Non-threatened Herptiles	Medium	Minor	Minor
Non-threatened Invertebrates	Medium	Minor	Minor

However, the following mitigation measures **will be implemented** to reduce the impacts:

- Strict speed controls (20km/hr) which will be enforced by EPC HSE and Security teams;
- Ban against driving outside of delineated access roads and restricting driving and machinery operation to daylight hours; and
- Protocol for removal of any road-kill carcasses immediately upon observation to at least 10 meters away from the access road.
- These measures shall be captured in the CESMP and shall be implemented and monitored by the Ecologist on Site.

With the above measures, the **residual** significance is presented in the following table.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Raptors	Very High	Negligible	Minor
Threatened Raptors	High	Negligible	Minor
Threatened Ground birds	High	Negligible	Minor
Non-threatened Raptors	Medium	Negligible	Negligible to minor
Threatened Mammals	High	No change	Neutral
Non-threatened Carnivores	Medium	No change	Neutral
Non-threatened Mammals (non-carnivores)	Medium	Negligible	Negligible to minor
Threatened Herptiles	High	Negligible	Minor
Non-threatened Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Invertebrates	Medium	Negligible	Negligible to minor

"Take" (Poaching, Hunting, Gathering)

Presence of site workers may lead to increased hunting, poaching, or gathering on site. Flora and vegetative matter may be gathered for consumption or for fuel; eggs taken from breeding bird nests; poaching of hare, ground birds or tortoise for consumption or for domestic trade; and persecution of raptors, snakes, and carnivores could potentially take place.

This **direct** impact has **low intensity**, with a **spatial extent** of the full construction footprint, is **long-term** and **irreversible**, with a **possible** likelihood.

Thus, the magnitude of impact is considered as **Moderate to Minor**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Moderate	Major
Threatened Flora	High	Moderate	Moderate to Major
Near- and Non-threatened Flora	Medium	Moderate	Moderate
Endangered Birds	Very High	Minor	Moderate to Major
Threatened Birds, Herptiles	High	Minor	Minor to moderate

Non-threatened Mammals, Herptiles, Raptors, Songbirds	Medium	Minor	Minor

However, the following mitigation measures **will be implemented** to reduce the impacts:

- Strict controls forbidding the hunting, gathering, poaching or otherwise disturbance of any flora or fauna on site, included in induction training;
- Staff training such as toolbox talks on specific species of concern such as Mediterranean Spur-thighed Tortoise, snakes, hares etc which might otherwise be hunted or killed.
- These measures shall be captured in the **CESMP** and shall be implemented and monitored by the Ecologist on Site.

With the above measures, the **residual** significance is presented in the following table.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	Minor
Threatened Flora	High	Negligible	Minor
Near- and Non-threatened Flora	Medium	Negligible	Negligible to minor
Endangered Birds	Very High	Negligible	Minor
Threatened Birds, Herptiles	High	Negligible	Minor
Non-threatened Mammals, Herptiles, Raptors, Songbirds	Medium	Negligible	Negligible to minor

Littering

Improper management of solid waste such as plastic containers and plastic bags, may result in wind-blown litter, which are a danger to wildlife due to entanglement or ingestion.

This **direct** impact has **low intensity**, with a **spatial extent** that could extend to regional, is **long-term** and **irreversible**, with a **possible** likelihood.

Thus, the magnitude of impact is considered as **Minor**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Minor	Moderate to Major
Threatened Birds, Bats, Mammals, Herptiles	High	Minor	Minor to Moderate
Non-threatened Birds, Bats, Mammals, Herptiles, Invertebrates	Medium	Minor	Minor

However, the following mitigation measures **will be implemented** to reduce the impacts:

- Preparation of a Waste Management Plan as one of the supplementary plans to the CESMP;

- Strict waste management supervision and controls under the HSE Team;
- Zero tolerance for littering on site;
- Daily inspections and clean-up of litter by EPC/sub-contractor(s) responsible.
- These measures shall be captured in the **CESMP** and shall be implemented and monitored by the Ecologist on Site.

With the above measures, the **residual** significance is presented in the following table.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	Minor
Threatened Birds, Bats, Mammals, Herptiles	High	Negligible	Minor
Non-threatened Birds, Bats, Mammals, Herptiles, Invertebrates	Medium	Negligible	Negligible to Minor

Disturbance

The presence of anthropogenic activity is disturbing to many sensitive species, which can result in reduced survivorship, reproductive success, and ultimately, population decline.

Species particularly sensitive include the shy Goitered Gazelle and Bustard species, although most wildlife which is not already habituated to anthropogenic disturbance is anticipated to be negatively affected.

Disturbance especially impacts the reproductive success of breeding birds, which may abandon breeding attempts, or desert nests or colonies if disturbance levels are unacceptable. Disturbance may also impact important biodiversity features such as dens, caves/bat roosts, and other areas where fauna congregate.

This **direct** impact has **low intensity**, with a **spatial extent** of the full construction footprint and a 1km buffer, is **long-term** and **reversible**, with a **possible** likelihood.

Thus, the magnitude of impact is considered as **Moderate to Minor**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Moderate	Major
Threatened Birds	High	Moderate	Moderate to Major
Non-threatened Birds	Medium	Minor	Minor
Non-threatened Bats	Medium	Minor	Minor
Threatened Mammals (Goitered Gazelle)	High	Moderate	Moderate to Major
Non-threatened Mammals (carnivores)	Medium	Moderate	Moderate

Receptor	Value/Sensitivity	Magnitude	Significance
Non-threatened Mammals (non-carnivores)	Medium	Minor	Minor
Threatened Herptiles	High	Moderate	Moderate to Major
Non-threatened Herptiles	Medium	Moderate	Moderate

However, the following mitigation measures will be implemented to reduce the impacts:

- Minimize construction footprint buffer zones and temporary laydown areas.
- Avoid disturbance during sensitive ecological periods, particularly breeding season of sensitive species of concern. The **Breeding Birds Protection Plan** provides exact methodology and details on the seasonal timings and distance of no-go buffers which should be utilized.

With the above measures, the **residual** significance is presented in the following table.

Receptor	Value/Sensitivity	Magnitude	Residual
Endangered Birds	Very High	Negligible	Minor
Threatened Birds	High	Negligible	Minor
Non-threatened Birds	Medium	Negligible	Negligible to minor
Non-threatened Bats	Medium	Negligible	Negligible to minor
Threatened Mammals	High	Negligible	Minor
Non-threatened Mammals (carnivores)	Medium	Negligible	Negligible to minor
Non-threatened Mammals (non-carnivores)	Medium	Negligible	Negligible to minor
Mediterranean Spur-thighed Tortoise	High	Negligible	Minor
Non-threatened Herptiles	Medium	Negligible	Negligible to minor

Dispersal and Competition

Shyer species may be displaced away from the project area, having potentially indirect secondary impacts on adjacent territories via increased competition for resources compromising population stability, causing ecosystem imbalances.

However, the surrounding areas on a landscape level seem to support similar habitat types and are not constrained by large-scale urban or industrial developments. Therefore, it is not anticipated that displaced individuals will have a significant impact on adjacent ecosystems.

Figure 3-24 Project and Surrounding Areas

Proliferation of Generalists Pests

Improper management of solid waste can result in the proliferation of pest species, such as feral dog, cat, rats, and other urban-adapted species. This can cause competition with, and displacement of, native fauna.

This direct impact has **low intensity**, with a **spatial extent** of the full construction footprint, is **long-term** and **reversible**, with a **possible likelihood**.

Thus, the magnitude of impact is considered as **Moderate**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Fauna	Very High	Moderate	Major
Threatened Fauna	High	Moderate	Moderate to Major
Non-threatened Fauna	Medium	Moderate	Moderate

However, the following mitigation measures **will be implemented** to reduce the impacts:

- Preparation of a Waste Management Plan as one of the supplementary plans to the CESMP;
- Strict waste management supervision and controls under the HSE Team;
- Zero tolerance for littering on site;
- Daily inspections and clean-up of litter by EPC/sub-contractor(s) responsible.
- No provision of food waste for feral cats and dogs
- These measures shall be captured in the **CESMP** and shall be implemented and monitored by the Ecologist on Site.

With the above measures, the **residual** significance is presented in the following table.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Fauna	Very High	Negligible	Minor
Threatened Fauna	High	Negligible	Minor
Non-threatened Fauna	Medium	Negligible	Negligible to minor

BIOSECURITY RISKS

Introduced Flora / Pathogens

Soil imports, intentional or via previously used excavation and earthworks equipment, may contain pathogens that can spread and infect native vegetation and fauna that do not have natural defence mechanisms.

Exotic seeds in soil imports can allow the spread of invasive, weedy species which outcompete native species. Secondary impacts may occur on wildlife which utilize the reduced native vegetation for foraging or shelter.

The magnitude and unmitigated significance calculations are presented in the table below. This **direct** impact has **low intensity**, with a regional **spatial extent**, is **long-term** and **irreversible**, with a **possible** likelihood.

Thus, the magnitude of impact is considered as **Major (for flora)** to **Moderate (for fauna)**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Major	Major
Threatened Flora	High	Major	Major
Near- and Non-threatened Flora	Medium	Major	Moderate to Major
Endangered Fauna	Very High	Moderate	Major
Threatened Fauna	High	Moderate	Moderate to Major
Non-threatened Fauna	Medium	Moderate	Moderate

However, the following mitigation measures **will be implemented** to reduce the impacts:

- Soil imports will be taken from local quarry or borrow pit as close to the site as reasonably practical to avoid risk of foreign seeds and invasive species;
- Soil imports from outside of the area will undergo checks to prevent accidental introduction of exotic species / pathogens.
- Plant and machinery will require an HSE certificate of inspection, issued by the EPC, before coming onto site and this will include necessary cleaning /washing to reduce risks of importing invasive species in mud taken from urban sites. The Waste Management Plan will also include waste water management protocols;
- These measures shall be captured in the **CESMP** and shall be implemented and monitored by the Ecologist on Site.
- On-site ecologist will monitor for any invasive species in the cleared areas which, if found, will be removed to prevent potential spread beyond the construction area.

With the above measures, the **residual** significance is presented in the following table.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Flora	Very High	Negligible	Minor
Threatened Flora	High	Negligible	Minor
Near- and Non-threatened Flora	Medium	Negligible	Negligible to minor
Endangered Fauna	Very High	Negligible	Minor
Threatened Fauna	High	Negligible	Minor
Non-threatened Fauna	Medium	Negligible	Negligible to minor

ENVIRONMENTAL QUALITY

Air Quality

Dust can coat vegetation, reducing photosynthesis and respiration ability, causing desiccation. Emissions of pollutants such as NOx, SOx, PM and CO can lower survivorship and increase susceptibility of affected wildlife to disease.

This **direct** impact has **low intensity**, with a **spatial extent** of the full construction footprint, is **temporary** and **reversible**, with a **possible** likelihood.

Thus, the magnitude of impact is considered as **Minor**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Flora	Very High	Minor	Moderate to Major
Threatened Flora	High	Minor	Minor to moderate

Receptor	Value/Sensitivity	Magnitude	Significance
Near- and Non-threatened Flora	Medium	Minor	Minor
Endangered Fauna	Very High	Minor	Moderate to Major
Threatened Fauna	High	Minor	Minor to moderate
Non-threatened Fauna	Medium	Minor	Minor

However, the following mitigation measures **will be implemented** to reduce the impacts:

- Refer to air quality control measures.
- All tracks will be damped down to reduce risk of dust and this will be checked daily.
- These measures shall be captured in the **CESMP** and shall be implemented and monitored by the Ecologist on Site.

With the above measures, the **residual** significance is presented in the following table.

Receptor	Value/Sensitivity	Magnitude	Residual
Endangered Flora	Very High	Negligible	Minor
Threatened Flora	High	Negligible	Minor
Near- and Non-threatened Flora	Medium	Negligible	Negligible to minor
Endangered Fauna	Very High	Negligible	Minor
Threatened Fauna	High	Negligible	Minor
Non-threatened Fauna	Medium	Negligible	Negligible to minor

Noise

Construction noise can cause acoustic masking, disturbance and displacement, and general reduction in survivorship and reproductive success in a variety of fauna. Most impacted are acoustic communicators such as bird species.

This **direct** impact has **moderate-high intensity**, with a **regional spatial extent**, is **long-term** and **reversible**, with a **certain** likelihood.

Thus, the magnitude of impact is considered as **Major (for birds) and Moderate (for others)**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

Receptor	Value/Sensitivity	Magnitude	Significance
Endangered Birds	Very High	Major	Major
Threatened Birds	High	Major	Major
Non-threatened Birds	Medium	Major	Moderate to Major
Non-threatened Bats	Medium	Moderate	Moderate
Threatened Mammals (Goitered Gazelle)	High	Moderate	Moderate to Major

Receptor	Value/Sensitivity	Magnitude	Significance
Non-threatened Mammals (non-carnivores)	Medium	Moderate	Moderate

However, the following mitigation measures **will be implemented** to reduce the impacts:

- Refer to noise control measures;
- Avoid disturbance during sensitive ecological periods, particularly breeding season of sensitive species of concern. The **Breeding Birds Protection Plan** provides exact methodology and details on the seasonal timings and distance of no-go buffers which should be utilized;
- Install temporary acoustic barriers around large generators, Best Available Technology (BAT) and Best Management Practices (BMP) within construction methodology to reduce noise, especially intermittent noise, as much as possible.
- These measures shall be captured in the **CESMP** and shall be implemented and monitored by the Ecologist on Site.

With the above measures, the **residual** significance is presented in the following table.

Receptor	Value/Sensitivity	Magnitude	Residual
Endangered Birds	Very High	Negligible	Minor
Threatened Birds	High	Negligible	Minor
Non-threatened Birds	Medium	Negligible	Negligible to minor
Non-threatened Bats	Medium	Negligible	Negligible to minor
Threatened Mammals (Goitered Gazelle)	High	Negligible	Minor
Non-threatened Mammals (non-carnivores)	Medium	Negligible	Negligible to minor

Light Pollution

Night-time lighting can impact nocturnal wildlife behaviour. It can act as an attractant, which can cause congregation and higher predation rates / change movement and migration behaviour; act as a repellent which causes displacement, or interfere with the circadian cycle and cause lower survivorship and reproductive success.

However, lighting will be required only at specific work areas and not across the wider area or along access roads, thereby limiting lighting to relatively small areas, where night work is required.

This **direct** impact has **moderate intensity**, with a **spatial extent** of the full construction footprint, is **long-term** and **reversible**, with a **probable** likelihood.

Thus, the magnitude of impact is considered as **Moderate to Major**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative

Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

The magnitude and **unmitigated** significance calculations are presented in the table below.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Moderate	Major
Threatened Birds	High	Moderate	Moderate to Major
Non-threatened Birds	Medium	Moderate	Moderate
Non-threatened Bats	Medium	Major	Moderate to Major
Threatened Mammals (Goitered Gazelle)	High	Moderate	Moderate to Major
Non-threatened Mammals	Medium	Moderate	Moderate
Threatened Herptiles (Mediterranean Spur-thighed Tortoise)	High	Moderate	Moderate to Major
Non-threatened Herptiles	Medium	Major	Moderate to Major
Non-threatened Invertebrates	Medium	Moderate	Moderate

However, the following mitigation measures **will be in place**, to minimize the magnitude of potential impact:

- Ensure lighting is fit for purpose and duration of lighting to be controlled and minimized as much as possible.
- Lights will be shielded to prevent skyglow, spill and glare.
- These measures shall be captured in the **CESMP** and shall be implemented and monitored by the Ecologist on Site.

With the above measures, the **residual** significance is presented in the following table.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	Minor
Threatened Birds	High	Negligible	Minor
Non-threatened Birds	Medium	Negligible	Negligible to minor
Non-threatened Bats	Medium	Negligible	Negligible to minor
Threatened Mammals (Goitered Gazelle)	High	Negligible	Minor
Non-threatened Mammals	Medium	Negligible	Negligible to minor
Threatened Herptiles (Mediterranean Spur-thighed Tortoise)	High	Negligible	Minor
Non-threatened Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Invertebrates	Medium	Negligible	Negligible to minor

Contamination

Fuels and solvents will be used during construction activities and maintenance. Improper use, storage and handling can result in chemical spills and contamination of the soil and groundwater. Flora and fauna that come into contact may become ill or die.

This **direct** impact has **high intensity**, with a **spatial extent** of the full construction footprint, is **long-term** and **irreversible**, but with an **unlikely** likelihood.

Thus, the magnitude of unmitigated impact is considered as **Moderate**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Natural Habitat (Highland and Lowland Mountains)	High	Moderate	Moderate to Major
Endangered Species	Very High	Moderate	Major
Threatened Species	High	Moderate	Moderate to Major
Non-threatened Species	Medium	Moderate	Moderate

However, the following mitigation measures **will be in place**, to minimize the magnitude of potential impact:

- Refer to hazardous materials control measures, emergency action plan and spill prevention and clean up measures which shall be detailed in the CESMP.

With the above measures, the **residual** significance is presented in the following table.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Natural Habitat (Highland and Lowland Mountains)	High	Negligible	Minor
Endangered Species	Very High	Negligible	Minor
Threatened Species	High	Negligible	Minor
Non-threatened Species	Medium	Negligible	Negligible to Minor

Soils

During construction earthworks and vehicle movement, soils may become compacted, which prohibits vegetation regrowth and use for burrowing. Further, removal of vegetation may cause an increase in wind-driven soil erosion, leading to loss of native soils.

This **direct** impact has **low intensity**, with a **spatial extent** of the full construction footprint, is **long-term** and **reversible**, with a **possible** likelihood.

Thus, the magnitude of impact is considered as **Moderate**. The Value/Sensitivity is as per the Sensitive Receptor Table. The matrix was applied to arrive at the qualitative Significance of the Unmitigated impact. The magnitude and unmitigated significance calculations are presented in the table below.

Table 3-26 Significance of Soil Compaction Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFIANCE
Endangered Flora	Very High	Moderate	Major
Threatened and Endemic Flora	High	Moderate	Moderate to Major
Near-threatened Flora	Medium	Moderate	Moderate
Non-threatened Flora	Medium	Moderate	Moderate
Modified agricultural habitat	Medium	Moderate	Moderate
Semi Desert / lowland steppe	High	Moderate	Moderate to Major
Highland mountain / Mountain Steppe	High	Moderate	Moderate to Major

However, the following mitigation measures **will be in place**, to minimize the magnitude of potential impact:

- Minimise construction footprint. This measure has been implemented;
- Strict controls to prevent driving out of designated corridors;
- Habitat restoration post-construction inclusive of topsoil replacement if benficial or soil tilling where deemed necessary to promote regrowth.
- The EPC contractor **will commit** to the post-construction restoration of all affected areas to natural habitat conditions. The exact scope and methodology will be detailed in a **Restoration Action Plan**.
- These measures reduce the spatial extent, intensity and likelihood of the impact occurring and thus the magnitude of impact is reduced accordingly.

Table 3-27 Residual Significance of Soil Compaction Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFIANCE
Endangered Flora	Very High	Negligible	Minor
Threatened and Endemic Flora	High	Negligible	Minor
Near-threatened Flora	Medium	Negligible	Negligible to Minor
Non-threatened Flora	Medium	Negligible	Negligible to Minor
Modified agricultural habitat	Medium	Negligible	Negligible to Minor
Semi Desert / lowland steppe	High	Negligible	Minor
Highland mountain / Mountain Steppe	High	Negligible	Minor

3.5.2 Operational Phase

ECOSYSTEM FUNCTION

Habitat Fragmentation

Development and operation of large-scale and linear alignment projects will fragment the landscape's existing habitats, reducing overall ecosystem connectivity and function. This in turn reduces the ability for vegetation recruitment and wildlife movement between habitat patches. Species with large home range requirements and migratory species in particular may be affected by fragmented habitat. Long-term fragmentation caused by physical barriers may also lead to a reduction in genetic exchange which is a concern for r-selected species with rapid generation turnover.

Neither the wind farm nor the OHTL will be fenced; therefore, there will be no physical barriers to movement. However, turbines may deter migratory birds who exhibit macro-scale avoidance behaviour; longer migratory movements can increase stress and lower survivorship of migrants that expend more energy to navigate around wind farms.

Migratory raptors do not exhibit macro-avoidance behaviour; (in fact, this is the reason that migratory raptors are at high risk for turbine collision); thus habitat fragmentation from the presence of migratory movement barriers is not considered to apply to raptors.

The project site does not represent a migratory corridor bottleneck for waterbirds as evidenced by habitat mapping and survey results. Other species known and/or anticipated to occur are not thought to be likely barred from movement throughout the habitat patch by the operation of the project. Therefore, the magnitude of the potential habitat fragmentation impact has been determined to be **Negligible.**

Table 3-28 Significance of Habitat Fragmentation Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Negligible	Minor
Threatened Birds	High	Negligible	Minor
Non-threatened Birds	Medium	Negligible	Negligible to minor
Threatened Mammals (Goitered Gazelle)	High	Negligible	Minor
Non-threatened Mammals (carnivores)	Medium	Negligible	Negligible to minor
Non-threatened Mammals (non-carnivores)	Medium	Negligible	Negligible to minor
Threatened Herptiles (Mediterranean Spur-thighed Tortoise)	High	Negligible	Minor

Receptor	Value/Sensitivity	Magnitude	Significance
Non-threatened Herptiles	Medium	Negligible	Negligible to minor
Threatened Invertebrates (Saga ephippigera)	High	Negligible	Minor
Non-threatened Invertebrates	Medium	Negligible	Negligible to minor

Biodiversity Loss, Lowered Survivorship & Reproductive Success

Turbine Collision - Birds

Wind Farms pose a unique threat to birds due to the potential for collision with moving turbines. It has been well documented at existing wind farm developments that turbine collisions result in mortality of birds. However, the magnitude of risk and significance of the potential impact is highly dependent upon the location of the wind farm and landscape context, spatial layout, height and length of turbines, and the types and numbers of birds present. In order to assess the potential impacts, separate assessments are undertaken which are species-specific, location specific and season-specific.

- Generally, larger soaring birds and 'poor fliers' with high wing-loading are thought to be at higher risk.
- Migratory individuals are at higher risk than residents.
- Raptors have restricted forward field of view that may reduce visibility of turbines and avoidance ability.
- Research indicates that many migratory birds, particularly waterfowl, potentially avoid wind farms at macro scales.

Quantitative assessment was undertaken by utilizing a Collision Risk Model (CRM) developed as per SNH Guidelines, using *Band et. al* predictive modelling. It is important to note that avoidance rates are predicted and have a large weight on the final collision risk predictions. Further, avoidance behaviour is not only species-specific but may also be influenced by one (1) turbine locations and two (2) weather conditions (visibility / flight ability). Therefore, even low total annual predicted mortality rates do not exclude the need for adaptive mitigation approaches (detailed subsequently).The CRM analysis was initially performed for five seasons of VP survey data spanning a 1.5-year monitoring period ,2020 and 2021. A new CRM was undertaken with additional VP survey data collected during Spring 2022 (March to May) as a supplement to the existing baseline information and 2020-2021 CRM. The annual predicted mortality rates using the Spring 2022 dataset are presented alongside the results of the 2020-2021 dataset in the table below. Refer to the CRM report (provided in Appendix B) for additional detail regarding methodology and analysis of collision risk predictions.

Table 3-29 Total Annual Predicted Mortality Rates Using Collision Risk Modelling[2]

English Common Name	Using Spring 2020-2021 Dataset		Using Spring 2022 Dataset	
	Using most realistic CA values for each season		Using most realistic CA values for each season	
	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision
Tier 1				
Egyptian Vulture	0.0114	87	0.0629	15
Steppe Eagle	0.0706	14	0.0787	12
Tier 2				
Little Bustard	0.236	4	0.236	4
Black Stork	0.000275	3630	0	N/A
Great White Pelican	0.0948	10	0	N/A
Dalmatian Pelican	0.239	4	0	N/A
European Honey-Buzzard	0.153	6	0.157	6
Cinereous Vulture	0.336	2	0.867	1
Eurasian Griffon	0.432	2	0.670	1
Unidentified Vulture[3]	1.02	<1	1.76[4]	<1
Short-toed Snake-Eagle	0.00793	126	0.0131	76
Booted Eagle	0.00996	100	0.00548	182
Imperial Eagle	0.00175	571	0.00198	504
Golden Eagle	0.00755	132	0.0144	69
Northern Goshawk	0	N/A	0.00621	161
Red Kite	0	N/A	0.0380	26
Black Kite	0.0119	84	0.226	4
White-tailed Eagle	0.0136	73	0.0136	73
Long-legged Buzzard	0.403	2	0.849	1
Lesser Kestrel	61.5	<1	80.8	<1
Eurasian Hobby	0	N/A	0.0136	73
Tier 3				
Lesser Spotted Eagle	0.0157	63	0.00517	193
Eurasian Marsh-Harrier	0.234	4	0.803	1
Hen Harrier	0.0194	51	0.130	7

[2] The table presents and compares the results of the CRM analyses with annual predicted collision risk covering all seasons i.e., Spring, Summer, Autumn and Winter using the Spring 2020-2021 and Spring 2022 datasets.
[3] The VP survey data included numerous observations ascribed to "vulture sp." that were likely either Eurasian Griffon or Cinerous Vulture. Therefore, collision risk was modelled in "Unidentified Vulture" using all of the "Vulture sp." observations shown in this table, plus all of the observations of Eurasian Griffon and Cinereous Vulture.
[4] Collision risk for "Cinerous + Griffon" was calculated based on all flights of Eurasian Griffon, plus all flights of Cinereous Vulture, plus all flights ascribed to "vulture sp.," hence it is larger than the sum of Eurasian Griffon plus Cinereous Vulture due to the addition of the "vulture sp." data, but it should not be added to the collision risk of the other vulture species, as it already includes all collision risk for Eurasian Griffon and Cinereous Vulture.

English Common Name	Using Spring 2020-2021 Dataset		Using Spring 2022 Dataset	
	Using most realistic CA values for each season		Using most realistic CA values for each season	
	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision
Montagu's Harrier	0.0576	17	0	N/A
Eurasian Sparrowhawk	0.0149	67	0.00637	156
Common Buzzard	0.0172	58	0.00409	244
Short-eared Owl	0	N/A	0	N/A
Eurasian Kestrel	1.63	<1	0.693	1

The CRM analysis using the **Spring 2020-2021** dataset shows that no tier 1 target bird species are predicted to experience collisions more frequently than one fatality per 14 years under the most likely collision avoidance rate scenarios modelled. The project area hosts a wide variety of target bird species, including 2 species classified as tier 1 target species, 15 species classified as tier 2 target species, and 8 species classified as tier 3 target species. Three tier 2 target species are predicted to experience more than one fatality per year under the most likely collision avoidance rate scenarios modelled; Lesser Kestrel – 61.5 fatalities predicted per year, Cinereous Vulture – 0.336 fatalities predicted per year and Eurasian Griffon – 0.432 fatalities predicted per year. Predicted fatality levels for these species may have potential to impact regional populations of these species, and therefore may warrant special consideration in the biodiversity management planning for the Project. Among tier 3 target bird species, only the Eurasian Kestrel, a widespread and abundant species that does not have elevated conservation status at the national or international levels, was predicted to experience more than one collision per year under the most likely collision avoidance scenarios modelled (1.63 collisions per year).

Overall, the **Spring 2022** results were generally consistent with the previous springs' results. However, the spring 2022 results did include some notable differences from the earlier springs' results in a few cases. The key differences between the spring 2022 CRM results and the results from previous springs are briefly discussed below:

There was an increase in predicted Egyptian Vulture risk in the spring 2022 data set, which estimates 0.0558 collisions/year, relative to the 2020-2021 data set (0.00425 collisions/year). This increase was reflected in both the number of spring observations, which roughly tripled in 2022 relative to both of the previous springs and the predicted collision risk. This difference indicates an interannual variation in the utilization of the site by this species however the magnitude of the difference is minor as this difference does not increase the overall level of project related risk to this species.

There was no spring migratory passage of Black Stork, Great White Pelican, or Dalmatian Pelican observed in spring 2022, whereas a small numbers of individuals or flocks were

observed for these three species during spring of 2020 or 2021. Therefore, this had the effect of removing all collision risk for these species, as none of them were observed at the site in other seasons. This result likely reflects natural inter-annual variation in the extent of migratory passage of this species through the site.

Increased activity and collision risk of Eurasian Griffon and Cinereous Vultures was recorded in 2022 compared with the previous two spring seasons. The corresponding changes between the numbers of total observations of these species and predicted collision risk suggests that the difference was largely due to natural factors, as opposed to methodological artifacts. The overall magnitude of the increase on collision risk is minor which does not indicate a substantial change in the overall level of predicted collision risk for these species.

Two species of migratory raptors saw significantly higher spring migratory passage in spring 2022 compared with spring of 2020 or 2021, Long-legged Buzzard and Eurasian Marsh-Harrier. This result likely reflects natural inter-annual variation in the extent of migratory passage of these species through the site.

Several additional less common spring migrants also appeared either for the first at the Project site in Spring 2022 or had relatively small increases in spring collision risk in 2022, compared with previous springs, including Northern Goshawk, Red Kite, Black Kite, Hen Harrier, and Eurasian Hobby. Furthermore, there were also some spring migrants observed in previous springs that were not observed in spring 2022, including Montagu's Harrier, Eurasian Sparrowhawk, Common Buzzard, and Short-eared Owl. These changes do not point to an increase on the spring migrant activity rather a combination of indeterminate factors.

There was a 24% increase in the predicted spring collision risk for Lesser Kestrel in spring 2022 compared with previous springs. This difference appears to be attributable to a modest, natural increase in flight activity of this species at the site, compared with previous springs, as the trend in total numbers of observations reflects the change in predicted collision risk. The magnitude of impact of collision has been qualitatively assigned as per the below table, taking into consideration the predicted number of collision fatalities.

Table 3-30 Significance of Bird Turbine Collision Impact

RECEPTOR	VALUE	MAGNITUDE	SIGNIFICANCE
Egyptian Vulture (Critical)	Very High	Negligible	Minor
Steppe Eagle (Critical)	Very High	Minor	Moderate to Major
Little Bustard	High	Minor	Minor to Moderate
Black Stork	Medium	Negligible	Negligible to Minor
Great White Pelican	Medium	Negligible	Negligible to Minor

Receptor	Value	Magnitude	Significance
Dalmatian Pelican	High	Negligible	Minor
European Honey-Buzzard	Medium	Minor	Minor
Cinereous Vulture	High	Minor	Minor to Moderate
Eurasian Griffon	Medium	Minor	Minor
Unidentified Vulture[5]	Medium	Moderate	Moderate
Short-toed Snake-Eagle	Medium	Negligible	Negligible to Minor
Booted Eagle	Medium	Negligible	Negligible to Minor
Imperial Eagle	High	Negligible	Minor
Golden Eagle	Medium	Negligible	Negligible to Minor
Black Kite	Medium	Negligible	Negligible to Minor
White-tailed Eagle	Medium	Negligible	Negligible to Minor
Long-legged Buzzard	Medium	Minor	Minor
Lesser Kestrel	Medium	Major	Moderate to Major
Lesser Spotted Eagle	Low / Lower	Negligible	Negligible to Minor
Eurasian Marsh-Harrier	Low / Lower	Minor	Negligible to Minor
Hen Harrier	Low / Lower	Negligible	Negligible to Minor
Montagu's Harrier	Low / Lower	Minor	Negligible to Minor
Eurasian Sparrowhawk	Low / Lower	Negligible	Negligible to Minor
Common Buzzard	Low / Lower	Negligible	Negligible to Minor
Short-eared Owl	Low / Lower	Negligible	Negligible to Minor
Eurasian Kestrel	Low / Lower	Moderate	Negligible to Minor

Species with potential **Moderate to Major collision impact** significance include Steppe Eagle, Cinereous Vulture, Eurasian Griffon, and Lesser Kestrel.

Earlier iterations of the wind farm design included an extension of area to the west, where the number of bird flights recorded during VP surveys were higher. These areas were flagged as

[5] The VP survey data included numerous observations ascribed to "vulture sp." that were likely either Eurasian Griffon or Cinerous Vulture. Therefore, we modeled collision risk in "Unidentified Vulture" using all of the "Vulture sp." observations shown in this table, plus all of the observations of Eurasian Griffon and Cinereous Vulture.

high risk and the WTG layout was subsequently amended to avoid those areas. The number of WTG's have been decreased from 49 to 25. Iterations of the WF layout is provided in Section 2 and reasoning for changes in the layout in Section 2.1.4.4.

This was following the mitigation hierarchy of "Avoidance" as the optimal mitigation measure.

The following mitigation measures **will also be implemented** to further reduce collision risk:

- Planned infrastructure elements attractive to birds, bats and insects such as lattice towers, crevices and external lighting have been specified to be designed accordingly to minimize attractiveness, preventing perching, nesting, roosting and feeding on and near turbines.
- The Livestock Management Plan will include a livestock carcass removal protocol to ensure the management of livestock carcasses so as to reduce food availability to vultures in the project footprint in close proximity to the wind turbines
- The Bird and Bat Fatality Monitoring Plan (BBFMP) entails detailed and intensive carcass searches that will take place throughout the wind farm. Best international practice will be followed in determining the appropriate level of search efforts as well as formulas for searcher-bias adjustments. The BBFMP will be continued for up to 5 years or until the risk to birds is considered 'negligible' in consultation with the lenders;
- A Potential Biological Removal Analysis was undertaken to determine the thresholds for acceptable levels of annual losses. Should the BBFMP prove that thresholds for any particular species are reached, this will trigger an upscaling of mitigation as provided in the Collision Risk Management Plan (CRMP)
- The Biodiversity Action Plan (BAP) provides the strategy for No Net Loss (NNL) for PBF species such as Steppe Eagle, Cinereous Vulture and Griffon Vulture
- The Biodiversity Offset Plan (BOP) details the offset measures (Nest Box Program) that will be implemented for the Lesser Kestrels to ensure NNL
- The Collision Risk Management Plan provides details of the automated Shut-Down On Demand (SDOD) system, Identiflight, and shut-down protocols that will be implemented at the project site. The plan details process of Adaptive Management that will be implemented as necessary, roles and responsibilities of entities involved as well as the resourcing requirements to fulfil the management protocols outlined the CRMP
- The CRMP also outlines operational management measures that may be required if PBR thresholds are exceeded during the fatality monitoring.
- Turbines will be curtailed using Identiflight Shut Down On Demand (SDOD) system for the species listed in the following table. The automated SDOD system guarantees a minimum 90% reduction rate in collisions. Given the near 99% success of this system in currently operating wind farms worldwide, this calculation is considered as highly precautionary, and it is the minimum guarantee provided by the technology solution provider. Based on the 90% reduction in predicted fatalities, the residual collision risk to these species is provided in the table below.

Table 3-31 Residual Collision Risk to Species Protected by Identiflight

English Common Name	Annual Predicted Collisions/ Year using Spring 2020-2021 Dataset	Annual Predicted Collisions/ Year using Spring 2022 dataset	10% Annual Residual Predicted Collison per year using Spring 2020-2021 dataset	10% Annual Residual Predicted Collision per year using Spring 2022 dataset
Egyptian Vulture	0.0114	0.0629	0.0011	0.0063
Steppe Eagle	0.0706	0.0787	0.0071	0.0079
Cinereous Vulture	0.44625	0.99264	0.0446	0.0993
Eurasian Griffon	0.57375	0.76736	0.0574	0.0767

These measures reduce the intensity and likelihood of the impact occurring and thus the magnitude of impact is reduced accordingly. Residual significance of turbine collision impact is therefore considered to be Moderate or lower for all bird species.

Table 3-32 Residual Significance of Bird Turbine Collision Impact

Receptor	Value	Magnitude	Significance
Steppe Eagle	Very High	Negligible	Minor
Egyptian Vulture	Very High	Negligible	Minor
Cinereous Vulture	High	Minor	Minor to Moderate
Eurasian Griffon	Medium	Minor	Minor
Lesser Kestrel	Medium	Moderate	Moderate

Turbine Collision – Bats

Bat fatalities from wind turbine collisions are documented world-wide. However, the driving impetus behind this (when considering that bats rarely collide with other man-made structures) is still unknown and being researched. The patterns that have been observed thus far include:

- Migratory bats making long-distance movements are at higher risk of collision than resident "sedentary" bats.
- "Tree" bats, those that roost in trees, are at higher risk of collision fatalities.
- The majority of fatalities occur during late summer and autumn, which coincides with breeding, increased foraging, and migration.
- Collision Risk is higher for species adapted for foraging insects in open spaces.
- Wind turbines may be acting as an attractant to specific bat species. A recent study undertaken in England found that P. pipistrellus activity was 37% higher at turbines than at control locations, whereas P. pygmaeus activity was consistent with no attraction or repulsion by turbines. This may be due to the attraction of aerial insects to lights and heat associated with turbines.

- Fatalities increase at low wind speeds, and before and after the passage of storm fronts.
- Mortality increases with turbine tower height and rotor diameter.
- Barotrauma does not appear to be a significant contributing factor to mortality.

Given the above, the below table provides the risk ranking of the species present on site.

Table 3-33 Turbine Collision Risk of Bat Species

Scientific Name	Common Name	Flight Altitude -m	Migratory Behaviour	Collision Risk Estimation[6]
Myotis alcathoe	Alcathoe bat	Up to 15 m in the canopy	Sedentary	Low
Plecotus auritus	Brown long-eared bat	Up to & above the canopy (foraging and direct flight)	Sedentary	Low
Barbastella caspica	Eastern barbastelle	Above the canopy (foraging and direct flight)	Sedentary	Medium
Nyctalus noctula	Lesser noctule	10 m to few hundred	Migratory	High
Nyctalus leisleri	Common noctule	Above canopy, >25->50 m (forging & direct flight)	Sedentary	High
Pipistrellus nathusii	Nathusius's pipistrelle	1-20 m foraging, 30-50 m migration,	**Migratory**	High
Pipistrellus kuhlii	Kuhl's pipistrelle	1-10 m up to few hundred,	Sedentary	High
Pipistrellus pygmaeus	Soprano Pipistrelle	-	-	High
Hypsugo savii	Savii's pipistrelle	10 m to few hundred	Sedentary	High
Vespertilio murinus	Particolored bat	20-40m, above canopy (foraging), >40-50m in direct flight	**Migratory**	High
Eptesicus serotinus	Serotine bat	>25m, foraging above canopy, >40-50m in direct flight	Sedentary	Medium
Rhinolophus ferrumequinum	Greater horseshoe bat	10m to few hundred	Sedentary	Low
Myotis emarginatus	Geoffroy's bat	Up to 15 in the canopy	Sedentary	Low

[6] Rodrigues, L., L. Bach, M.-J. Dubourg-Savage, B. Karapandža, D. Kovač, T. Kervyn, J. Dekker, A. Kepel, P. Bach, J. Collins, C. Harbusch, K. Park, B. Micevski, J. Minderman, (2014). Guidelines for consideration of bats in wind farm projects – Revision 2014. EUROBATS Publication Series #6. UNEP/EUROBATS Secretariat, Bonn, Germany, 133pp.

Scientific Name	Common Name	Flight Altitude -m	Migratory Behaviour	Collision Risk Estimation[6]
Myotis mystacinus	Whiskered bat	Up to 15 in the canopy	Sedentary	Low

The magnitude and **unmitigated** significance calculations are presented in the table below.

Table 3-34 Significance of Bat Turbine Collision Impact

Receptor	Value/Sensitivity	Magnitude	Significance
Alcathoe bat	Medium	Minor	Minor
Brown long-eared bat	Medium	Minor	Minor
Eastern barbastelle	High	Moderate	Moderate to Major
Lesser noctule	Medium	Major	Moderate to Major
Common noctule	Medium	Major	Moderate to Major
Nathusius's pipistrelle	Medium	Major	Moderate to Major
Kuhl's pipistrelle	Medium	Major	Moderate to Major
Soprano Pipistrelle	Medium	Major	Moderate to Major
Savii's pipistrelle	Medium	Major	Moderate to Major
Particolored bat	Medium	Major	Moderate to Major
Serotine bat	Medium	High	Moderate to Major
Greater horseshoe bat	High	Minor	Minor to Moderate

The following mitigation measures **will be implemented** to reduce collision risk:

- Prevention of elements that may attract bats, or insects and therefore bats:
    - All wind turbines, particularly the nacelles, will be designed, constructed and maintained in such a manner that they do not support roosting bats – all the gaps and interstices should be made inaccessible to bats;
    - Lighting will be used only as needed with wavelengths and designs that do not attract insects or bats. Bright white or bluish lights (mercury vapor, white incandescent and white florescent) and high sodium vapour light are the most attractive to insects and will not be used
- The Collision Risk Management Plan has been prepared that provides a detailed Experimental Cut-in Speed Curtailment Program, wherein half of all turbines are shut-down and prevented from moving, during periods of high bat activity. The plan details process of Adaptive Management that will be implemented as necessary, roles and responsibilities of entities involved as well as the resourcing requirements to fulfil the management protocols outlined the CRMP
- **Upfront Experimental Curtailment will be in place.** This means that half of all turbines (in an alternating pattern) will be curtailed (stopped from spinning) during the following 6-week period when all the following conditions are met:
    - Time Period: August 1 – September 15

- Wind Speed <6m/s
- Duration: 2 hours immediately before and after sunset; 2 hours immediately before and after sunrise

- The upfront experimental curtailment will be in place for a total of 3 years. After this time, a review will take place in consultation with lenders to determine if the curtailment regime should continue, be modified, or possibly be stopped.
- The Bird and Bat Fatality Monitoring Plan (BBFMP) will entail detailed and intensive carcass searches that will take place throughout the wind farm. Best international practice will be followed in determining the appropriate level of search efforts as well as formulas for searcher-bias adjustments (Rodrigues et al., 2015a). The BBFMP will be continued for up to 5 years or until the risk to bats is considered 'negligible' in consultation with the lenders;
- The CRMP also outlines operational management measures that may be required if PBR thresholds are exceeded during the fatality monitoring.
- Acoustic monitoring shall be implemented once WTGs are erected to enable monitoring of bat activity once turbines are in place (which can cause behavioral adjustments). Acoustic monitors shall be deployed on both curtailed and controlled turbines at 2m above ground level in a uniform manner across the wind farm. A total of 1/4 of the curtailed turbines and 1/4 the control turbines will have a monitor deployed. Acoustic data measured will then be compared against meteorological data to identify if specific yearly timings, daily timings, and/or meteorological conditions can be linked with higher or lower bat activity indices and if these are correlating with recorded fatality rates.

With the above measures, the **residual** significance is reduced to Minor or less across all species.

OHTL Electrocution - Birds

Power transmission lines present potential electrocution risk to birds. In particular, larger-bodied birds which tend to prefer perching at high altitudes such as raptors, including eagles and vultures, have the highest risk for electrocution, as larger wingspans create the opportunity for span the distance between energized and ground components of power lines. Further compounding the impact is the fact that many of these species are K-selected with low reproductive rates, so additive mortality is of significance. For many endangered species worldwide, electrocution by powerlines is considered to be the number one conservation threat contributing to population decline.

Based on size, behaviour, and records from literature, the following categorizes the electrocution risk of the identified species of concern that may occur within the project site (OHTL corridors).

Grouping Value	Species of Concern (identified/suspected)	Wingspan	Perching Behaviour	Electrocution Risk (I=unlikely; II=possible; III=highly probable)
Endangered Birds: Highly Sensitive Raptors (VH Value)	Steppe Eagle (Critical)	Large	Yes	III
	Egyptian Vulture	Large	Yes	III
	Saker Falcon	Medium	Yes	III
Endangered Birds: Highly Sensitive Waterbirds (VH Value)	White-headed Duck	Medium	No	I
	Sociable Lapwing	Small	No	I
Threatened Birds: Sensitive Raptors (H Value)	Cinereous Vulture	Large	Yes	III
	Eastern Imperial Eagle	Large	Yes	III
	Greater Spotted Eagle	Large	Yes	III
	Pallid Harrier	Medium	Yes	III
Threatened Birds: Sensitive Waterbirds (H Value)	Dalmatian Pelican	Large	No	I
	Common Pochard	Medium	No	I
	Ferruginous Duck	Medium	No	I
	Lesser White-fronted Goose	Medium	No	I
	Marbeled Teal	Medium	No	I
	Red-breasted Goose	Medium	No	I
	Velvet Scoter	Medium	No	I
	Northern Lapwing	Small	No	I
	Eurasian Oystercatcher	Medium	No	I
	Great Snipe	Small	No	I
Threatened Birds: Sensitive Ground birds (H Value)	Great Bustard	Medium	No	I
	Little Bustard	Small	No	I
	Caucasian Grouse	Small	No	I
Songbirds / Allies (M Value)	European Turtle-dove	Small	Yes	II
	Meadow Pipit	Small	Yes	I
	Redwing	Small	Yes	I
Non-threatened Raptors (M Value)	Black Kite	Medium	Yes	III
	Booted Eagle	Large	Yes	III
	Golden Eagle	Large	Yes	III
	Griffon Vulture	Large	Yes	III
	Long-legged Buzzard	Large	Yes	III
	White-tailed Sea Eagle	Large	Yes	III
	Lesser Kestrel	Medium	Yes	III
	Bearded Vulture	Large	Yes	III
	Lesser-spotted Eagle	Large	Yes	III

The magnitude and **unmitigated** significance calculations are presented in the table below.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds: Highly Sensitive Raptors	Very High	Major	Major
Threatened Birds: Sensitive Raptors	High	Major	Major
Non-threatened Raptors	Medium	Major	Moderate to Major

The OHTL design, construction and operation is under a separate entity and is not included within the scope of the loan agreement. However, the results of baseline surveys, assessments, and recommendations for mitigation, management and monitoring have all been provided to the off-taker. However, the following mitigation measures are recommended to reduce the impacts:

The optimal design mitigation to completely remove electrocution risk is to bury the lines. However, this is not always possible and comes with other associated impacts. Therefore, for above-ground designs, the following integrated measures are recommended to be implemented:

- Ensure a safe design of the cross arm and related equipment (separate energized conductors and grounded hardware distances by more than largest species wingspan);
- Use suspended insulators and avoid pin and dead-end/strain insulators;
- Ensure safe distance (more than the largest species wingspan) between suspended conductor/jumper wire and lower branch in the cross arm;
- In the configurations with high electrocution risk (derivations, tap, transformer and switch poles and its connected grounded wires and jumpers) all grounded elements should be insulated, and grounded wires and jumpers should be sheathed wires;
- Design should be as per recommendations provided in Reference Note: Quick Guidance for Preventing Electrocution Impacts on Birds, Initiated by International Association for Falconry and Conservation of Birds of Prey;
- Provide safe perching and nesting opportunities via the erection of perching poles and/or nesting platforms or boxes; they should be the highest elements of the structure to attract birds away from perching on potentially dangerous components.
- A fatality monitoring plan similar to BBFMP is suggested following international al best practice to monitor for OHTL related fatalities;
- A Potential Biological Removal (PBR) Analysis was undertaken to determine the thresholds for acceptable levels of annual losses due to the project.

With the above measures, the **residual** significance is presented in the following table.

Receptor	Value/Sensitivity	Magnitude	Residual
Endangered Birds: Highly Sensitive Raptors	Very High	Negligible	Minor
Threatened Birds: Sensitive Raptors	High	Negligible	Minor
Non-threatened Raptors	Medium	Negligible	Negligible to minor

OHTL Collision - Birds

Thin, dark wires used in overhead transmission lines as well as guylines for weather masts are visually difficult to detect. Bird mortality by collisions with these wires are documented for a variety of species.

In the case of power lines, the bird collides with one of the wires, generally the earth wire, which is less visible. Particularly at risk are birds migrating between 20-50m altitude, birds flying at night, birds flying in flocks, and / or large and heavy birds of limited manoeuvrability.

Based on morphology, behaviour, and records from literature, the following categorizes the collision risk of the identified species of concern that may occur within the project site (OHTL corridors).

Grouping Value	Species of Concern (identified/suspected)	Risky Flight Indicators	Collision Risk (I=unlikely; II=possible; III=highly probable)
Endangered Birds: Highly Sensitive Raptors (VH Value)	Steppe Eagle (Critical)		I
	Egyptian Vulture	Poor Manoeuvrability Large-bodied Migratory	II
	Saker Falcon		I
Endangered Birds: Highly Sensitive Waterbirds (VH Value)	White-headed Duck	Poor Manoeuvrability Migratory	II
	Sociable Lapwing	Migratory Low Altitude	III
Threatened Birds: Sensitive Raptors (H Value)	Cinereous Vulture	Poor Manoeuvrability Large-bodied Migratory	II
	Eastern Imperial Eagle		I
	Greater Spotted Eagle		I
	Pallid Harrier		I
Threatened Birds: Sensitive Waterbirds (H Value)	Dalmatian Pelican	Poor Manoeuvrability Large-bodied Migratory Low Visual Detectability	III
	Common Pochard	Poor Manoeuvrability	II

Grouping Value	Species of Concern (identified/suspected)	Risky Flight Indicators	Collision Risk (I=unlikely; II=possible; III=highly probable)
		Migratory	
	Ferruginous Duck	Poor Manoeuvrability Migratory	II
	Lesser White-fronted Goose	Poor Manoeuvrability Migratory	II
	Marbeled Teal	Poor Manoeuvrability Migratory	II
	Red-breasted Goose	Poor Manoeuvrability Migratory	II
	Velvet Scoter	Poor Manoeuvrability Migratory	II
	Northern Lapwing	Migratory Low Altitude	III
	Eurasian Oystercatcher	Migratory Low Altitude	III
	Great Snipe	Migratory Low Altitude	III
Threatened Birds: Sensitive Ground birds (H Value)	Great Bustard	Poor Manoeuvrability Migratory Low Altitude Low Visual Detectability Nocturnal	III
	Little Bustard	Poor Manoeuvrability Migratory Low Altitude Low Visual Detectability	III
	Caucasian Grouse	Poor Manoeuvrability Migratory Low Altitude Low Visual Detectability	III
Songbirds / Allies (M Value)	European Turtle-dove	Low Altitude	II
	Meadow Pipit	Low Altitude	II
	Redwing	Low Altitude	II
Non-threatened Raptors (M Value)	Black Kite		I
	Booted Eagle		I
	Golden Eagle		I

Grouping Value	Species of Concern (identified/suspected)	Risky Flight Indicators	Collision Risk (I=unlikely; II=possible; III=highly probable)
	Griffon Vulture	Poor Manoeuvrability Large-bodied Migratory	II
	Long-legged Buzzard		I
	White-tailed Sea Eagle		I
	Lesser Kestrel		I
	Bearded Vulture	Poor Manoeuvrability Large-bodied Migratory	II
	Lesser-spotted Eagle		I

The magnitude and **unmitigated** significance calculations are presented in the table below.

Receptor	Value/Sensitivity	Magnitude	Significance
Endangered Birds, Level III	Very High	Major	Major
Endangered Birds, Level II	Very High	Moderate	Major
Threatened Birds, Level III	High	Major	Major
Threatened Birds, Level II	High	Moderate	Moderate to Major
Non-threatened Birds, Level II	Medium	Moderate	Moderate

The OHTL design, construction and operation is under a separate entity and is not included within the scope of the loan agreement. However the results of baseline surveys, assessments, and recommendations for mitigation, management and monitoring have all been provided to the offtaker. However, the following mitigation measures are recommended to reduce the impacts:

The optimal design mitigation to completely remove electrocution risk is to bury the lines. However, this is not always possible and comes with other associated impacts. Therefore, for above-ground designs, the following integrated measures are recommended to be implemented:

- Removing the thin neutral or earth (shield) wire above the high voltage transmission lines where feasible, and where this is not possible, marking the line to make it more visible;
- Bundling high voltage wires, and using spacers to increase visibility;
- Minimising the vertical spread of power lines. Having lines in a horizontal plane reduces collision risk;
- Depending on the location and topography, it may be suitable to have low-lying power lines which are beneath the altitude at which birds may travel;

- Using existing infrastructure corridors such as road and railway RoW; existing powerline transmission corridors; and other areas with existing disturbances that deter bird activity. The OHTL alignment was designed taking into account ecological constraints such as waterbodies, areas with green and vegetated habitat patches thought to be attractive to birds, and generally attempting to keep OHTL corridor within previously disturbed and developed areas as much as possible.
- Using bird deflectors to increase line visibility by thickening the appearance of the line by a minimum of 20 cm over a length of 10-20cm; or using markers that are moveable, of contrasting colours (e.g. black and white), contrast with the background, protrude above and below the line, and be placed 5-10 m apart. Firefly Diverters are considered to be of robust specification to provide the needed visual deterrence required, as it includes UV-light reflectivity and are visible in low-light and low-visibility conditions.
- Any markers must be robust to allow long-term durability for the environmental conditions of exposure; maintenance plans for the OHTL should include inspections of marker devices and replacements as needed.
- A fatality monitoring plan similar to BBFMP is suggested following international al best practice to monitor for OHTL related fatalities
- A Potential Biological Removal (PBR) Analysis was undertaken to determine the thresholds for acceptable levels of annual losses due to the project.

With the above measures, the **residual** significance is presented in the following table.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds, Level III	Very High	Negligible	Minor
Endangered Birds,Level II	Very High	Negligible	Minor
Threatened Birds, Level III	High	Negligible	Minor
Threatened Birds, Level II	High	Negligible	Minor
Non-threatened Birds, Level II	Medium	Negligible	Negligible to minor

Dispersal and Competition

Shyer species may be displaced away from the project area, having indirect secondary impacts on adjacent territories via increased competition for resources compromising population stability, causing ecosystem imbalances.

However, the surrounding areas on a landscape level seem to support similar habitat types and are not constrained by large-scale urban or industrial developments. Therefore, it is not anticipated that displaced individuals will have a significant impact on adjacent ecosystems.

Figure 3-25 Project and Surrounding Names

ENVIRONMENTAL QUALITY

Noise

Operational noise created by the rotation of the turbines and power generator can cause acoustic masking, disturbance and displacement, and general reduction in survivorship and reproductive success in a variety of fauna. Most impacted are typically acoustic communicators such as bird and bat species.

The noise studies undertaken for the project site found that existing ambient noise in the overall project location is mostly driven by wind.

Table 3-35 Background noise levels (linear regression)

Wind Speed	SR-15	SR-22	SR-23
Existing 8 m/2	40 dB	35 dB	37 dB
Modelled – 8 m/s	40.7 dB	35.7 dB	40.2 dB

Although there will be cumulative increase in noise closer to the WTGs, resultant effects on wildlife may be relatively minor. For one, the characteristic of the noise is not intermittent, as it will gradually build up and decrease depending on wind speed, rather than cause short,

sporadic sounds. Wildlife have been known to habituate to stable conditions, which can include high ambient operational noise.

Studies show that wildlife behaviour is impacted at dB levels of 40, but this is in contrast to lower background levels. As higher wind speeds are correlated with naturally occurring noise levels of 35 dB and higher, it is not anticipated that the addition of operational turbine noise will be significant on biodiversity.

The magnitude and unmitigated significance calculations are presented in the table below.

Table 3-36 Significance of Operational Noise Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Fauna	Very High	Minor	Moderate to Major
Threatened Fauna	High	Minor	Minor to Moderate
Non-threatened Fauna	Medium	Minor	Moderate

Light Pollution

Night-time lighting can impact nocturnal wildlife behaviour. It can act as an attractant, which can cause congregation and higher predation rates / change movement and migration behaviour; act as a repellent which causes displacement or interfere with the circadian cycle and cause lower survivorship and reproductive success.

The magnitude and **unmitigated** significance calculations are presented in the table below.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Moderate	Major
Threatened Birds	High	Moderate	Moderate to Major
Non-threatened Birds	Medium	Moderate	Moderate
Non-threatened Bats	Medium	Major	Moderate to Major
Threatened Mammals (Goitered Gazelle)	High	Moderate	Moderate to Major
Non-threatened Mammals	Medium	Moderate	Moderate
Threatened Herptiles (Mediterranean Spur-thighed Tortoise)	High	Moderate	Moderate to Major
Non-threatened Herptiles	Medium	Major	Moderate to Major
Non-threatened Invertebrates	Medium	Moderate	Moderate

However, the following mitigation measures will be implemented to reduce the impacts:

- Minimize external lighting as much as possible.
- Ensure lighting is only as bright as needed and duration of lighting to be controlled and minimized as much as possible (use motion detectors etc).
- Lights should be shielded to prevent spill and glare.
- Longer wavelengths are less disruptive to the majority of wildlife.

With the above measures, the **residual** significance is presented in the following table.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	Minor
Threatened Birds	High	Negligible	Minor
Non-threatened Birds	Medium	Negligible	Negligible to minor
Non-threatened Bats	Medium	Negligible	Negligible to minor
Threatened Mammals (Goitered Gazelle)	High	Negligible	Minor
Non-threatened Mammals	Medium	Negligible	Negligible to minor
Threatened Herptiles (Mediterranean Spur-thighed Tortoise)	High	Negligible	Minor
Non-threatened Herptiles	Medium	Negligible	Negligible to minor
Non-threatened Invertebrates	Medium	Negligible	Negligible to minor

3.6 Monitoring & Reporting for Compliance and Performance

The mitigation measures applied to reduce significant impacts will require a number of management plans to detail the implementation and action items needed, as well as monitoring and reporting requirements to ensure compliance and measure performance.

3.6.1.1 Design Phase

The following outline the mitigation requirements during design phase:

- Integration of design mitigation into lighting design, and exclusion of roosting and perching opportunities within WTGs.
- Micrositing of project elements where applicable.

3.6.1.2 Pre-construction

The following outline the mitigation requirements pre-construction:

- Review of Construction Methodology by environmental consultant:
  - Site Clearance and Layout
  - Timing and method of works
  - Lighting Strategy
  - Solid Waste Management Strategy
- Preparation of Biodiversity Action Plan (BAP):
  - Which outlines the CHA process, findings, and illustrates the pathway to no-net loss for PBF species, as well as Biodiversity Monitoring and Evaluation Requirements as outlined in the BAP .

- Preparation of Flora Conservation Action Plan, Breeding Birds Protection Plan, Reptile Relocation Plan, Habitat Restoration Plan and Compensation Offset Plan
- Preparation of Collision Risk Management Plan (CRMP) and Bird and Bat Fatality Monitoring Plan
- Carry out preconstruction surveys, and implementation of actions as per the above plans.

- Preparation of Framework Construction Environmental and Social Management Plan (CESMP), inclusive of:
  - General Site Controls
  - Solid Waste Control Plan
  - Biodiversity Chance Find Procedure
  - Air Quality Control Plan
  - Dust Control Plan
  - Noise Control Plan
  - Ecology Control Plan
  - Biosecurity Control Plan
  - Lighting Control Plan
  - Hazardous Materials Control Plan
  - Emergency Action Plans
  - Spill Prevention and Clean-up Procedures

3.6.1.3 Construction

The following outline the mitigation requirements during construction:

- The EPC will employ a full-time site-based Ecologist, to ensure that ecology related measures are understood and fully implemented.
- Implementation of CEMP
  - Daily Checklist
  - Weekly Inspection
  - Monthly Reporting
  - Quarterly Auditing
- Biodiversity Monitoring and Evaluation Requirements as outlined in the BAP

3.6.1.4 Post-construction

The following outline the mitigation requirements post-construction:

- Biodiversity Monitoring and Evaluation Requirements as outlined in the BAP

3.6.1.5 Pre- Operation

The following outline the mitigation requirements during operation:

- Preparation and Implementation of OESMP, inclusive of:
  - General Site Controls
  - Noise Control Plan
  - Lighting Control Plan
  - Collision Risk Management Plan
  - Post-construction Fatality Monitoring Plan
- Biodiversity Monitoring and Evaluation Requirements as outlined in the BAP

4 SUMMARY OF BIODIVERSITY PLANS

The following plans have been or will be prepared to clearly outline requirements that are expected as a minimum to be linked to the CESMP and/or OESMP, to protect species of conservation concern.

Table 4-1 Biodiversity Management Plans

PLAN / PROCEDURE	PROJECT PHASE	PURPOSE AND KEY REQUIREMENTS
Flora Conservation Action Plan (FCAP)	Pre-construction, Construction	The Flora Conservation Action Plan provides a framework to guide the implementation of impact mitigation that will be undertaken for the protection of sensitive flora species that may be impacted from the project construction. The scope of this plan includes timing and effort required for pre-construction surveying for the purposes of in-situ protection where possible for threatened flora, methodology for identification and demarcation of areas to be protected, location and timing for seed collection and specimen translocation, specifications for seed storage and holding requirements of specimens for translocation and the monitoring and reporting requirements associated with the plan.
Reptile Relocation Plan (RRP)	Pre-construction, Construction	The Reptile Relocation Plan provides detailed instruction on the surveying and relocation methodology required to mitigate impacts on reptile species of concern - the Mediterranean Spur-thighed Tortoise (*Testudo graeca*). The scope of this plan includes the timing and effort required for pre-construction surveying for the purposes of identifying suitable areas for release of this species, methods for relocation surveying, detection and release as well as monitoring and reporting requirements associated with the plan.
Breeding Birds Protection Plan (BBPP)	Pre-construction, Construction	The Breeding Bird Protection Plan provides a framework to guide the implementation of impact mitigation that will be undertaken for the protection of breeding bird species that may be impacted from the project construction. The scope of this plan includes the methodology for breeding bird surveys, list of protocols and procedures to be taken when nests of sensitive breeding bird species are found during the breeding bird surveys, establishment of buffers and the monitoring and reporting requirements associated with the plan.
Ecology Control Plan (part of CESMP)	Construction	All ecological-related controls that must be in place throughout construction are captured in the Ecology Control Plan, part of the CESMP.
Biosecurity Control Plan (part of CESMP)	Construction	All biosecurity controls that must be in place throughout construction are captured in the Biosecurity Control Plan, part of the CESMP.
Biodiversity Chance Find Procedure	Construction	The Biodiversity Chance Find Procedure provides a clear instruction to the construction team on the protocol to be

Plan / Procedure	Project Phase	Purpose and Key Requirements
(Part of CESMP)		followed in the event that any elements of concern are incidentally found within the active construction footprint during construction works. This protocol also applies to animal refuges and shelters such as bird nests and reptile or mammal burrows and bat roosts for threatened species.
Biodiversity Offset Plan	Post-construction	The purpose of the plan is to outline in detail the compensation offsets for Lesser Kestrels, which will be implemented and monitored to ensure NNL.
Habitat Restoration Plan	Post-construction	The purpose of the plan is to provide the methodology for post-construction restoration of laydown and other areas for re-wilding and restoration of native habitat types. The requirements will include restoration methods for, the areas to be restored as well as the required monitoring post-restoration.
Collision Risk Management Plan (CRMP)	Pre-operation and Operation	The plan provides provide the management measures that will be in place during the wind project's operational phase. This includes automated camera-led SDOD system and the SDOD protocols for bird collision mitigation. The plan also provides the Cut-in Curtailment System for mitigating bat collisions. This plan outlines the monitoring programme and adaptive management process.
Bird and Bat Fatality Monitoring (BBFMP)	Operation	This plan will outline the on-going monitoring and management plan for bird mortality. It will include as a minimum: • Methodology for monitoring bird mortality • Thresholds for sightings/mortality counts that will trigger adaptive management and/or compensatory measures • Monitoring program • Reporting requirements.
Livestock Management Plan	Operation	Livestock Management Plan provides mitigation measures to reduce collision risk to scavenging raptors during the operational phase of the Project by reducing the availability of domestic livestock carrion within the wind turbine area.
Biodiversity Action Plan	Construction, Operation, & Decommissioning	BAP to include: Preparation of Biodiversity Action Plan, inclusive of: • , individualized approaches for species of concern i.e. Steppe Eagle, Goitered Gazelle, etc • Pathway to no-net loss for PBF species • **Flora Conservation Action Plan** • **Reptile Relocation Plan** • **Breeding Birds Protection Plan** The requirements of the plans shall include details on the methodology and monitoring to be followed for all related mitigation measures. These plans will be prepared to clearly outline requirements that will be in place for construction,

Plan / Procedure	Project Phase	Purpose and Key Requirements
		operation and decommissioning works, to protect species of conservation concern. The plans will include: • Overview of the species of concern • List of protocols and procedures to be taken related to biodiversity protection • Establishment of No-Go Zones • Trainings for Staff to increase awareness of prohibited actions related to biodiversity • Monitoring Program • Reporting Requirements
Biodiversity Monitoring & Evaluation Programme (BMEP)	Pre-construction, Construction, Commissioning & Operation	A Biodiversity Monitoring & Evaluation Programme (BMEP) in the BAP will capture the monitoring and adaptive evaluation requirements related to biodiversity management targets.

5 CUMULATIVE IMPACT ASSESSMENT

5.1 Operation Phase

During operation, the cumulative impacts have been considered from the operation of both WFs (Area 1 and Khizi 3) and the existing Yeni Yashma WF. The Valued Environmental Components (VECs) considered for operation phase include:

- Biodiversity (WFs and OHTL);

A brief assessment is provided below for each VEC.

5.1.1 Biodiversity

Ecosystem Function

Habitat Fragmentation

Development and operation of large-scale and linear alignment projects will fragment the landscape's existing habitats, reducing overall ecosystem connectivity and function. This in turn reduces the ability for vegetation recruitment and wildlife movement between habitat patches. Species with large home range requirements and migratory species in particular may be affected by fragmented habitat. Long-term fragmentation caused by physical barriers may also lead to a reduction in genetic exchange which is a concern for r-selected species with rapid generation turnover. Neither wind farm nor the OHTL will be fenced; therefore, there will be no physical barriers to movement.

In some cases, turbines may deter migratory birds who exhibit macro-scale avoidance behaviour; longer migratory movements can increase stress and lower survivorship of migrants that expend more energy to navigate around wind farms. The below avian receptors may be cumulatively affected by the presence of three wind farms operating simultaneously.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	CUMULATIVE SIGNIFICANCE
Endangered Birds	Very High	Moderate	Major
Threatened Birds	High	Moderate	Moderate to Major
Non-threatened Birds	Medium	Moderate	Moderate

The following mitigation measures are being applied at both Khizi 3 and Area 1 wind farms to reduce the impacts:

- Linear alignments such as OHTL overlapping with other linear infrastructure (Existing roads, other OHTL) where possible to minimize additional fragmentation.
- Restoration of areas to suitable habitat conditions post-construction.

With the above measures, the **residual** significance is presented in the following table.

Receptor	Value/Sensitivity	Magnitude	Residual Cumulative Significance
Endangered Birds	Very High	Minor	Moderate to Major
Threatened Birds	High	Minor	Minor to Moderate
Non-threatened Birds	Medium	Minor	Minor

BIODIVERSITY LOSS, LOWERED SURVIVORSHIP & REPRODUCTIVE SUCCESS

Turbine Collision - Birds

The presence of three wind farms in the same migratory corridor may produce cumulative collision impacts. The following mitigation measures will be implemented at both Khizi 3 and Area 1 wind farms to reduce collision risk:

- Planned infrastructure elements attractive to birds, bats and insects such as lattice towers, crevices and external lighting have been specified to be designed accordingly to minimize attractiveness, preventing perching, nesting, roosting and feeding on and near turbines.
- The Livestock Management Plan will include a livestock carcass removal protocol to ensure the management of livestock carcasses so as to reduce food availability to vultures in the project footprint in close proximity to the wind turbines
- The Bird and Bat Fatality Monitoring Plan (BBFMP) entails detailed and intensive carcass searches that will take place throughout the wind farm. Best international practice will be followed in determining the appropriate level of search efforts as well as formulas for searcher-bias adjustments. The BBFMP will be continued for up to 5 years or until the risk to birds is considered 'negligible' in consultation with the lenders;
- A Potential Biological Removal Analysis was undertaken to determine the thresholds for acceptable levels of annual losses. Should the BBFMP prove that thresholds for any particular species are reached, this will trigger an upscaling of mitigation as provided in the Collision Risk Management Plan (CRMP)
- The Biodiversity Action Plan (BAP) provides the strategy for No Net Loss (NNL) for PBF species such as Steppe Eagle, Egyptian Vulture, Cinereous Vulture and Griffon Vulture.
- The Biodiversity Offset Plan (BOP) details the offset measures that will be implemented for the Lesser Kestrel to ensure NNL.
- The Collision Risk Management Plan provides details of the automated Shut-Down On Demand (SDOD) system, Identiflight, and shut-down protocols that will be implemented at the project site. The plan details process of Adaptive Management that will be implemented as necessary, roles and responsibilities of entities involved as well as the resourcing requirements to fulfil the management protocols outlined the CRMP

The potential worst-case scenario for collisions by bird species produced by additive total annual predicted mortality rates modelled at both Area 1 and Khizi 3 wind farms, are outlined in the following table.

Table 5-1 CIA –Cumulative Annual Collisions (Area 1 and Khizi 3 WF) [7]

English Common Name	CIA (SCENARIO 2020-2021 DATA)	CIA (SCENARIO 2022 DATA)
	Using most realistic CA values for each season	
	Predicted Collisions/ year	Predicted Collisions/ year
Egyptian Vulture*	0.0025	0.0074
Steppe Eagle*	0.0258	0.0367
Saker Falcon	0.00315	0.00315
Pallas's Fish-Eagle	0.00144	
Little Bustard	0.236	0.236
Black Stork	0.000275	
Great White Pelican	0.0948	
Dalmatian Pelican	0.239	
Osprey	0.000466	
Bearded Vulture*	0.0078	0.0071
European Honey-Buzzard	0.548	0.2009
Cinereous Vulture*[8]	0.9482	1.0542
Eurasian Griffon*[9]	1.5038	1.2118
Short-toed Snake-Eagle	0.01611	0.02159
Booted Eagle	0.07546	0.05988
Imperial Eagle	0.00306	0.00426
Golden Eagle	0.12855	0.0432
Northern Goshawk		0.00621
Pallid Harrier	0.0736	0.0579
Red Kite		0.038
Levant Sparrowhawk	0.0138	
Black Kite	0.0982	0.364
White-tailed Eagle	0.0658	0.0658
Long-legged Buzzard	1.002	2.019
Lesser Kestrel	88.4	202.8
Red-footed Falcon	0.145	0.534

[7] The table presents and compares the results of the CRM analyses with cumulative annual predicted collision risk covering all seasons i.e., Spring, Summer, Autumn and Winter using the Spring 2020-2021 and Spring 2022 datasets for both Area 1 and Khizi 3 WF.

[8] Collision risk for Cinereous Vulture includes all flights of Cinereous Vulture and proportion of all flights labelled "vulture sp that is attributable to Cinereous Vulture.

[9] Collision risk for Griffon Vulture includes all flights of Griffon Vulture and proportion of all flights labelled "vulture sp that is attributable to Griffon Vulture.

Eurasian Hobby	0.0115	0.0251
Lanner Falcon	0.023	0.0592
Peregrine Falcon	0.00177	0.00148
Lesser Spotted Eagle	0.0157	0.00517
Eurasian Marsh-Harrier	0.2988	0.8317
Hen Harrier	0.1294	0.1992
Montagu's Harrier	0.2056	0.0391
Eurasian Sparrowhawk	0.0603	0.03337
Rough-legged Hawk	0.0442	0.0246
Common Buzzard	0.2702	0.09449
Eurasian Kestrel	10.25	11.993

*Turbines will be curtailed for 4 species at both wind farms as per CRMP using Identiflight. One additional species will be curtailed for at Khizi 3 i.e., Bearded Vulture, recorded only at Khizi 3. The cumulative collision risk, for these species only, was calculated after the considering 90% reduction in fatalities as per Identiflight's guarantee.

Black cells indicate that the species was not recorded during VP survey at Area 1 or Khizi 3 or both WF sites.

The above table represents an unrealistic worst-case scenario i.e., the absence of fatality monitoring and the adaptive management process outlined in the CRMP. These mitigative measures cannot be quantitively accounted for during assessment of predicted residual collision risk.

The above model predicts a residual collision risk of1 bird per year and 1-2 birds per year beyond accepted thresholds, for Cinereous Vulture and Griffon Vulture respectively. However, the rationale explaining the unlikelihood of this scenario is briefly discussed below:

- Identiflight: The automated camera-based shut-down on demand system, Identiflight, that will be in place for both wind farm projects guarantee a minimum 90% reduction rate in collisions. Given the near 99% success of this system in currently operating wind farms worldwide, this calculation is considered as highly precautionary, and it is the minimum guarantee provided by the technology solution provider.

- The high-definition cameras of the Identiflight system are linked to AI technology which uses machine learning to contribute to a neural network, meaning that the accuracy of species identification and flight path prediction increases over time. Therefore, on the basis of the true-life capabilities of this SDOD technology alone, the residual collision risk to Cinereous Vulture and Griffon Vulture is considered to be significantly lower than the above predicted collision risk scenario.

- Adaptive Management Framework: The BBFMP outlines intensive carcass searches that will take place to inform on bird and bat fatalities as a result of turbine collision. Furthermore, the CRMP provides the framework for the adaptive management process which allows for responsive reactions to potential issues. For example, should fatalities of Cinereous Vulture or Griffon Vulture be recorded, despite the upfront curtailment system in place, this will trigger an Emergency Meeting as per the CRMP. Footage of the collision(s) could be extracted and reviewed from the Identiflight cameras and

discussions on potential required changes to the Curtailment Prescription in place (which details the risk radii in place for triggering tracking and shut-down as well as reactivation protocol) could be made. With an Adaptive Approach, real-world adjustments will be made to ensure that far more than 90% of curtailed bird species will be protected from collision.

Therefore, with implementation of the CRMP protocols, predicted residual collision risk is further reduced, and it is not anticipated that there will be any net loss for Cinereous Vulture or Eurasian Griffon.

LESSER KESTREL

The above model predicts a residual collision risk ranging from 89-203 birds per year for Lesser Kestrel. The rationale explaining the unlikelihood of this scenario is briefly discussed below:

- Sensitivity of the Band CRM Model: The large residual predicted collision risk result for this species exposes the well-known weakness of the Band CRM Model's sensitivity to small variations in the collision avoidance (CA) parameter. The CA parameters used in this CRM to represent Lesser Kestrels were derived from values estimated for the American Kestrel (*Falco sparverius*). This species is known to be highly susceptible to wind turbine collisions in North America, which likely results from this species' tendency to hover while hunting for small prey animals on the ground.

  This brings into question whether Lesser Kestrels flying near turbines in the vicinity of their nesting colonies exhibit collision avoidance tendencies and behaviours comparable to those of American Kestrels. This is unknown; however, it is a key assumption of the CRM model, and this introduces a significant element of uncertainty to the prediction. Therefore, based on expert judgement and due to a high degree of inherent uncertainty, this prediction is better viewed as a hypothesis, rather than a firm prediction.

- Adaptive Management Framework: The BBFMP outlines intensive carcass searches that will take place to inform on bird and bat fatalities as a result of turbine collision. Furthermore, the CRMP provides the framework for the adaptive management process which allows for responsive reactions to potential issues. For example, should fatalities of Lesser Kestrel indeed exceed the annual thresholds, recommendations for habitat modification have been put in place that have been proven to reduce kestrel collisions in other wind farms. To reiterate, with an Adaptive Approach, real-world adjustments will be made to ensure that the previous worst-case scenario predicted will not come to pass.

- Biodiversity Offset Plan (BOP) will outline offset measures in the form of a Nest Box Program to ensure NNL for Lesser Kestrel

Therefore, residual cumulative collision risk is considered as Neutral to all species.

Spatial Analysis

A third wind farm, Yeshma wind farm, is known to be operating in the close vicinity of Khizi 3. Without any quantitative data on the bird flight activity or mortality/collision rates, it is not possible to quantitatively assess the cumulative collision risk. However, a spatial analysis has been undertaken.

An assessment of the landforms surrounding the project site enables us to predict a general flight path of migratory flocks*, which typically avoids expanses of flat desert and mountain features and follows along coastlines or river deltas to wetland staging areas and stopover sites. (*migratory flight path prediction is an imperfect science. Migration pathways vary by type of birds, species, age, and even individuals year by year. However, very broad, general patterns can be made based on these behavioural assumptions.)

The below provide indicative migratory flight paths for northbound spring migration and southbound autumn migration. Spring is of higher concern (and registered higher numbers for both Area 1 and Khizi 3) and it is possible that migrating birds will be exposed to all three or at least, two wind farms (Yeshma and Khizi 3) given the proximity and where they lay relative to each other, along the migration route.

Northbound Spring Migration

Figure 5-1 Northbound Spring Migration

Figure 5-2 Northbound Spring Migration

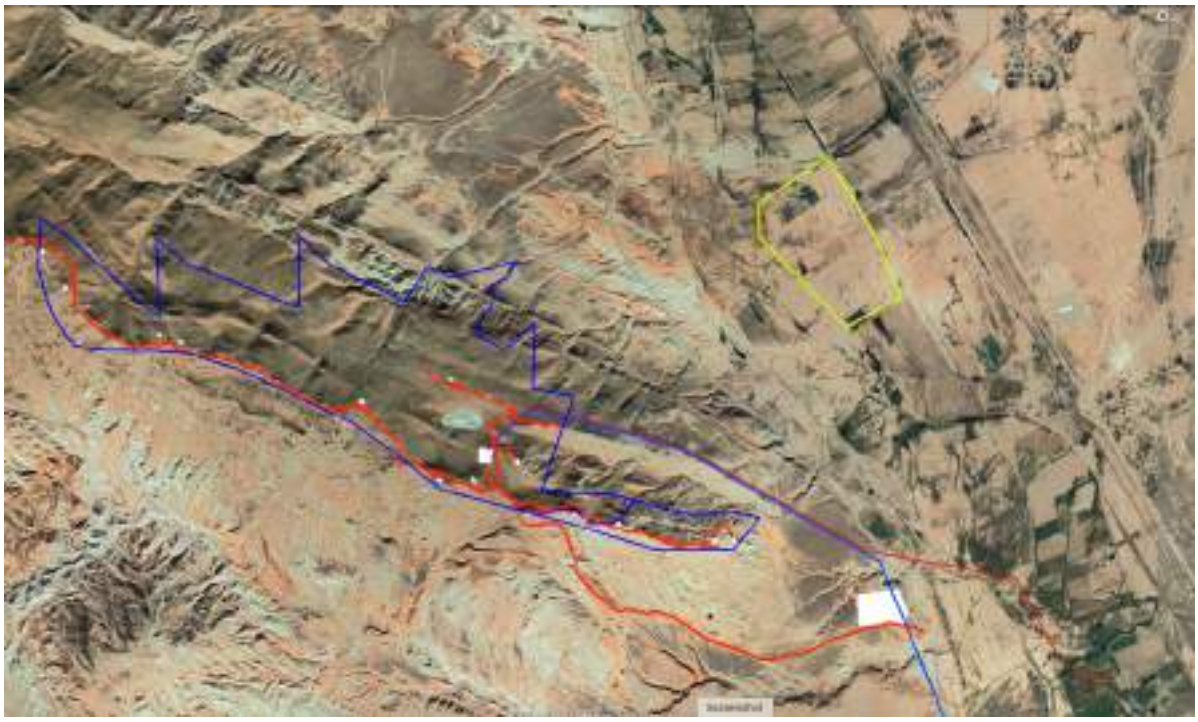
Southbound Autumn Migration

Figure 5-3 Southbound Autumn Migration

Figure 5-4 Southbound Autumn Migration

Of highest concern is the proximity of the Yeshma wind farm to Khizi 3. It can be predicted that birds, both residential and migratory, will regularly be subjected to collision risk from both wind farms.

Figure 5-5 Yeni Yashma WF, Khizi 3 WF and OHTL



It is plausible that collisions are already occurring at Yeshma wind farm in a similar magnitude as is predicted for Khizi 3. However, the data is not available to undertake a quantitative analysis. Taking the conservative approach that Yeshma wind farm is undergoing collision risk in the same level of magnitude as predicted for Khizi 3, and that currently no mitigative measures are available, the cumulative impact of all three wind farms (with mitigation in place at Khizi and Area 1, and no mitigation at Yeshma) may qualitatively be assessed as **Moderate**.

Turbine Collision – Bats

Bats may be cumulatively affected by the presence of multiple regional wind farms operating simultaneously. In the absence of any mitigation, cumulative impact is anticipated to be Major. Again, no information is known regarding the Yeshma Wind Farm impacts on bats, as no mortality or survey information was available. As a conservative approach it is assumed that there are no mitigative controls and that bat mortality is Major at Yeshma Wind Farm.

The following mitigation measures **will be implemented** both Khizi 3 and Area 1 wind farms to reduce collision risk:

- Prevention of elements that may attract bats, or insects and therefore bats:
    - All wind turbines, particularly the nacelles, will be designed, constructed and maintained in such a manner that they do not support roosting bats – all the gaps and interstices should be made inaccessible to bats;
    - Lighting will be used only as needed and use wavelengths and designs that do not attract insects or bats. Bright white or bluish lights (mercury

vapor, white incandescent and white florescent) and high sodium vapour light are the most attractive to insects and will not be used

- The Collision Risk Management Plan has been prepared that provides a detailed Experimental Cut-in Speed Curtailment Program, wherein half of all turbines are shut-down and prevented from moving, during periods of high bat activity. The plan details process of Adaptive Management that will be implemented as necessary, roles and responsibilities of entities involved as well as the resourcing requirements to fulfil the management protocols outlined the CRMP
- **Upfront Experimental Curtailment will be in place.** This means that half of all turbines (in an alternating pattern) will be curtailed (stopped from spinning) during the following 6-week period when all the following conditions are met:
    - Time Period: August 1 – September 15
    - Wind Speed <6m/s
    - Duration: 2 hours immediately before and after sunset; 2 hours immediately before and after sunrise
- The upfront experimental curtailment will be in place for a total of 3 years. After this time, a review will take place in consultation with lenders to determine if the curtailment regime should continue, be modified, or possibly be stopped.
- The Bird and Bat Fatality Monitoring Plan (BBFMP) will entail detailed and intensive carcass searches that will take place throughout the wind farm. Best international practice will be followed in determining the appropriate level of search efforts as well as formulas for searcher-bias adjustments (Rodrigues et al., 2015a). The BBFMP will be continued for up to 5 years or until the risk to bats is considered 'negligible' in consultation with the lenders;
- The CRMP also outlines operational management measures that may be required if PBR thresholds are exceeded during the fatality monitoring.
- Acoustic monitoring shall be implemented once WTGs are erected to enable monitoring of bat activity once turbines are in place (which can cause behavioral adjustments). Acoustic monitors shall be deployed on both curtailed and controlled turbines at 2m above ground level in a uniform manner across the wind farm. A total of 1/4 of the curtailed turbines and 1/4 the control turbines will have a monitor deployed. Acoustic data measured will then be compared against meteorological data to identify if specific yearly timings, daily timings, and/or meteorological conditions can be linked with higher or lower bat activity indices and if these are correlating with recorded fatality rates.

Given appropriate mitigation will be in place at Area 1 and Khizi 3, the cumulative regional impact on all bat species including Yeshma Wind Farm can qualitatively be assessed as Moderate.

OHTL Electrocution - Birds

Power transmission lines present potential electrocution risk to birds. In particular, larger-bodied birds which tend to prefer perching at high altitudes such as raptors, including eagles and vultures, have the highest risk for electrocution, as larger wingspans create the opportunity for span the distance between energized and ground components of power lines. Further compounding the impact is the fact that many of these species are K-selected with low reproductive rates, so additive mortality is of significance. For many endangered species worldwide, electrocution by powerlines is considered to be the number one conservation threat contributing to population decline.

The below receptors may be cumulatively affected by the presence of three wind farms operating simultaneously.

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds: Highly Sensitive Raptors	Very High	Major	Major
Threatened Birds: Sensitive Raptors	High	Major	Major
Non-threatened Raptors	Medium	Major	Moderate to Major

The OHTL design, construction and operation is under a separate entity and is not included within the scope of the loan agreement. However, the results of baseline surveys, assessments, and recommendations for mitigation, management and monitoring have all been provided to the off-taker. However, the following mitigation measures are recommended to reduce the impacts:

- Ensure a safe design of the cross arm and related equipment (separate energized conductors and grounded hardware distances by more than largest species wingspan);
- Use suspended insulators and avoid pin and deadend/strain insulators;
- In the configurations with high electrocution risk (derivations, tap, transformer and switch poles and its connected grounded wires and jumpers) all grounded elements should be insulated, and grounded wires and jumpers should be sheathed wires;
- Design should be as per recommendations provided in Reference Note: Quick Guidance for Preventing Electrocution Impacts on Birds, Initiated by International Association for Falconry and Conservation of Birds of Prey;
- Provide safe perching and nesting opportunities via the erection of perching poles and/or nesting platforms or boxes; they should be the highest elements of the structure to attract birds away from perching on potentially dangerous components.
- A fatality monitoring plan similar to BBFMP is suggested following international al best practice to monitor for OHTL related fatalities;

- A Potential Biological Removal (PBR) Analysis was undertaken to determine the thresholds for acceptable levels of annual losses due to the project.

With the above measure, residual impacts from Khizi 3 and Area 1 will be Negligible and the resultant cumulative impact for all target species (even assuming no mitigation at Yeshma Wind Farm) will be Minor.

OHTL Collision - Birds

Thin, dark wires used in overhead transmission lines as well as guylines for weather masts are visually difficult to detect. Bird mortality by collisions with these wires are documented for a variety of species.

In the case of power lines, the bird collides with one of the wires, generally the earth wire, which is less visible. Particularly at risk are birds migrating between 20-50m altitude, birds flying at night, birds flying in flocks, and / or large and heavy birds of limited manoeuvrability.

The below receptors may be cumulatively affected by the presence of three wind farms operating simultaneously..

Receptor	Value/Sensitivity	Magnitude	Significance
Endangered Birds: Highly Sensitive Raptors	Very High	Major	Major
Threatened Birds: Sensitive Raptors	High	Major	Major
Non-threatened Raptors	Medium	Major	Moderate to Major

The OHTL design, construction and operation is under a separate entity and is not included within the scope of the loan agreement. However, the results of baseline surveys, assessments, and recommendations for mitigation, management and monitoring have all been provided to the off-taker. However, the following mitigation measures are recommended to reduce the impacts:

- Removing the thin neutral or earth (shield) wire above the high voltage transmission lines where feasible, and where this is not possible, marking the line to make it more visible;
- Bundling high voltage wires, and using spacers to increase visibility;
- Minimising the vertical spread of power lines. Having lines in a horizontal plane reduces collision risk;
- Using existing infrastructure corridors such as road and railway RoW; existing powerline transmission corridors; and other areas with existing disturbances that deter bird activity. The OHTL alignment was designed taking into account ecological constraints such as waterbodies, areas with green and vegetated habitat patches thought to be attractive to birds, and generally attempting to keep OHTL corridor within previously disturbed and developed areas as much as possible.

- Using bird deflectors to increase line visibility by thickening the appearance of the line by a minimum of 20 cm over a length of 10-20cm; or using markers that are moveable, of contrasting colours (e.g. black and white), contrast with the background, protrude above and below the line, and be placed 5-10 m apart. Firefly Diverters are considered to be of robust specification to provide the needed visual deterrence required, as it includes UV-light reflectivity and are visible in low-light and low-visibility conditions.
- Any markers must be robust to allow long-term durability for the environmental conditions of exposure; maintenance plans for the OHTL should include inspections of marker devices and replacements as needed
- A fatality monitoring plan similar to BBFMP is suggested following international al best practice to monitor for OHTL related fatalities;

A Potential Biological Removal (PBR) Analysis was undertaken to determine the thresholds for acceptable levels of annual losses due to the project.Therefore, with the above measures, impacts from Khizi 3 and Area 1 will be Negligible and the resultant cumulative impact for all target species (even assuming no mitigation at Yeshma Wind Farm) will be Minor.

Receptor	Value/Sensitivity	Magnitude	Residual Cumulative Significance
Endangered Birds	Very High	Negligible	Minor
Threatened Birds	High	Negligible	Minor
Non-threatened Birds	Medium	Negligible	Negligible to Minor

5.1.1.1 Conclusions

Other impacts arising during operation are relatively localized and thus do not present cumulative effects.

The below summarizes the potential cumulative effects on biodiversity receptors.

Table 5-2 Summary of Potential Cumulative Effects on Biodiversity Receptors (Operation)

Project	Operation
Impacts from Area 1 WF	Direct mortality and displacement are major operational impacts that could potentially be regionally additive. Collision risk for birds and bats will have a residual significance of minor given the stringent mitigation and management measures proposed. OHTL impacts likewise given the proposed design are predicted to be of negligible significance. Habitat restoration is proposed as a compensatory offset to displacement and habitat degradation.
Impacts from Khizi 3 WF	Direct mortality and displacement are major operational impacts that could potentially be regionally additive. Collision risk for birds and bats will have a residual significance of minor given the stringent mitigation and management measures proposed. OHTL impacts likewise given the proposed design are predicted to be of negligible significance. Habitat restoration is proposed as a compensatory offset to displacement and habitat degradation.

Project	Operation
Impacts from Yeshma WF	Wind Turbine Collision for birds and bats are possibly occurring. No data is provided.
Cumulative Impacts	Wind Turbine collision for birds and bats may have additive mortality effects. However, stringent mitigation will reduce residual significance to Minor or less. No significant residual cumulative impact is anticipated. Habitat restoration regionally for Khizi 3 and Area 1 may serve to support receptors affected by Yeshma wind farm as well.

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APPENDIX A – FINAL CRITICAL HABITAT ASSESSMENT

Area 1 Wind Farm Project
Absheron Region
Azerbaijan

Critical Habitat Assessment
– Final Report

Prepared for:

April 2023

Document Information

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CONTENTS

LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
AoI	Area of Influence
AZE	Alliance for Zero Extinction
BMEP	Biodiversity Monitoring and Evaluation Programme
CHA	Critical Habitat Assessment
CO	Collapsed, IUCN Red List of Ecosystems Category
CR	Critically Endangered, IUCN Red List of Threatened Species Category
DD	Data Deficient, IUCN Red List of Threatened Species Category
EAAA	Ecologically Appropriate Area of Analysis
EBRD	European Bank for Reconstruction and Development
EOO	Extent of Occurrence
EN	Endangered, IUCN Red List of Threatened Species Category
IBA	Important Bird Areas
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
KBA	Key Biodiversity Areas
LC	Least Concern, IUCN Red List of Threatened Species Category
NT	Near Threatened, IUCN Red List of Threatened Species Category
OHTL	Overhead Transmission Line
PR	Performance Requirement
PS	Performance Standard
RDB	Red Data Book
SAC	Special Areas of Conservation
SPA	Special Protection Areas
VP	Vantage Point
VU	Vulnerable, IUCN Red List of Threatened Species Category

1 INTRODUCTION

CRITICAL HABITAT

'Critical Habitat' is a concept applicable to leading international financial lending institutions, designed to enable the identification of areas of high biodiversity value in which development would be particularly sensitive and require special attention. The concept has been developed in consultation with numerous international conservation organisations and thus takes into account many pre-existing conservation approaches, such as Key Biodiversity Areas (KBA), Important Bird Areas (IBA), and Alliance for Zero Extinction Sites (AZE).

The concept is further defined in the following documents:

- European Bank for Reconstruction and Development (EBRD) Performance Requirement 6 (PR6) Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- International Finance Corporation (IFC) IFC Performance Standard 6 (PS6) on Biodiversity Conservation and Sustainable Management of Living Resources;
- Asian Development Bank (ADB) Safeguard Policy Statement (SPS) 2009, ADB Environment Safeguards A Good Practice Sourcebook Draft Working Document; and
- A number of multilateral banks have policies closely aligned with PS6, and more than 128 private banks signed up to the Equator Principles (EP IV 2020) have an implicit commitment to PS6.

The objective of undertaking a Critical Habitat Assessment (CHA) is to arrive at definitive conclusions regarding whether or not the area where a development has been proposed meets the definitions of a Critical Habitat, per the classifications set out in EBRD PR6, IFC PS6 and the ADB Safeguards, following the criteria and processes for CHA described therein.

1.1 Purpose of Report

A CHA Screening exercise was previously undertaken for the project, which identified species of concern which have the potential to trigger criticality for the project's area of influence.

This report provides the results of detailed baseline studies (encompassing desktop review, relevant stakeholder engagement, and extensive field survey work) and will assess the status of species against the EBRD and IFC criteria and associated thresholds.

1.2 Project Background

Azerbaijan's National State Programme on the Use of Alternative and Renewable Energy Sources, 2016-2020, aims to increase the share of alternative and renewable energy sources to 20%. The Programme has identified wind as the preferred source of alternative energy with an estimated annual wind power capacity of 800 MW, based on International Energy Agency (IEA). ACWA Power signed an implementation agreement with the Ministry of Energy (MoE) in Azerbaijan for developing, building and operating a 240 MW wind power project. The 240 MW wind project will be split and built on two (2) locations as follows:

- Khizi 3: Capacity up to 162.5 MW and will be generated using 25 x 6.5 MW Wind Turbine Generators (WTG), located in Khizi region; and
- Area 1: Capacity up to 78 MW and will be generated using 12 x 6.5 MW WTGs, located at Absheron region.

Figure 1-1 Proposed Wind Farm Boundary (Area 1)

The Overhead transmission lines (OHTL) will connect Khizi 3 WF to Area 1 WFs (also being developed by ACWA Power) and to the national grid. The OHTL is split into three (3) lines as follows:

- 220 kV Khizi 3 - Yashma OHTL: This OHTL will connect the Khizi 3 WF substation (SS) to the existing Yashma SS and is approximately 20 km long (red line in Figure below) – assessed as part of Khizi 3 ESIA Report;

- 220 kV Khizi – Pirakashkul OHTL: The OHTL line that will connect Khizi 3 and Area 1 WFs SS and is approximately 30 km long (yellow line in Figure below) - assessed as part of Khizi 3 and Area 1 ESIA Report; and
- 220 kV Pirakashkul – Gobu OHTL: The OHTL line that will connect the Area 1 WF SS to the existing Gobu Power Station and is approximately 30 km long (Green line in Figure below)- assessed as part of Area 1 ESIA Report.

Figure 1-2 Proposed Wind Farm Location and OHTL Alignment

Note: *The responsibility for developing, constructing, commissioning and operating the OHTL lies with the Project off-taker, Azerenergi Open Joint Stock Company (Azerenergi), and as such, the OHTL is considered an 'Associated Facility' to the Project; as it is not being directly funded under the loan agreement with lenders. Therefore, all assessment findings and recommendations relating to the OTHL are being passed on to the off-taker.*

2 METHODOLOGY

2.1 CHA Criteria

There are several international lending organizations that have produced varying criterion for which critical habitat is defined by; however, they are generally aligned with the EBRD PR6 criterion. The below provides an overview of all applicable criteria as per EBRD, IFC and ADB:

- EBRD PR6 Criterion(i): Highly threatened or unique ecosystems /// IFC PS6 Criterion 4: Highly Threatened or Unique Ecosystems
- EBRD PR6 Criterion (ii): Habitats of significant importance to endangered or critically endangered species /// IFC PS6 Criterion 1: Critically Endangered and Endangered Species /// ADB criterion "habitat required for the survival of critically endangered or endangered species";
- EBRD PR6 Criterion (iii) Habitats of significant importance to endemic or geographically restricted species and sub-species /// IFC PS6 Criterion 2: Endemic and Restricted-range Species /// ADB criterion "areas with special significance for endemic or restricted-range species";
- EBRD PR6 Criterion (iv) Habitats supporting globally significant concentrations of migratory or congregatory species /// IFC PS6 Criterion 3: Migratory and Congregatory Species /// ADB criteria "sites that are critical for the survival of migratory species" and "areas supporting globally significant concentrations or numbers of individuals of congregatory species";
- EBRD PR6 Criterion (v) Areas associated with key evolutionary processes /// IFC PS6 Criterion 5: Key Evolutionary Processes /// ADB criterion "areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services";
- ADB criterion "areas with biodiversity that has significant social, cultural or economic importance to local communities"

Even if they do not meet any of the CH criteria, some sensitive ecological features of the study area that may be affected by the project may be considered "Priority Biodiversity Features," defined by EBRD as biodiversity features that are vulnerable, but not as sensitive as CH features. PBF trigger a No Net Loss mitigation standard under EBRD PR6, and hence require careful consideration during project assessment and mitigation planning. Therefore, the scope of the present analysis was to identify not only any biodiversity features triggering criticality under any of the pertinent CH criteria, but also to identify all PBF potentially impacted by the Project as well.

EBRD have outlined the following criteria for the classification of PBF:

- PBF Criterion (i): Threatened habitats

- PBF Criterion (ii): Vulnerable species
- PBF Criterion (iii): Significant biodiversity features identified by a broad set of stakeholders or governments (such as KBA or IBA)
- PBF Criterion (iv): Ecological structure and functions needed to maintain the viability of priority biodiversity features.

2.1.1 Critical Habitat Criteria and Associated Thresholds

Some of the CH criteria listed above have quantitative thresholds associated with them, defined in lender policy, while others can only be assessed using more qualitative evaluation of the criterion. In the present section, biodiversity features potentially affected by the Project are assessed against the quantitative thresholds associated with some of the CH criteria. The specific criteria and associated quantitative thresholds evaluated (where applicable) consist of the following:

Thresholds for EBRD CH Criterion i (Highly threatened or unique ecosystems) are the following:

a) EAAA that is ≥5% of global extent of an ecosystem type with IUCN status of Endangered (EN) or Critically Endangered (CR); and
b) EAAA that is an ecosystem determined to be of high priority for conservation by national or regional systematic conservation planning.

Thresholds for EBRD CH Criterion ii (Habitats of significant importance to endangered or critically endangered species) are the following:

a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species);
b) Areas that support globally significant population of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR, meets the threshold (a) above; and
c) EAAA that contains important concentrations of a nationally or regionally listed EN or CR species.

Thresholds for EBRD CH Criterion iii (Habitats of significant importance to endemic or geographically restricted species and sub-species) is the following:

d) EAAA that regularly holds ≥ 10% of global population AND ≥ 10 reproductive units of a species.

Thresholds for Criterion iv (Habitats supporting globally significant concentrations of migratory or congregatory species) are the following:

e) EAAA that sustains, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population at any point of the species' lifecycle; and

f) EAAA that predictably supports ≥10 percent of global population during periods of environmental stress.

EBRD CH Criterion v (Areas associated with key evolutionary processes) does not have a set of associated quantitative thresholds. The qualitative (expert-based) basis for evaluating this criterion is the following:

g) Areas with landscape features that might be associated with particular evolutionary processes evolutionary processes or populations of species that are especially distinct and may be of special conservation concern given their distinct evolutionary history. For example:
   - Isolated lakes or mountaintops
   - Populations of species listed as priorities by the Edge of Existence Programme.

EBRD CH Criterion vi (Ecological functions that are vital to maintaining the viability of biodiversity features) also does not have a set of associated quantitative thresholds. The qualitative (expert-based) basis for evaluating this criterion is the following:

h) Ecological functions without which critical biodiversity features could not exist. For example:
   - Riparian zones and rivers
   - Dispersal or migration corridors
   - Hydrological regimes
   - Seasonal refuges or food sources
   - Keystone or habitat-forming species

2.1.2 Priority Biodiversity Feature Criteria Thresholds

A biodiversity feature will be determined to be a PBF if the minimum thresholds of any single criterion are met. The below are as per EBRD PR 6 and associated Guidance Note 6.

Thresholds for PBF criterion i (Threatened habitats) are the following:

a) EAAA that is < 5% of the global extent of an ecosystem type with IUCN status of CR or EN

Thresholds for PBF criterion ii (Vulnerable species) are the following:

a) EAAA that supports < 0.5% of global population OR < 5 reproductive units of a CR or EN species.
b) EAAA supports a VU species
c) EAAA that supports regularly occurring nationally or regionally listed EN or CR species
d) EAAA that holds regularly occurring range-restricted species

e) EAAA identified as recognized national or international process as important for migratory birds (esp. wetlands)

PBF Criterion iii and iv do not have quantitative thresholds. As per EBRD PR6 GN6, the assessment for these criteria must rely upon expert judgement.

2.1.3 Ecologically Appropriate Area of Analysis

The Ecologically Appropriate Area of Analysis (EAAA) is a new concept related to a Project's Ecological area of influence that was introduced with the 2019 revision of IFC PS6, and is currently considered by IFC, EBRD and ADB as the basis for spatial delimitation of the area of analysis for the purpose of performing CHA (and identification of PBFs). Unlike most other "area of influence" concepts, the EAAA concept is species-specific. Therefore, differently configured EAAA may be drawn for different species for the same project, based on the species' different ecological characteristics, especially movement patterns. EAAA considered for CHA should not be confused with other spatial delineations of the Project area, or Project's area of influence for other purposes elsewhere within the Project's ESIA and other documentation (for example, the AoI considered for the evaluation of noise impacts)[1].

The EAAA for a particular species or species group encompasses the total area within which the species or species group may be impacted by the Project. The EAAA is based on habitat configurations, locations of ecological features, and the typical home range of species. The EAAA has been delineated for species and species-groups for which the possibility of criticality must be examined. The estimated population of the entire EAAA is used as the basis to determine if criticality has been met, in relation to the quantitative thresholds associated with some of the CH criteria, as described above.

[1] The Project Study Area as determined during CHA Screening outlines the total spatial area within which potential species distribution overlaps are examined utilizing global databases. The Project Study Area is described in the CHA Screening Report.

The Area of Influence is specific to impacts. For example, the AoI for noise impacts on fauna may be inclusive of the noise-generating activity footprint and a 500m buffer; whilst the AoI for Habitat Fragmentation impact may be much more broad, encompassing a wider region than the impacting activity itself. The impact-specific AoIs are discussed in relation to impacts and receptors within the ESIA.

2.1.4 Determining EAAA

Defining the EAAA is an integral step in determining criticality. The critical thresholds must be measured against the population of the species present within the "EAAA", which on a practical level roughly translates into the full range covered by members of a population regularly utilizing or occurring within a particular area.

Therefore, to determine EAAA and assess criticality, the following steps must be followed:

1. Determine the largest Area of Influence for the species based on the project's identified impacts and the species' ecology (habitat affiliation, dispersal, etc.)
2. The next step is calculating the estimated population present within the EAAA in relation to the global population and comparing these ratios to the thresholds for determination of criticality status.

This is a relatively straight-forward concept when considering residential, sedentary populations. For example, for a terrestrial species with limited mobility and specific habitat requirements, the largest applicable area of influence would amount to the full construction footprint (as the primary concern is direct loss and disturbance during construction). Based on this, the home range regularly occupied by the population probably does not exceed a buffer around the project boundaries. The size of the most appropriate buffer for a given species can be estimated on the basis of the species' dispersal ecology (home range size). The EAAA would be considered as the project boundaries plus the buffer. However, the entire project footprint need not be considered as part of the EAAA if a portion of that footprint contains habitat unsuitable for the species. This type of restriction of the EAAA is especially important when areal coverage of a species is used as proxy for population size, as extrapolation of the population of a species occurring within a Project's EAAA based on the entire acreage of the Project footprint would result in a significant exaggeration if only a small portion of the Project's footprint is utilised by the species. The number of individuals making up the population within that EAAA in relation to the global population of the species (or the areal coverage of the species EAAA in relation to the species global Extent of Occurrence (EOO)would then be compared to the critical thresholds.

For species with extremely large home ranges, long-ranging nomadic species, and/or migratory species, this approach is difficult to utilize. For example, migrant waterbirds may be impacted on a large scale by the project as a result of macro-avoidance resulting in habitat fragmentation or migration route impacts, during the operation of the project. Or, long-distance migrant eagles which are at risk of turbine collision may be on a migratory journey of hundreds of thousands of kilometers.

If we are to apply the concept of ascertaining the entire home range of the species that pass through the area of influence (considering for example a 2km buffer around the wind farm as

the AoI – including all migratory birds flying through this area) then this 'EAAA' in this case could easily become an entire geographical region.

It is recognized that the EAAA is intended as a project specific concept, and therefore it is not intended to span multiple continents, or very large regional scale area, e.g., to cover the entire ranges of individual long-distance migratory birds. With migratory birds, CHA generally follows the IUCN KBA standard, emphasizing areas that function as significant migratory stopover sites and/or bottleneck, with EAA delineated to include the Project footprint plus a reasonable buffer based on the scale of the species' typical daily foraging movements, rather than its entire migratory route,

It is acknowledged that EAAA should not be equated to the probability of impact on a species. We believe that following the approach outlined above still honours this as we are not only assessing the population within the AoI, but we are utilizing the worst-case AoI on a species-specific level to help define the overall total area for which the EAAA must be delineated. Criticality thresholds are then compared to the EAAA total, not the AoI total.

Each species analysis section includes the reasoning followed to ascertain the EAAA, the likely population within the EAAA, and the final assessment of criticality.

The following summarizes the EAAA that has been applied for various taxa:

- For Flora species, the EAAA has been delineated using the following factors: (1) known locations, (2) habitat requirements inclusive of soil type/substrate , and (3) contiguous tracts of connected habitat. The full AoI of the project on flora species is the starting point and the EAAA may include all or part of the AoI as well as extending beyond the AoI dependent upon the previously mentioned factors.
- For bats, the EAAA has been set as the footprint of the project site, associated vertical airspace, and a buffer of up to 5km
- For migratory birds: The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. Instead, CHA generally follows the IUCN KBA standard, emphasizing areas that function as significant migratory stopover sites and/or bottlenecks with EAAAs delineated to include the Project footprint plus a reasonable buffer based on the scale of the species' typical daily or foraging movements, rather that its entire migratory route.
- For breeding/resident birds: The total EAAA for this species has been applied as all suitable habitat within the project boundaries as well as within a 5km buffer around the wind farm and OHTL. This should provide an adequate accounting of birds likely to regularly utilize the project area during breeding season.
- For terrestrial (long-ranging) mammals: The total EAAA, has been set to include the project footprint as well as connected uninterrupted terrestrial habitat suitable for the species in question, generally extending approximately 20-30km from the project area.

- The EAAA for Mediterranean Spur-thighed Tortoise may be considered as the project footprint, extending a maximum of 2-5km buffer within contiguous suitable habitat.

3 BIRDS

A number of bird species were identified during CHA Screening that pertain to the EBRD CH and PBF criteria for threatened species, and migratory/congregating species.

3.1 Overview

The results of the CHA Screening were used as a starting point. Further analysis and assessment was subsequently made only for species for which (1) observations were made during one or more of the site-specific baseline field surveys, or (2) despite not being registered during field surveys, it is still anticipated (based on stakeholder engagement or historical and desktop information) that the species could possibly occur in the vicinity of the Project.

3.1.1 Globally Threatened Species

The following table lists all species of IUCN Red List CR/EN/VU status that were identified during the screening process, as well as any additional IUCN CR/EN/VU species that were recorded during the surveys. The results derived from baseline studies are provided, along with the total global population and associated critical threshold. For species which require further assessment to determine PBF/Critical status, this is provided in the subsequent sub-section (Section 3.2).

Table 3-1 Screening Results for Globally Threatened Species

SPECIES	IUCN	BASELINE STUDY	GLOBAL POPULATION	CONCLUSION
Sociable Lapwing	CR	Not recorded in any baseline surveys taking place from Spring 2020 through Spring 2022, including VP surveys, breeding bird surveys, nest searches and transect surveys. Migratory birds have possibility to occur based on secondary information.	Global population currently estimated at 11,200 individuals. Therefore >56 individuals would need to be present within the EAAA to trigger CH.	The species has been further assessed. Refer to Section 3.2. Species does not trigger criticality but will be considered a PBF with NNL requirements in place.
White-headed Duck	EN	Not recorded in any baseline surveys taking place from Spring 2020 through Spring 2022, including VP surveys, breeding bird surveys,	Global population currently estimated at 5300-8700 individuals. Therefore >26 individuals would	Not anticipated to occur regularly in the project area. Criticality is unlikely. However, will be considered a PBF with NNL

Species	IUCN	Baseline Study	Global Population	Conclusion
		nest searches and transect surveys. Habitat does not appear suitable for stopovers or wintering (no water bodies).	need to be present within the EAAA to trigger CH.	requirements in place.
Steppe Eagle	EN	Strong migratory activity throughout project site especially during spring. Important migratory corridor passes on the coast of the Caspian Sea.	Global population currently estimated at 50000-75000 individuals. Therefore >250 individuals would need to be present within the EAAA to trigger CH.	The species has been further assessed. Refer to Section 3.2. Species does not trigger criticality, but will be considered a PBF with NNL requirements in place.
Egyptian Vulture	EN	Recorded throughout multiple seasons. Known to breed in the overall study area.	Global population currently estimated at 12400-36000 individuals. Therefore >60 individuals would need to be present within the EAAA to trigger CH.	The species has been further assessed. Refer to Section 3.2. Species does not trigger criticality but will be considered a PBF with NNL requirements in place.
Saker Falcon	EN	Recorded during OHTL surveys	Global population currently estimated at 12200-29800 individuals. Therefore >61 individuals would need to be present within the EAAA to trigger CH.	The species has been further assessed. Refer to Section 3.2. Species does not trigger criticality but will be considered a PBF with NNL requirements in place.
Pallas's Fish-eagle	EN	Not recorded in any baseline surveys taking place from Spring 2020 through Spring 2022, including VP surveys, breeding bird surveys, nest searches and transect surveys.	Global population currently estimated at 1000-2499 individuals. Therefore >5 individuals would need to be present within the EAAA to trigger CH.	Not anticipated to occur regularly in the project area. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.

Species	IUCN	Baseline Study	Global Population	Conclusion
*It should be noted that VU species do not trigger criticality against the 0.5% threshold but are assessed against the potential of the EAAA to support a substantially important population that could cause uplisting of the species to EN if the population were to be adversely impacted.				
Lesser White-fronted Goose	VU	Not recorded in baseline surveys taking place from Spring 2020 through Spring 2022, including VP surveys, breeding bird surveys, nest searches and transect surveys. Habitat does not appear suitable for stopovers or wintering (no water bodies).	Global population currently estimated at 16000-27000 individuals.	Not anticipated to occur regularly in the project area. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Marbled Teal	VU	Not recorded in any baseline surveys taking place from Spring 2020 through Spring 2022, including VP surveys, breeding bird surveys, nest searches and transect surveys. Habitat does not appear suitable for stopovers (no water bodies).	Global population currently estimated at 55,000-61,000 individuals.	Not anticipated to occur regularly in the project area. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Common Pochard	VU	Not recorded in any baseline surveys taking place from Spring 2020 through Spring 2022, including VP surveys, breeding bird surveys, nest searches and transect surveys. Habitat does not appear suitable for stopovers (no water bodies).	Global population currently estimated at 760000-790000 individuals.	Not anticipated to occur regularly in the project area. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.

Species	IUCN	Baseline Study	Global Population	Conclusion
Eastern Imperial Eagle	VU	Recorded during multiple survey efforts.	Global population currently estimated at 3500-15000 individuals.	The species has been further assessed. Refer to Section 3.2. Species does not trigger criticality but will be considered a PBF with NNL requirements in place.
Greater Spotted Eagle	VU	Not recorded in any baseline surveys taking place from Spring 2020 through Spring 2022, including VP surveys, breeding bird surveys, nest searches and transect surveys. Known from previous surveys of migratory raptors in the region to occur as a rare migrant.	Global population currently estimated at 3900-10000 individuals.	Not anticipated to occur regularly in the project area. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Red-footed Falcon	VU	Not recorded in any baseline surveys taking place from Spring 2020 through Spring 2022, including VP surveys, breeding bird surveys, nest searches It is listed as a passage migrant in Absheron-Gobustan and Azerbaijan, and may breed, but only sporadically, in western Azerbaijan	Global population currently estimated at 287500-400000 individuals.	Not anticipated to occur regularly in the project area. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Great Bustard	VU	Not recorded in any baseline surveys taking place from Spring 2020 through Spring 2022, including VP surveys, breeding bird surveys, nest searches and transect surveys. Occurs in Azerbaijan only irregularly, as a rarity in winter.	N/A	This species is not anticipated to occur and is not considered as a possible critical habitat trigger nor as a PBF.

Species	IUCN	Baseline Study	Global Population	Conclusion
European Turtle-Dove	VU	Not recorded in any baseline surveys taking place from Spring 2020 through Spring 2022, including VP surveys, breeding bird surveys, nest searches and transect surveys. Habitat does not appear suitable for the species which requires forested areas.	Global population currently estimated at 12800000-47600000 individuals.	Not anticipated to occur regularly in the project area. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.

3.1.2 Nationally Threatened Species

The following lists all species located within the Azerbaijan RDB which were encountered at least once throughout the baseline surveys. No additional RDB species are considered likely to occur regularly as per the local expert(s).

The National Red Data Book (RDB) of Azerbaijan was not prepared following IUCN status categories and criteria. However, a national ornithological expert was consulted to "translate" the national RDB status of each species into rough equivalency with IUCN status categories. In the present analysis, only species with national RDB status roughly equivalent to IUCN CR/EN/VU status are considered.

In order to trigger criticality under Criterion ii, the species should have a national status of EN or CR; and the EAAA must contain an important concentration and/or represent a core, vital habitat for the species national population.

Species listed as VU in the RDB cannot trigger criticality but will be considered as Priority Biodiversity Features.

Table 3-2 Screening Results for Nationally Threatened Species

Species	RDB Status	Survey Results	National Population	Conclusion
Black Stork	CR	A total of 1 individual was recorded during VP surveys from Spring 2020-2021 during the month of May. None were observed during any OHTL surveying.	~100	Not anticipated to occur regularly in the project area. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Osprey	CR	It is a passage migrant through the Absheron-Gobustan region.	~20	The EAAA is not considered an

Species	RDB Status	Survey Results	National Population	Conclusion
		No observations were made during VP surveys from Spring 2020-2021 OHTL Surveys were undertaken. A total of 5 observations were made during Summer 2021 and 1 observation during Autumn 2021.		important concentration or core, vital habitat for this species' national population. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Short-toed Snake Eagle	CR	It is a resident native breeding bird within Azerbaijan, with potential breeding occurring within the Absheron-Gobustan Region. A total of 5 observations were recorded during VP surveys from Spring 2020-Spring 2021. 2 observations were recorded in Spring 2022 None were observed during the breeding bird survey. OHTL Surveys were undertaken. A total of 14 observations were made during Summer 2021 and 3 observations during Autumn 2021.	~200	The EAAA is not considered an important concentration or core, vital habitat for this species' national population. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Bearded Vulture	EN	It is a native resident within Azerbaijan, however, occurs only as a passage migrant and winter visitor in the Absheron-Gobustan Region. No observations were made during VP surveys from Spring 2020-2021 nor during the surveys of Spring 2022 None were observed during the breeding bird survey. None were observed during Summer or Autumn 2021 OHTL surveying.	~100	The EAAA is not considered an important concentration or core, vital habitat for this species' national population. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Cinereous Vulture	EN	It is a native resident within Azerbaijan but does not breed in the Absheron-Gobustan area.	~300	The EAAA is not considered an important concentration or core, vital habitat

Species	RDB Status	Survey Results	National Population	Conclusion
		A total of 541 observations were recorded during VP surveys from Spring 2020-2021 throughout all months excepting December. Additionally, a total of 188 observations of "unidentified Vulture" of which likely 1/3 to 1/2 is attributable to Cinereous Vulture were recorded during VP surveys from Spring 2020-2022 A total of 105 observations were recorded during Spring 2022 (March, April and May). No nests were recorded during the breeding bird surveys. OHTL Surveys were undertaken. A total of 11 observations were made during Summer 2021 and 233 observations during Autumn 2021. The vultures are evidently attracted by a poultry farm located 4km to the southeast of the wind farm boundary and regularly visit the outdoor dumping area of this poultry farm in large congregations. Further vultures frequent the project site due to livestock grazing activity and feed on livestock carcasses and placental remains after birthing.		for this species' national population. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Long-legged Buzzard	EN	It is a native breeding bird within the Absheron-Gobustan Region. A total of 100 observations were recorded during VP surveys from Spring 2020-Spring 2021. A total of 80 observations were recorded during Spring 2022 (March, April and May). No nests were recorded during the breeding bird surveys. OHTL Surveys were undertaken. A total of 78 observations were made	~2,000	The EAAA is not considered an important concentration or core, vital habitat for this species' national population. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.

Species	RDB Status	Survey Results	National Population	Conclusion
		during Summer 2021 and 58 observations during Autumn 2021.		
Booted Eagle	EN	It is a passage migrant within the Absheron-Gobustan Region. A total of 9 observations were recorded during VP surveys from Spring 2020-Spring 2021 1 observation was recorded during Spring 2022 (March, April and May). None have been recorded during Summer or Autumn OHTL surveying.	~100	The EAAA is not considered an important concentration or core, vital habitat for this species' national population. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Golden Eagle	EN	It is a native resident in Azerbaijan but only occurs in Absheron-Gobustan Region as a passage migrant and/or visitor. A total of 8 observations were recorded during VP surveys from Spring 2020-Spring 2021. An additional 7 observations were recorded during Spring 2022. OHTL Surveys were undertaken. A total of 2 observations were made during Summer 2021 and 6 observations during Autumn 2021.	~200	The EAAA is not considered an important concentration or core, vital habitat for this species' national population. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
White-tailed Eagle	EN	It is a resident and winter visitor within the Absheron-Gobustan Region. A total of 2 observations were recorded during VP surveys from Spring 2020-2021 OHTL Surveys were undertaken. A total of 5 observations were made during Autumn 2021.	~100	The EAAA is not considered an important concentration or core, vital habitat for this species' national population. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Peregrine Falcon	EN	It is a passage migrant in the Absheron-Gobustan Region.	~100	The EAAA is not considered an important concentration or core, vital habitat

Species	RDB Status	Survey Results	National Population	Conclusion
		Not recorded in VP surveys taking place from Spring 2020 through Spring 2022 OHTL Surveys were undertaken. A total of 1 observation was made during Summer 2021 and 2 observations during Autumn 2021.		for this species' national population. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
Dalmatian Pelican	VU	Recorded during multiple survey efforts.	~300	Considered as PBF with NNL requirements.
Eurasian Griffon Vulture	VU	Recorded during multiple survey efforts.	~800	Considered as PBF with NNL requirements.
European Honey-Buzzard	VU	Recorded during multiple survey efforts.	~1,500	Considered as PBF with NNL requirements.
Pallid Harrier	VU	Recorded during multiple survey efforts.	~100	Considered as PBF with NNL requirements.
Levant Sparrowhawk	VU	Recorded during multiple survey efforts.	~500	Considered as PBF with NNL requirements.
Black Kite	VU	Recorded during multiple survey efforts.	~500	Considered as PBF with NNL requirements.
Merlin	VU	Recorded during multiple survey efforts.	~150	Considered as PBF with NNL requirements.
Eurasian Hobby	VU	Recorded during multiple survey efforts.	~200	Considered as PBF with NNL requirements.
Lesser Kestrel	VU	Recorded during multiple survey efforts.	~1,500	Considered as PBF with NNL requirements.
Little Bustard	VU	Recorded during multiple survey efforts.	Unknown	Considered as PBF with NNL requirements.
Lanner Falcon	DD	Recorded during multiple survey efforts.	~100	Considered as PBF with NNL requirements.

3.1.3 Migratory Birds

The project lies within the Black Sea/Mediterranean Flyway and West Asian-East African Flyway. Three IBAs are within 15-25 km of the project site. These include:

- Yashma Island;
- Alty Agach area; and
- Mount Kargabazar and Mount Gush-gaya.

Yashma Island includes species which have triggered Criterion A4 ("the site is known or thought to hold congregations of ≥1% of the global population of one or more species on a regular or predictable basis.").

Yashma Island consists of staging areas which indicates that these species may pass through the project site during the migratory periods.

Tufted Duck has been listed as triggering Criterion A4 due to numbers exceeding 1,000 birds being recorded at the IBA site. Further, "Waterbirds" as a group has been listed as triggering Criterion A4 due to records indicating between 20,000-30,000 waterbirds utilize the IBA.

The project footprint does not include wetland or water-based habitats that would be suitable for Tufted Duck or migratory flocks of waterbirds for staging and stopover purposes. As the project lies within the migratory corridor, it is possible, however, that migrating flocks may pass through the project airspace.

A review of baseline data covering surveys undertaken throughout Spring 2020 – Spring 2022, including VP surveys, breeding bird surveys, nest searches, and transect surveys, has not identified any species or groups of (non-threatened) migratory birds occurring in large enough numbers to potentially trigger criterion (iii).

3.2 Species Assessments

3.2.1 Sociable Lapwing

The Sociable Lapwing (*Vanellus gregarious*) is a migrant wader that is listed as **Critically Endangered** on the IUCN Red List and is an Annex 1 species of the Bern Convention Resolution 6, due to rapid population decline thought to be driven by hunting pressures. The Sociable Lapwing is also ranked #51 on the Top100 Edge of Extinction bird species list.

3.2.1.1 ECOLOGY

Preferred habitat during migration is typically sandy plains with short grass, dry meadows, fallow land and cultivated fields. The main diet is insectivorous although grain can also be taken. Gregarious mainly during breeding season, although during autumn migration may form larger groups of birds; however, spring migration typically sees smaller flocks of 5-15 individuals.

3.2.1.2 DISTRIBUTION

It is a passage migrant through Azerbaijan, crossing southbound in the autumn months and returning northbound in the spring months to breed in Northern Kazakhstan and Russia in the summer months.

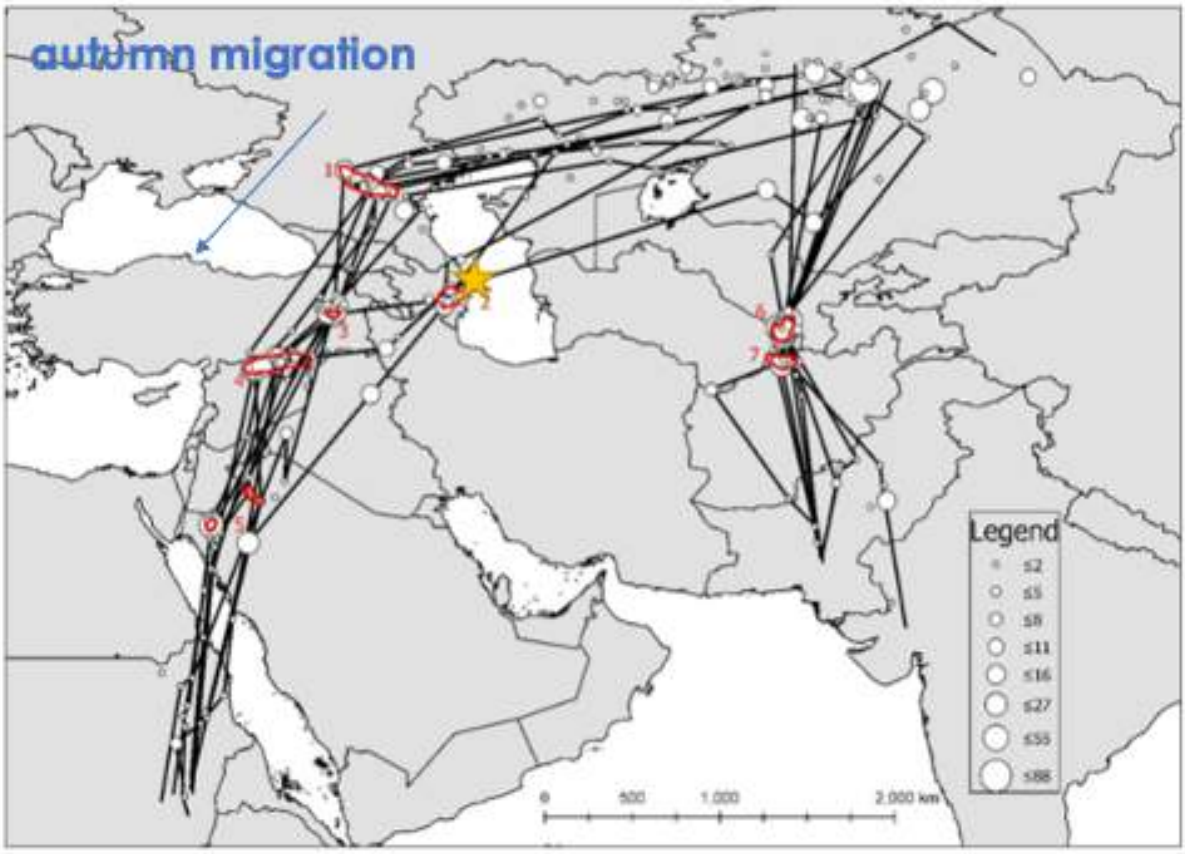
Figure 3-1 Sociable Lapwing Distribution

Figure 3-2 Sociable Lapwing Distribution (cont.)

3.2.1.2.1 Satellite Tracking

Recent research[2] indicates that the species generally follows one of two migratory pathways. The western migratory pathway cuts through the Absheron peninsula, and includes 'low- lands of east-central Azerbaijan' as an essential staging area.

Figure 3-3 Sociable Lapwing Migration - Autumn

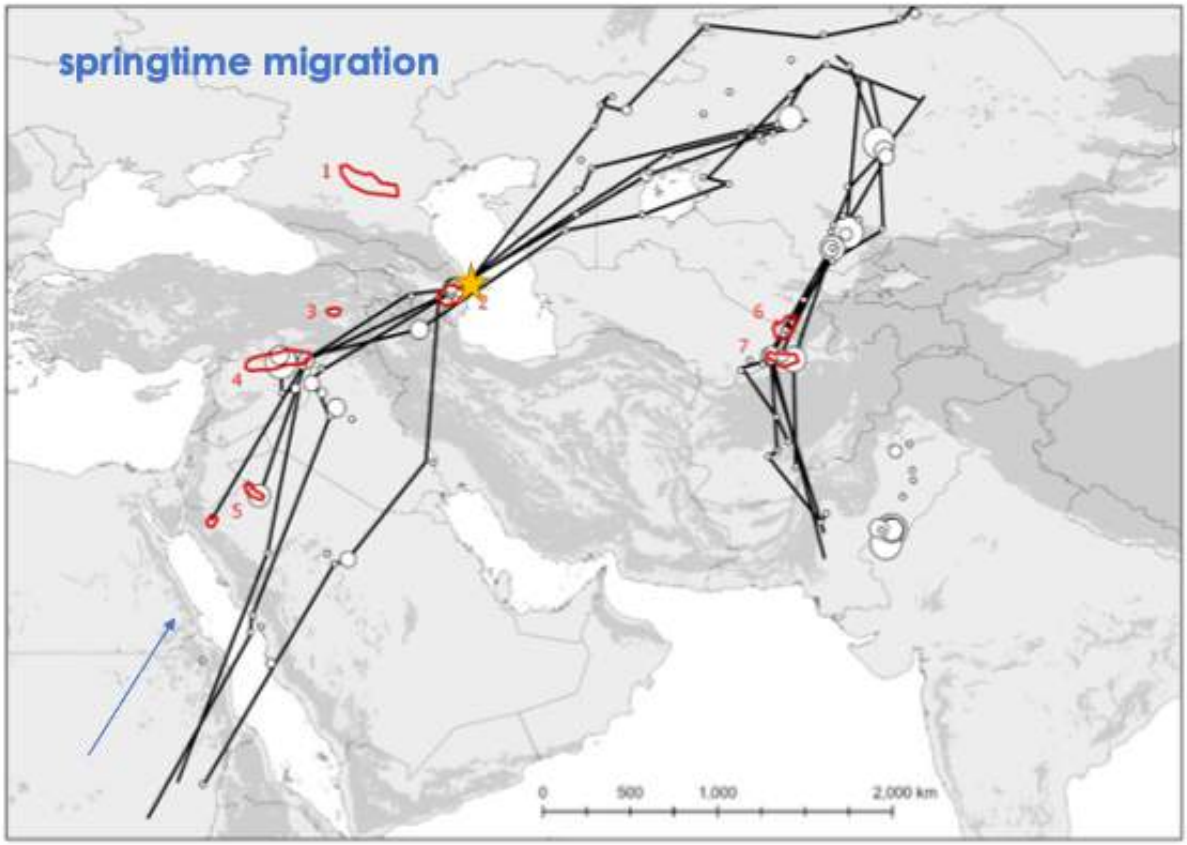


This figure, extracted from "Migration strategy, site fidelity and population size of the globally threatened Sociable Lapwing Vanellus gregarius" (2021) shows the soutbound autumn migration of birds leaving from breeding grounds and heading towards overwintering areas.

Some western flyway migrants (those that overwinter in east Africa and Arabia) pass through the Absheron peninsula after crossing the Caspian Sea.

[2] Migration strategy, site fidelity and population size of the globally threatened Sociable Lapwing *Vanellus gregarius*

Figure 3-4 Sociable Lapwing Migration - Spring



This figure, extracted from "Migration strategy, site fidelity and population size of the globally threatened Sociable Lapwing Vanellus gregarius" (2021) shows the northbound springtime migration of birds leaving from wintering grounds and returning to the breeding grounds.

The majority of western flyway migrants (those that overwinter in east Africa and Arabia) pass through the Absheron peninsula and cross the Caspian Sea.

The migratory periods for the western pathway are listed as follows:

- Autumn migration: departing southbound from breeding grounds in early September; and arriving to wintering grounds by early November.
- Spring migration: departing northbound from wintering areas by early March; and arriving to breeding grounds by mid-April.

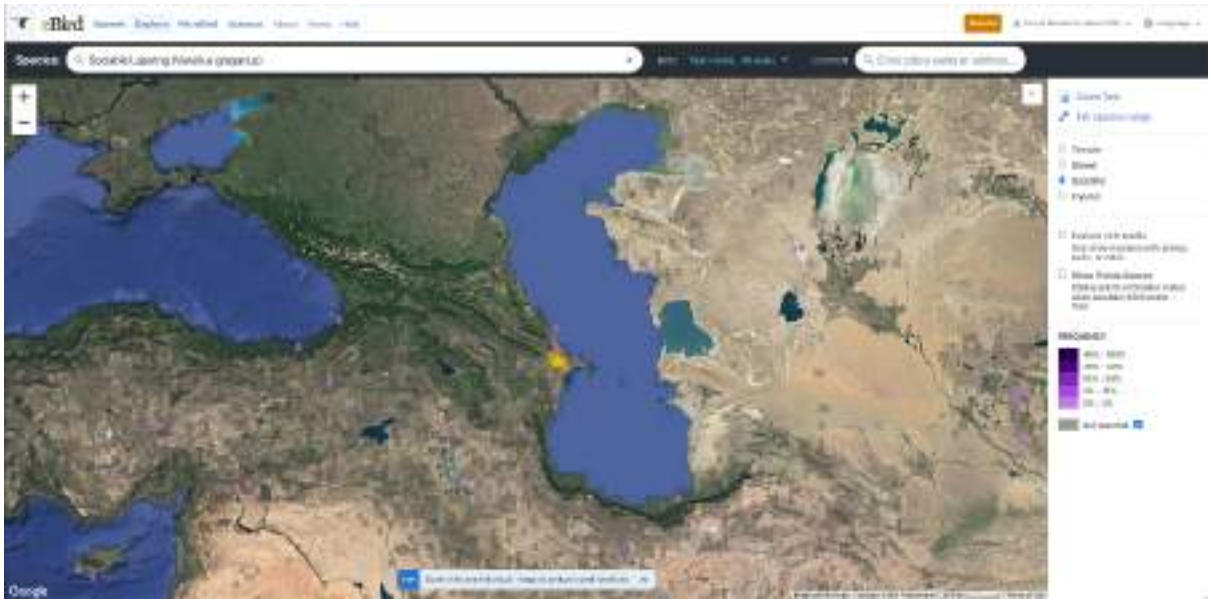
Typically, the birds spent longer time periods at multiple stopovers and staging areas on the southbound autumn migration, but on the spring return to breeding grounds took more direct pathways. It would appear that the potential crossovers in spring return migration across the Absheron peninsula (for direct flights over the Caspian sea) are more likely than the autumn migration.

Thus the period of highest risk for Sociable Lapwing migration across the Absheron peninsula is between early March to mid-April; heading in the Northbound direction.

3.2.1.2.2 Public Records

The following records are available on Ebird, documenting Sociable Lapwing in localities as close as 16 km away from the project site.

Figure 3-5 Sociable Lapwing Ebird Records - Regional



Two sites in particular, Central Gobustan, and Besh Barmag Bottleneck, have multiple records. Besh Barmag is located over 100km from the project site, but records have been compiled as well since they provide insight to regional distribution and migratory patterns.

Figure 3-6 Sociable Lapwing Ebird Records - Within 100km

The following table provides the sighting records for both sites.

Table 3-3 Sociable Lapwing Records on Ebird for Gobustan and Besh Barmag

SITE	DATE	SEASON	NUMBER INDIVIDUALS
Gobustan (16km southwest of project)	April 02, 2008	Spring (northbound)	1
	April 02, 2007	Spring (northbound)	23
	March 24, 2007	Spring (northbound)	21
	March 21, 2007	Spring (northbound)	5
	April 12, 2006	Spring (northbound)	5
	March 18, 2006	Spring (northbound)	105
Besh Barmag Bottleneck (35km north of project)	September 21, 2016	Autumn (southbound)	2
	September 15, 2016	Autumn (southbound)	11
	October 26, 2014	Autumn (southbound)	2
	October 20, 2014	Autumn (southbound)	1
	October 16, 2014	Autumn (southbound)	1
	April 05, 2012	Spring (northbound)	3
	April 04, 2012	Spring (northbound)	5
	April 02, 2012	Spring (northbound)	13
	March 30, 2012	Spring (northbound)	6
	November 07, 2011	Autumn (southbound)	1
	October 09, 2011	Autumn (southbound)	1

3.2.1.2.3 Stakeholder Consultations

As part of the ESIA stakeholder consultation process, communications with the local Regulator, Ministry of Environment and Natural Resources (MENR) were undertaken to collect data on the

Yani Yeshma Wind Farm. The Yani Yeshma Wind Farm is an existing wind. The following records were provided which indicates at least 64 Sociable Lapwing were recorded during 2020.

Figure 3-7 Sociable Lapwing Records - Yani Yeshma Wind Farm

Bird count table in Absheron and Yashma (2020).

	Name of Birds	No		Name of Birds	No
1	little grebe	30	22	Golden Eagle	1
2	black-necked grebe or eared grebe	1050	23	Marsh Harrier	20
3	Great Crested Grebe	20	24	ruddy shelduck	10
4	Great Cormorant	780	25	mallard	1730
5	Pingy Cormorant	220	26	gadwall	1030
6	Dalmation pelican	35	27	northern pintail	93
7	Pelican sp.	3	28	Eurasian teal	50
8	Great egret	15	29	common pochard	1500
9	Little egret	20	30	ferruginous duck	630
10	grey heron	13	31	Red-crested pochard	415
11	Flamingo	10-12	32	Bucephala cdilula	8
12	whooper swan	15	33	red-breasted merganser	6
13	whooper swan	3	34	smew	10
14	Graylag Goose	30	35	common pochard	1500
15	sociable lapwing black-tailed godwit	7 25	36	rock dove	700
16	**red knot**	95	37	common wood pigeon	9
			38	European herring gull	210
17	Sociable Lapwing	50	39	rock dove	700
18	greater scaup	450	40	Starling	7100
19	Carrion Crow.	150	41	Rook	220
20	Perdix	35			
21	sociable lapwing	7			

The exact monitoring methodology (dates and timeframes covered) as well as exact locations are not provided, but the Wind Park area is approximately 3.5km to the north of the proposed associated OHTL; and 18km north of the proposed Area 1 Wind Farm project area.

Figure 3-8 Location of Yani Yashma Wind Farm

As part of the CHA, Sociable Lapwing leading researching and expert Rob Sheldon was consulted, to request any relevant data covering the Absheron Peninsula. An unpublished report, "Survey of the Critically Endangered Sociable Lapwing in Azerbaijan, September 2016" by Rob Sheldon, Ruslan Urazaliyev, and Kai Gauger was shared, relevant summary points are presented below:

- Surveys were conducted from Sept 16-25th 2016 at 6 locations along the Caspian Sea coastline, both towards the north and south of the Absheron peninsula. These locations included Gobustan steppes and Besh Barmag, the closest to the proposed Area 1 project area.
- No Sociable Lapwing were recorded during these surveys, although another monitoring team recorded 11 birds flying south on migration on September 15th, 2016. It was postulated that the surveying time frame might have been too early before the anticipated peak migration period during October.
- Based on a review of existing data and survey results, it was concluded that the Absheron peninsula and Azerbaijan in general was of higher importance in springtime for Sociable Lapwing, as autumn migration records show birds have favored routes from southwest Russia to eastern Turkey.
- At the surveyed locations, many signs of hunting (discharged shotgun cartridges) were noted, but it is not known if Sociable Lapwing are regularly hunted or not.

Figure 3-9 2016 Survey Locations

3.2.1.2.4 Project Surveys

Vantage Point Surveys were undertaken throughout the year as per Scottish Natural Heritage (SNH) Guidelines, to inform the Collision Risk Model (CRM) as well as the ESIA. Surveys included coverage during the following timeframes:

- Spring 2020 (surveys ranged March 28-May 08 2020);
- Summer 2020 (surveys ranged May 28- June 03 2020);
- Autumn 2020 (surveys ranged Sept 10-December 07 2020; and
- Winter 2021, (surveys ranged Jan 09 – March 09 2021).

Sociable Lapwing has not been sighted during surveys to date covering spring 2020, summer 2020, autumn 2020, and winter 2021.

3.2.1.3 ANALYSIS

3.2.1.3.1 EAAA

The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. Instead, CHA generally follows the IUCN KBA standard, emphasizing areas that

function as significant migratory stopover sites and/or bottlenecks, with EAAAs delineated to include the Project footprint plus a reasonable buffer based on the scale of the species' typical daily or foraging movements, rather than its entire migratory route..

A provisional EAAA which includes the entirety of the project as well as a buffer of 10km has been put in place for migratory species, adjusted when there are specific habitat needs, stopover sites or other ecological features that should be included or excluded from the EAAA. For this species, the provisional EAAA with 10km buffer will be utilized.

3.2.1.3.2 Criticality

The species has an estimated global population of 11,200 individuals, which means the CR/EN criticality threshold of 0.5% is 56 individuals.

Zero (0) observations of this species were made during the year-long seasonal VP surveys of the project area.

It seems clear that migrating Sociable Lapwing pass through the general Absheron region during both migration seasons, and more heavily during spring migration. Records from several locations around the project area indicate that the species has the possibility to be present during migratory periods. However, over a full year of surveying, including coverage of both autumn and spring peak migratory periods for Sociable Lapwing, have not recorded any birds passing through the wind farm project area.

This can potentially be explained by the terrain; the northbound birds may be crossing to the coast of the Caspian Sea south of the project. The highest numbers recorded regionally are at locations along the coast, so it is sensible to assume that birds may be avoiding crossing the project airspace in preference of migrating closer to the coast, where there are more water bodies and agricultural fields and less mountainous terrain.

The project airspace itself does not appear to be utilized regularly by Sociable Lapwing, as evidenced by the lack of records throughout the entirety of the surveying period. Further, it is evident that the habitat within and adjacent to the project area is not suitable for Sociable Lapwing stopover. Therefore considered that Critical Habitat has not been triggered for the species.

Thus, it has been determined that the project does not meet criticality and does not qualify as Critical Habitat for Sociable Lapwing.

However, the species is still to be considered as a priority biodiversity feature, and the ESIA shall include assessment of potential impacts arising from the construction and operation of the project wind farm and associated facilities, along with recommendations for management,

mitigation and monitoring in line with EBRD and lender requirements and international best practice.

3.2.2 Steppe Eagle

The Steppe Eagle is listed as **Endangered** on the IUCN Red List and is an Annex 1 species of the Bern Convention Resolution 6, due to rapid population decline across much of its global range.

3.2.2.1 ECOLOGY

It inhabits steppe and semi-desert and breeds in mountainous regions. Diet varies regionally but mainly is formed by small mammals such as susliks.

The species is considered to be highly vulnerable to wind farms and power line impacts.

3.2.2.2 DISTRIBUTION

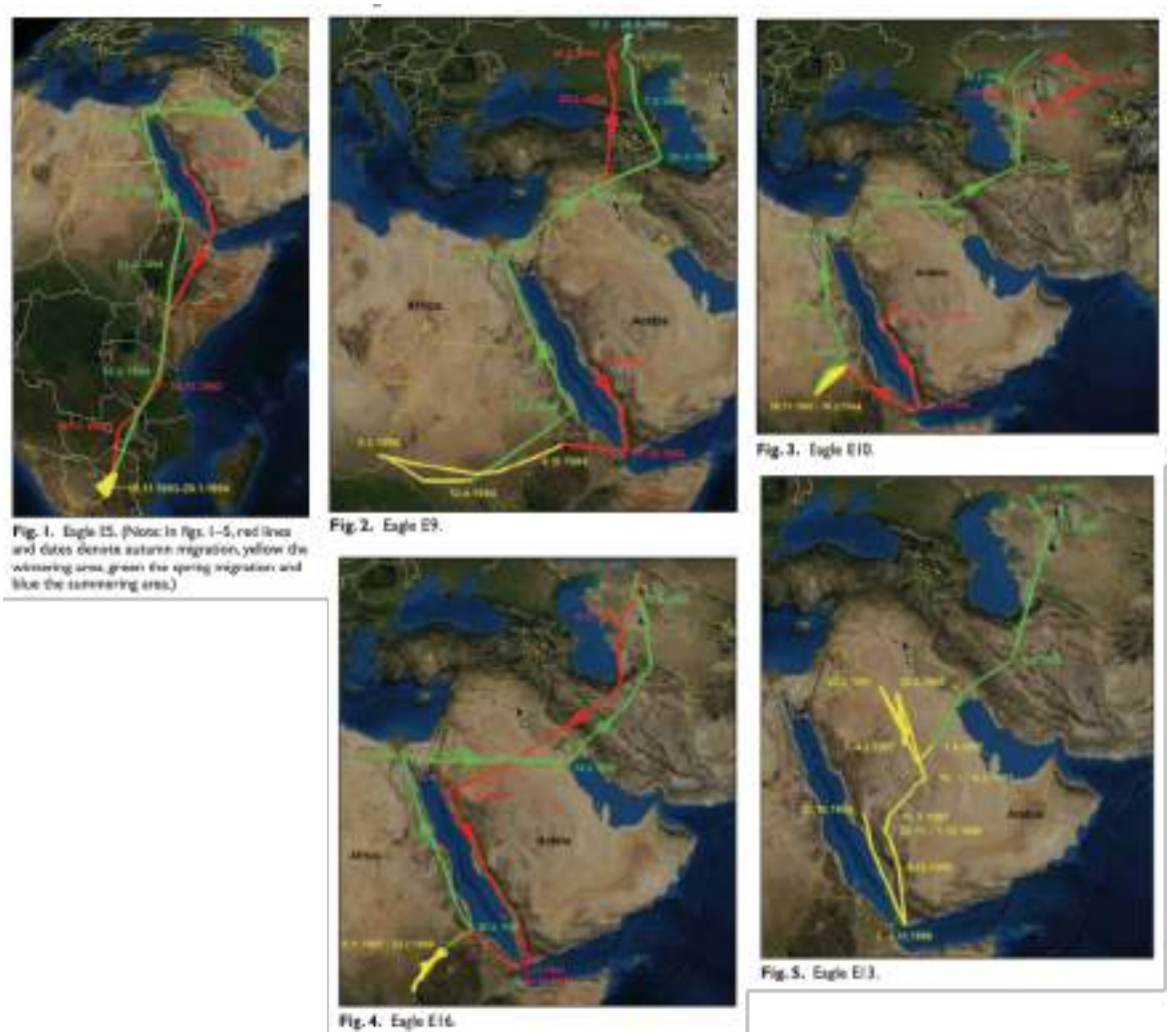
It is a passage migrant through Azerbaijan, crossing southbound in the autumn months and returning northbound in the spring months to breed in the summer months. Migrants leave their breeding grounds between August and October/November, returning between January and May. It avoids sea crossings and thus forms large concentrations at bottleneck sites.

Figure 3-10 Steppe Eagle Distribution

3.2.2.2.1 Satellite Tracking

A number of studies have been undertaken to monitor Steppe Eagle flight paths via the deployment of satellite tracking telemetry devices on wild birds. The following figures depict the migratory flight paths undertaken by a number of Steppe Eagles.

Figure 3-11 Steppe Eagle Migration Flight Paths[3]



The above figure demonstrates that many eagles keep to the eastern side of the Caspian Sea during both autumn and spring migrations, whilst one individual passed close to the western coast of the Caspian Sea and the Absheron peninsula during the spring return migration.

[3] Meyburg, B. U., Meyburg, C., & Paillat, P. (2012). Steppe Eagle migration strategies—revealed by satellite telemetry. *British Birds*, *105*(9), 506.

Figure 3-12 Steppe Eagle Migration Flight Paths[4]

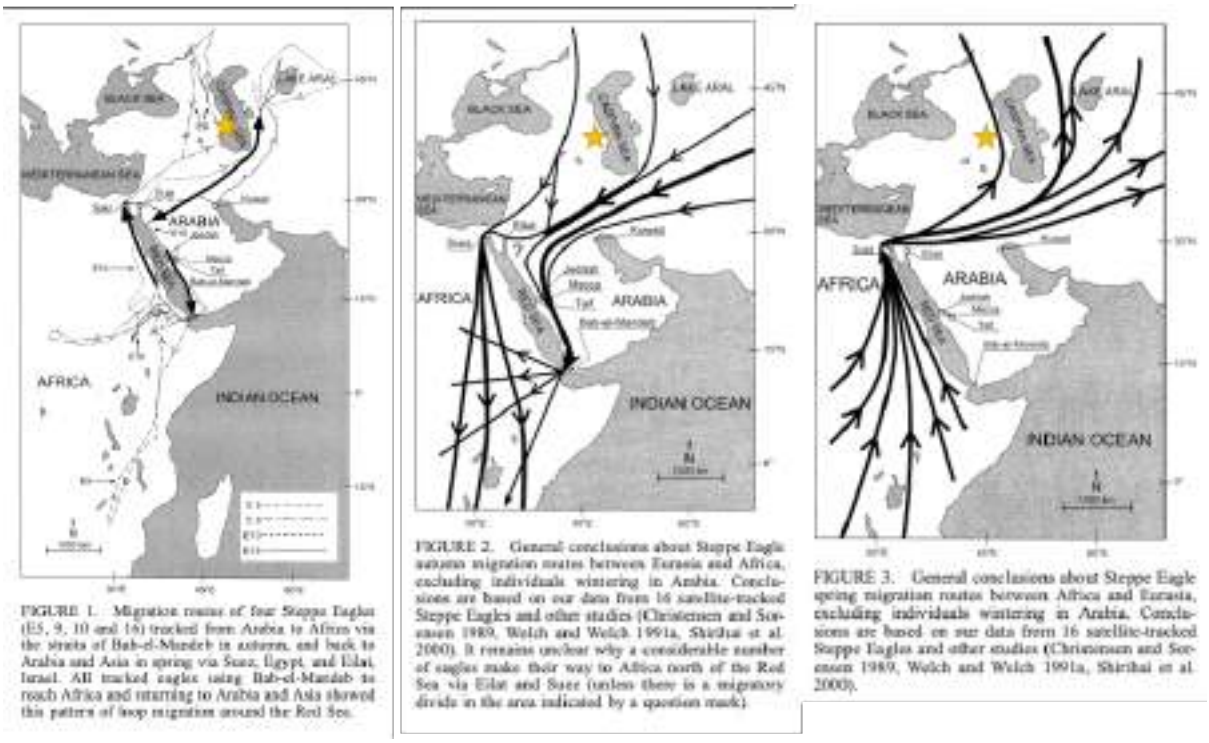


FIGURE 1. Migration routes of four Steppe Eagles (E5, 9, 10 and 16) tracked from Arabia to Africa via the straits of Bab-el-Mandeb in autumn, and back to Arabia and Asia in spring via Suez, Egypt, and Eilat, Israel. All tracked eagles using Bab-el-Mandab to reach Africa and returning to Arabia and Asia showed this pattern of loop migration around the Red Sea.

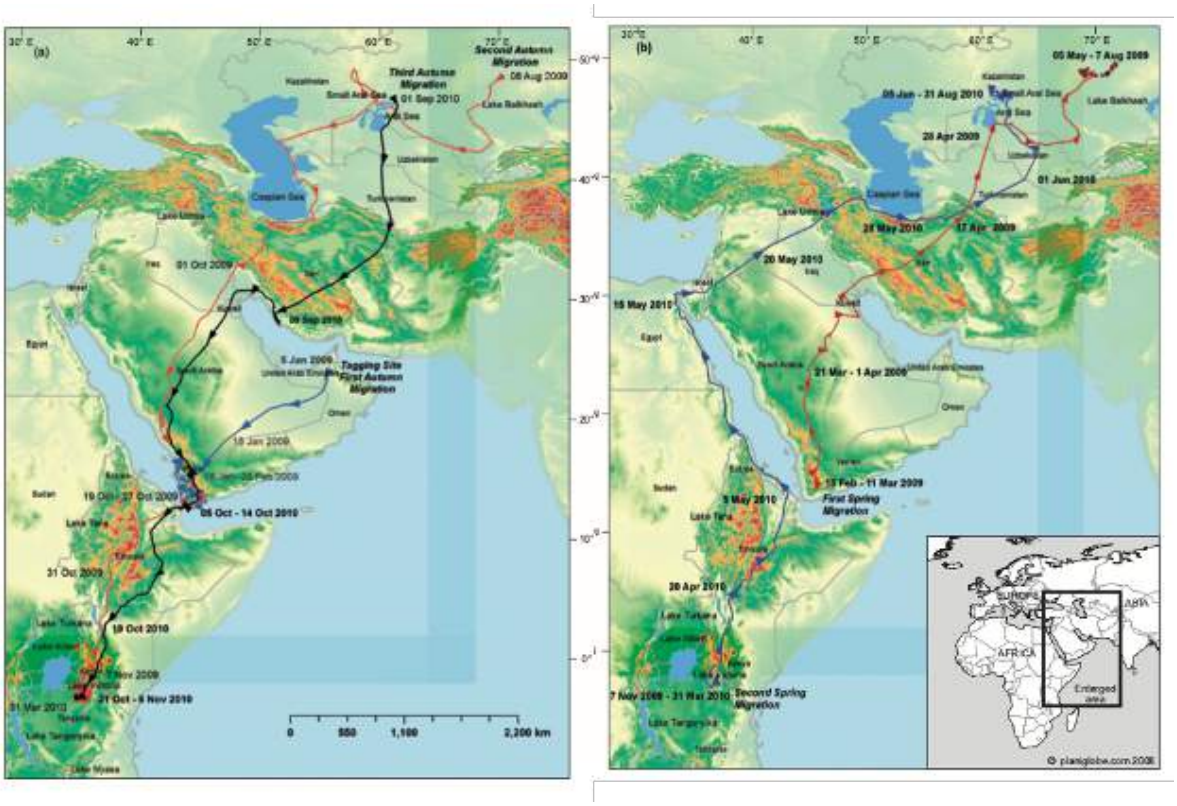
FIGURE 2. General conclusions about Steppe Eagle autumn migration routes between Eurasia and Africa, excluding individuals wintering in Arabia. Conclusions are based on our data from 16 satellite-tracked Steppe Eagles and other studies (Christensen and Sorensen 1989, Welch and Welch 1991a, Shirihai et al. 2000). It remains unclear why a considerable number of eagles make their way to Africa north of the Red Sea via Eilat and Suez (unless there is a migratory divide in the area indicated by a question mark).

FIGURE 3. General conclusions about Steppe Eagle spring migration routes between Africa and Eurasia, excluding individuals wintering in Arabia. Conclusions are based on our data from 16 satellite-tracked Steppe Eagles and other studies (Christensen and Sorensen 1989, Welch and Welch 1991a, Shirihai et al. 2000).

The above figure demonstrates the possibility for eagles to pass the Absheron peninsula during both migration seasons but depicts that it is more likely during the spring migration compared to the autumn migration.

[4] Meyburg, B. U., Paillat, P., & Meyburg, C. (2003). Migration routes of Steppe Eagles between Asia and Africa: a study by means of satellite telemetry. *The Condor*, *105*(2), 219-227.

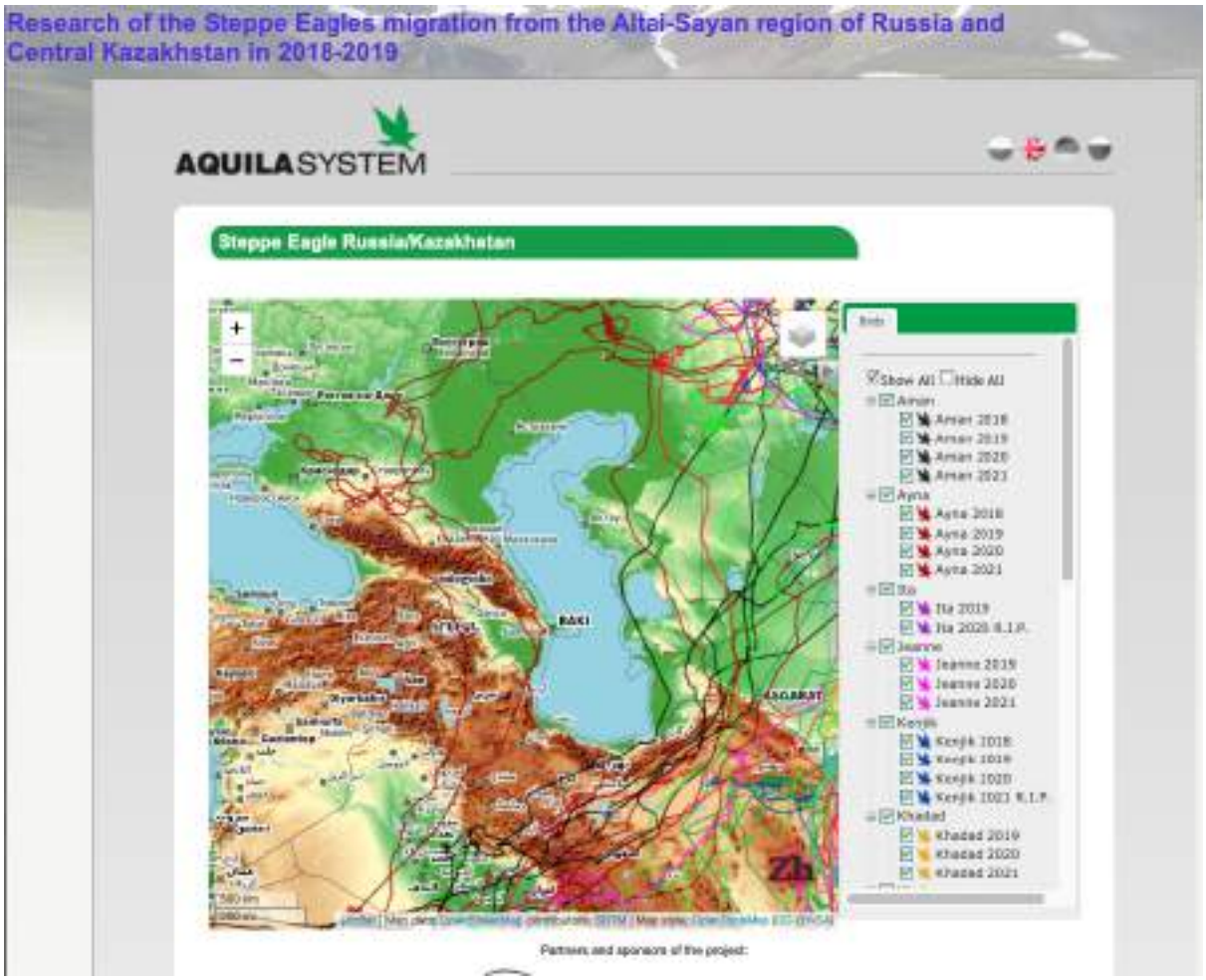
Figure 3-13 Steppe Eagle Migration Flight Paths[5]



The above figure provides an example from a tagged bird of utilizing the eastern side of the Caspian Sea for both spring and autumn migrations, bypassing the Absheron peninsula altogether, which seems to be a typical migration strategy for regional Steppe Eagle.

[5] Javed, S., Khan, S., Nazeer, J., Ahmed, S., Hammadi, A. A., & Hammadi, E. A. (2014). Satellite tracking of a young Steppe Eagle from the United Arab Emirates during two spring and autumn migrations. *Ostrich*, *85*(2), 131-138.

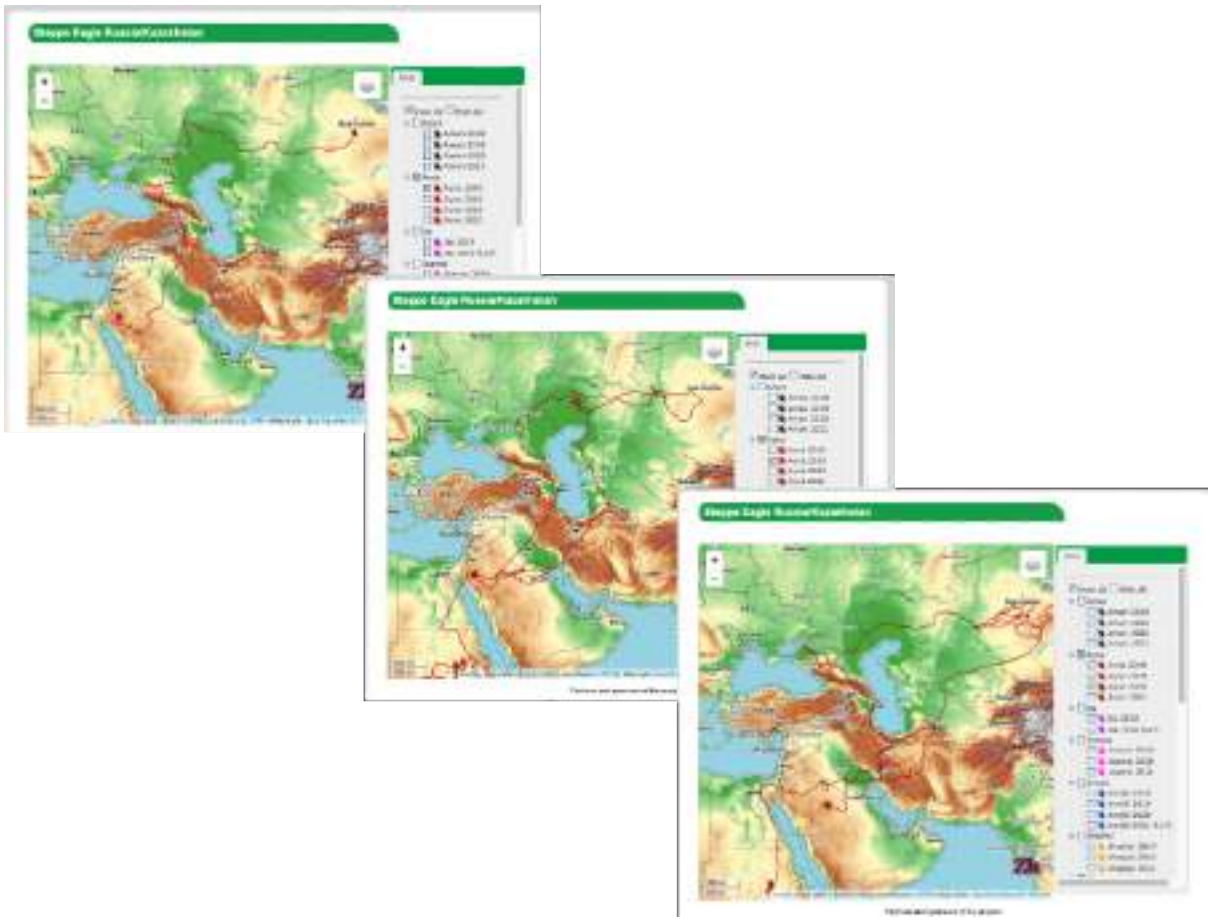
Figure 3-14 Steppe Eagle Migration Flight Paths[6]



The above figure showcases that the majority of tagged eagles preferred the eastern migratory pathway whilst a single individual (out of 14 tracked birds) utilizied the land between the Black Sea and the Caspian Sea, passing close to the Absheron peninsula during the northbound spring migration.

[6] http://rrrcn.ru/en/migration/se2018

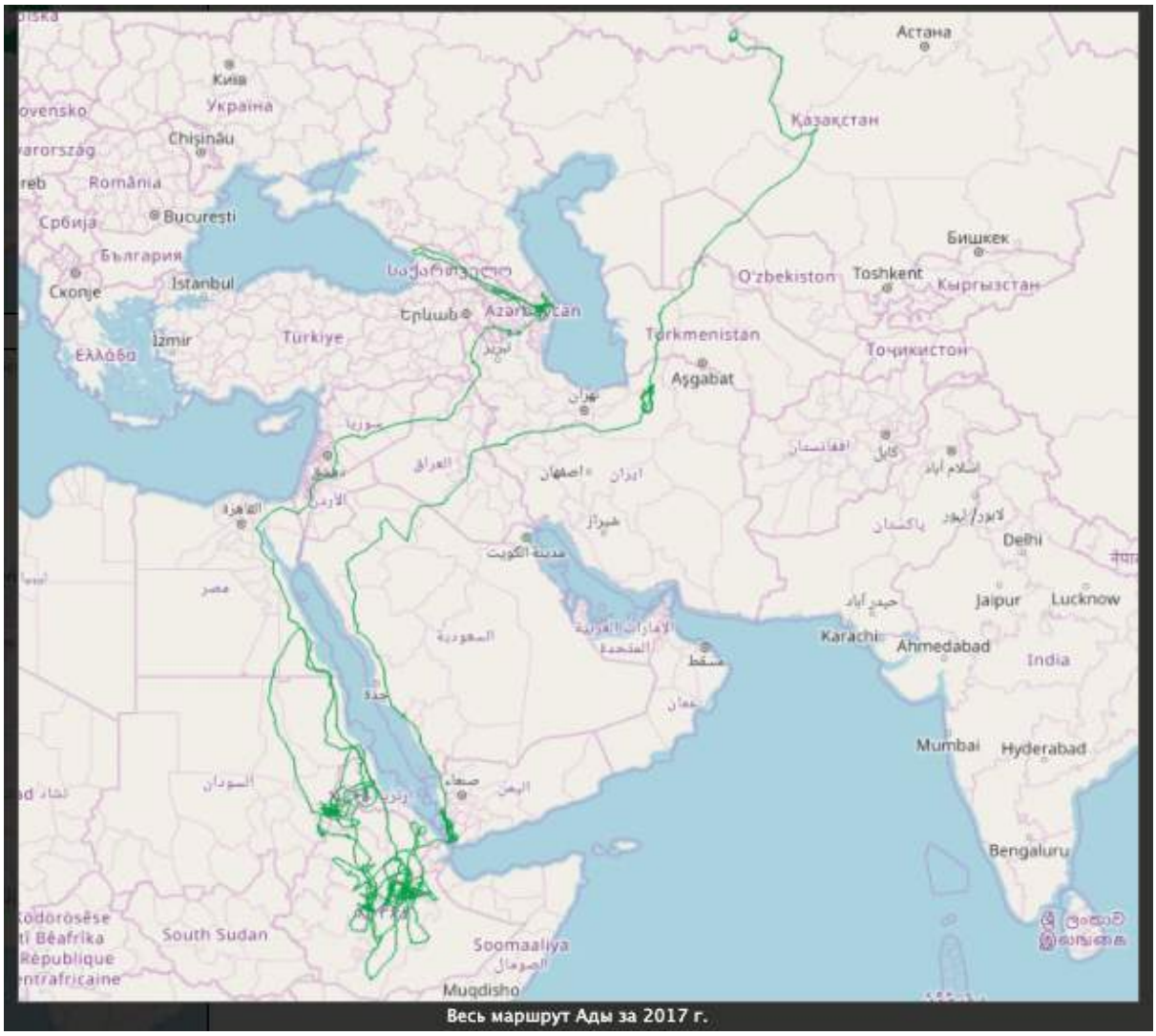
Figure 3-15 Steppe Eagle Migration Flight Paths[7]



The above figure illustrates the fidelity of individual birds to migratory pathways; the same individual used the clockwise migration path (heading south on the east of the Caspian sea, and heading north on the western coast of the Caspian Sea and passing the Absheron peninsula) for three consecutive years.

[7] http://rrrcn.ru/en/migration/se2018

Figure 3-16 Steppe Eagle Migration Flight Paths[8]



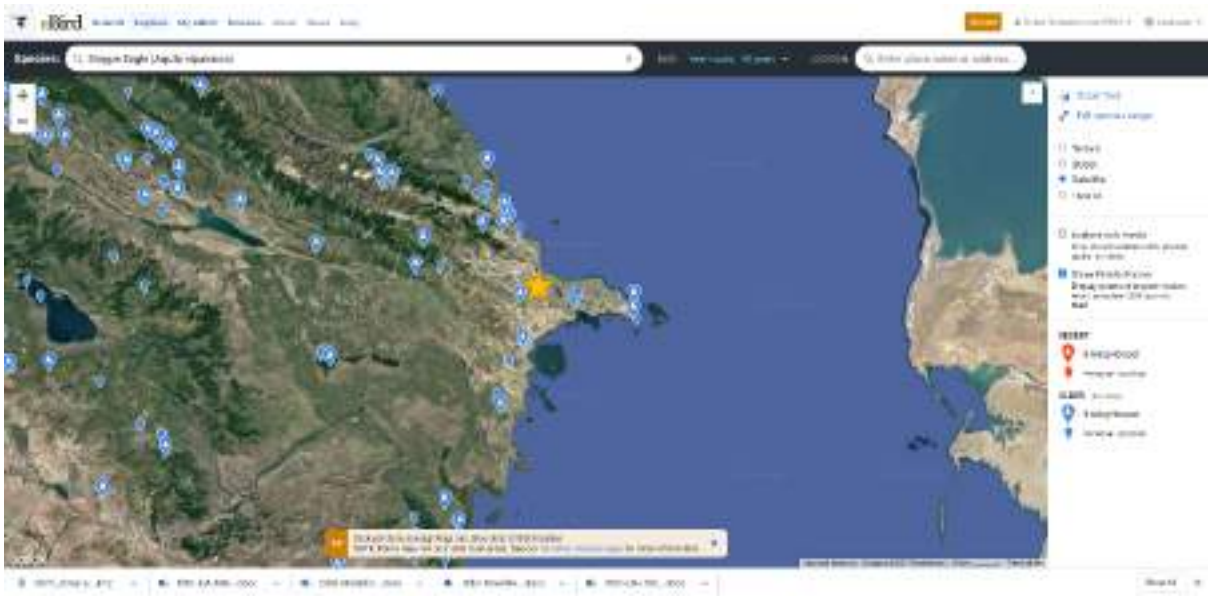
The above figure provides another example of an individual which utilized a clockwise strategy, (heading south on the east of the Caspian sea, and heading north on the western coast of the Caspian Sea and passing the Absheron peninsula) indicating that although it appears to be less preferred than the pathway fully to the east of the Caspian Sea, it is a commonly followed migration path by regional Steppe eagles.

[8] http://rrrcn.ru/en/migration/eagles2016/4

3.2.2.2.2 Public Records

The following records are available on Ebird, documenting Steppe Eagle in localities within 10km of the project site as well as throughout the region. However, recorded numbers are typically low (one or two individuals reported per sighting).

Figure 3-17 Steppe Eagle Ebird Records (Regional)



3.2.2.2.3 Project Surveys

Vantage Point Surveys were undertaken throughout the year as per Scottish Natural Heritage (SNH) Guidelines, to inform the Collision Risk Model (CRM) as well as the ESIA. The findings of these surveys included the following records of Steppe Eagle:

- Spring 2020, 43 individuals / Spring 2021, 12 individuals/ Spring 2022, 21 individuals;
- Summer 2021, 5 individuals;
- Autumn 2020, 5 individuals;
- Winter 2021, none;
- Summer 2021 OHTL, 3 individuals; and
- Autumn 2021 OHTL, 31 individuals

3.2.2.3 ANALYSIS

3.2.2.3.1 EAAA

The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. Instead, CHA generally follows the IUCN KBA standard, emphasizing areas that

function as significant migratory stopover sites and/or bottlenecks, with EAAAs delineated to include the Project footprint plus a reasonable buffer based on the scale of the species' typical daily or foraging movements, rather than its entire migratory route.

A provisional EAAA which includes the entirety of the project as well as a buffer of 10km has been put in place for migratory species, adjusted when there are specific habitat needs, stopover sites or other ecological features that should be included or excluded from the EAAA. For this species, the provisional EAAA with 10km buffer will be utilized.

3.2.2.3.2 Criticality

Global population is currently estimated at 50000-75000 individuals. Therefore 0.5% population threshold (lower range) would be 250 individuals.

The national population of Steppe Eagle is estimated at ~400 individuals.. A total of 89 observations were made over the course of four seasons, with as many as 23 observations recorded in a single season. These observations, at least within seasons, each likely represent a different individual bird, rather than multiple flights from individual birds, as Steppe Eagle are a passage migrant through the region.

Recalling that CH for migratory birds should be aligned with KBA / IBAs, it is important to note:

- The projects are not located in designated KBAs or IBAs
- The project is not considered to be a key bottleneck or stopover site
- The project area does not contain any particular habitat or features that would attract migrating Steppe Eagle
- Steppe Eagle are passing through the project airspace only
- Nearby IBAs, such as Alty Agach and Mount Gush-Gaya, have not identified Steppe Eagle as a trigger species, therefore this region does not satisfy the KBA standard (and thus CH standard) for migrating Steppe Eagles

Thus, it has been determined that the project does not meet criticality and does not qualify as Critical Habitat for Steppe Eagle.

However, the species is still to be considered as a priority biodiversity feature, and the ESIA shall include assessment of potential impacts arising from the construction and operation of the project wind farm and associated facilities, along with recommendations for management, mitigation and monitoring in line with EBRD and lender requirements and international best practice.

3.2.3 Egyptian Vulture

The Egyptian Vulture (*Neophron percnopterus*) is listed as **Endangered** on the IUCN Red List, due to rapid decline proposed to be caused by secondary poisoning (after consumption of livestock carcasses treated with the veterinary drug diclofenac). It is also a priority Edge species, ranking 75 in the top 100 bird species list.

3.2.3.1 ECOLOGY & CONSERVATION

Preferred habitat includes lowland and montane regions over open, often arid, country, but this species also scavenges at human settlements.

In addition to diclofenac poisoning, general disturbance and habitat loss are also listed as threats of concern, along with the risk for power line electrocution and wind turbine collision.

3.2.3.2 DISTRIBUTION

It is listed as a passage species as well as native breeder in the region. Although the migration strategy of the Egyptian Vulture differs between regions and sometimes between birds, the majority that breed in the project area can be expected to migrate southwards towards India or Africa to overwinter in warmer locales.

3.2.3.2.1 Project Surveys

Vantage Point Surveys were undertaken throughout the year as per Scottish Natural Heritage (SNH) Guidelines, to inform the Collision Risk Model (CRM) as well as the ESIA.

This species has been sighted as follows during the surveys undertaken to date:

- Spring 2020, 3 individuals / Spring 2021, 4 individuals/Spring 2022, 12 individuals;
- Summer 2020, 3 /Summer 2021, 10 individuals;
- Autumn 2020, none;
- Winter 2020-21, none;
- Summer 2021 OHTL, 21 individuals; and
- Autumn 2021 OHTL, 1 individual.

3.2.3.3 ANALYSIS

3.2.3.3.1 EAAA

The total EAAA for this species has been applied as all suitable habitat within the project boundaries as well as within a 5km buffer around the wind farm and OHTL. This should provide an adequate accounting of birds likely to regularly utilize the project area during breeding season.

3.2.3.3.2 Criticality

Baseline studies show that the Egyptian Vulture are present regularly in the project area, especially in summer, and have been recorded to breed in the area. The findings indicate that this species is unlikely to occur overwinter in the area.

Observations made during the baseline surveys are anticipated to be multiple records of a few breeding birds rather than individual birds.

Although a number of birds have been recorded during spring and summer, multiple sightings can be made of the same bird, especially true of a potential breeding pair that may be in the area for a longer duration and thus have the potential to be counted in multiple survey efforts.

The global population is 12,400-36,000 mature individuals (Source: Birdlife Datazone; IUCN), which means the CR/EN criticality threshold is 62.5 individuals.

The total national population is estimated at ~200. Therefore, the EAAA would need to include 30% of all Egyptian Vultures in Azerbaijan, which is considered unlikely.

Breeding status for this species has been studied in the Absheron area. The current total estimate is around 10 breeding pairs within the EAAA, which would roughly translate to 40-50 birds, still under the critical threshold (as *per comm*. with member of Azerbaijan Ornithological Society).

Thus, it has been determined that the project does not meet criticality and does not qualify as Critical Habitat for Egyptian Vulture.

However, the species is still to be considered as a priority biodiversity feature, and the ESIA shall include assessment of potential impacts arising from the construction and operation of the project wind farm and associated facilities, along with recommendations for management, mitigation and monitoring in line with EBRD and lender requirements and international best practice.

3.2.4 Saker Falcon

The Saker Falcon (*Falco cherrug*) is listed as **Endangered** on the IUCN Red List, due to a rapid population decline.

3.2.4.1 ECOLOGY

It uses copses or cliffs for nest sites and often occupies the old nests of other birds.

Saker Falcon hunts close to the ground in open terrain, combining rapid acceleration with high manoeuvrability, thus specialising on mid-sized diurnal terrestrial rodents (especially ground squirrels) of open grassy landscapes such as desert edge, semi-desert, steppes, agricultural and arid montane areas.

Major threats include electrocution, decreased prey availability, and offtake for falconry.

3.2.4.2 DISTRIBUTION

It is a **potential resident and winter visitor** through Azerbaijan, particularly the Absheron-Gobustan region. The below figure showcases the migratory routes, and shows the region as a core wintering area.

Figure 3-18 Distribution Map of Saker Falcon

3.2.4.2.1 Project Surveys

Vantage Point Surveys were undertaken throughout the year as per Scottish Natural Heritage (SNH) Guidelines, to inform the Collision Risk Model (CRM) as well as the ESIA. This species has been sighted as follows during the surveys undertaken to date:

- Spring 2020, none / Spring 2021, none/Spring 2022, none;
- Summer 2021, none;
- Autumn 2020, none;
- Winter 2020-21, none;
- Summer 2021 OHTL, 5 individuals; and
- Autumn 2021 OHTL, none.

3.2.4.3 ANALYSIS

3.2.4.3.1 EAAA

The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. Instead, CHA generally follows the IUCN KBA standard, emphasizing areas that function as significant migratory stopover sites and/or bottlenecks, with EAAAs delineated to include the Project footprint plus a reasonable buffer based on the scale of the species' typical daily or foraging movements, rather than its entire migratory route.

A provisional EAAA which includes the entirety of the project as well as a buffer of 10km has been put in place for migratory species, adjusted when there are specific habitat needs, stopover sites or other ecological features that should be included or excluded from the EAAA. For this species, the provisional EAAA with 10km buffer will be utilized.

3.2.4.3.2 Criticality

National population is estimated at ~50 to 100. Therefore, it is considered unlikely that the project site itself sees over 100 birds per year. Global population currently estimated at 12200-29800 individuals. Therefore 0.5% population threshold (lower range) would be 61 individuals. Given that no observations were made during VP surveys, and OHTL surveys saw a total of 5 observations (which may be multiple sightings of a single or few individual birds) and that the currently anticipated national population is only 50-100 birds in total, it is considered that the population in the project's EAAA would most likely not meet the threshold.

Thus, it has been determined that the project does not meet criticality and does not qualify as Critical Habitat for Saker Falcon.

However, the species is still to be considered as a priority biodiversity feature, and the ESIA shall include assessment of potential impacts arising from the construction and operation of the project wind farm and associated facilities, along with recommendations for management, mitigation and monitoring in line with EBRD and lender requirements and international best practice.

3.2.5 Eastern Imperial Eagle

The Eastern Imperial Eagle is listed as **Vulnerable** on the IUCN Red List, due to persistent declines driven by habitat loss and degradation, adult mortality through persecution and collision with powerlines, nest robbing and prey depletion.

3.2.5.1 ECOLOGY

It occurs in steppe, lowland and riverine forests and semi-deserts. It breeds in forests up to 1,000 m and also in steppe and agricultural areas with large trees, and on electricity pylons.

3.2.5.2 DISTRIBUTION

It is a resident within Azerbaijan and a passage migrant in the Absheron-Gobustan Region.

3.2.5.2.1 Project Surveys

Vantage Point Surveys were undertaken throughout the year as per Scottish Natural Heritage (SNH) Guidelines, to inform the Collision Risk Model (CRM) as well as the ESIA. This species has been sighted as follows during the surveys undertaken to date:

- Spring 2020, none / Spring 2021, 1 individual/Spring 2022, 1 individual;
- Summer 2021, none;
- Autumn 2020, none;
- Winter 2020-21, 1 individual;
- Summer 2021 OHTL, none; and
- Autumn 2021 OHTL, 13 individuals.

3.2.5.3 ANALYSIS

3.2.5.3.1 EAAA

The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. Instead, CHA generally follows the IUCN KBA standard, emphasizing areas that function as significant migratory stopover sites and/or bottlenecks, with EAAAs delineated to

include the Project footprint plus a reasonable buffer based on the scale of the species' typical daily or foraging movements, rather than its entire migratory route.

A provisional EAAA which includes the entirety of the project as well as a buffer of 10km has been put in place for migratory species, adjusted when there are specific habitat needs, stopover sites or other ecological features that should be included or excluded from the EAAA. For this species, the provisional EAAA with 10km buffer will be utilized.

3.2.5.3.2 Criticality

It is important to note that as a Vulnerable species, the criteria for Critical Habitat to be met is such that the loss of the population of the EAAA would be sufficient enough to merit up listing of the species to Endangered.

Recalling that CH for migratory birds should be aligned with KBA / IBAs, it is important to note:

- The projects are not located in designated KBAs or IBAs;
- The project is not considered to be a key bottleneck or stopover site;
- The project area does not contain any particular habitat or features that would attract migrating Eastern Imperial Eagle;
- Eastern Imperial Eagle are passing through the project airspace only; and
- Nearby IBAs, such as Alty Agach and Mount Gush-Gaya, have not identified Eastern Imperial Eagle as a trigger species, therefore this region does not satisfy the KBA standard (and thus CH standard) for migrating Eastern Imperial Eagles.

Therefore, it is considered that Criticality has not been triggered for this species.

However, given the sensitivity of this receptor, this species is classified as Priority Biodiversity Feature (PBF), as per the EBRD PR6 GN6 criteria.

4 BATS

A number of bat species were identified during CHA Screening that belong within Criterion ii and iii - threatened species, and migratory/congregating species, respectively.

No bat species which are considered globally or nationally threatened (IUCN CR/EN/VU) on the global level were found likely to occur during the initial Screening exercise, and none were documented from acoustic monitoring or mist netting.

Admittedly, the global population of bats is unknown definitively for most species in the region, and therefore the assessment against Criterion ii and iii is challenging. However, the relatively limited numbers of bats recorded from surveys indicate that both Criterion would be extremely unlikely to be triggered.

Regardless, all members of the order Chiroptera that were recorded, are considered as Priority Biodiversity Features for which NNL is required; in accordance with EBRD PR 6 and shall be treated as such in the ESIA and other biodiversity documentation.

Priority Biodiversity Features (all bat species confirmed or considered likely occurring within project EAAA[9]):

- Greater Horseshoe Bat
- Alcathoe Bat
- Brown Long-eared Bat
- Eastern Barbastelle
- Common Noctule
- Lesser Noctule
- Nathusius's Pipistrelle
- Kuhl's Pipistrelle
- Soprano Pipistrelle

[9] *A conservative EAAA for bats could be described as likely the project footprint, associated vertical airspace, and a buffer of up to 5km.*

- Savii's Pipistrelle
- Particolored Bat
- Serotine Bat

5 FLORA

A number of flora species were identified during CHA Screening that belong within Criterion ii and iv - threatened species, and range-restricted/endemic species, respectively.

5.1 Globally Threatened Species

The IUCN Red List is not considered comprehensive for flora species. However, it provides a starting point. The below provides a listing of all flora species of the Absheron-Gobustan region which are listed on the IUCN Red List of threatened species.

- Albanian Astragalus (*Astragalus albanicus*)
- Dodder Astragalus (*Astragalus cuscutae)*
- Marazinian Astragalus (*Astragalus maraziensis*)
- Caspian Bilacunaria (*Bilacunaria caspia)*
- Caspian Treacle Mustard (*Erysimum caspicum*)
- Theodor's Satin John's Wort (*Hypericum theodori*)
- Caspian Knotweed (*Polygonum caspicum*),
- Wedge-leaved Meadow Saxifrage (*Seseli cuneifolium*)
- Coastal Bastard Toad-flax (*Thesium maritimum*)

Of the above, **two species** were recorded to occur within the Area 1 WF Project Area during botanical surveying. See subsequent section for discussion on criticality assessment for these two species.

For all other IUCN listed endangered species (which have **not** been identified on site to date) they will be listed as Priority Biodiversity Features and will be assessed and managed accordingly in the ESIA and other biodiversity documentation (i.e. Biodiversity Action Plan).

5.1.1 Albanian Astragalus (*Astragalus albanicus*)

Albanian Astragalus was recorded during the 2021 botanical survey of the Laydown Area (LDA), as reported within the "Complete Botany Data Set" excel file provided by the surveying botanist. The number of individual specimens were not recorded, but the density and occurrence recorded on site was listed as "Rare" as per the DAFOR scale (Dominant, Abundant, Frequent, Occasional, Rare).

Albanian Astragalus can be found in grassland, rocky areas, dry clayey places, shingle slopes up to the middle mountain belt and the southern part of the Caspian seaside lowland.

The EAAA for the project site for this species has been defined on the basis of suitable contiguous mountain steppe habitat substrate and also including suitable lowland habitats where it has been recorded.

Figure 5-1 EAAA of *Astragalus albanicus* as per Habitat Requirements

The total size of the EAAA for *Astragalus Albanicus* is 1650 km^2. This species has a geographic range provided on IUCN Red List database which appears to be outdated. The full EOO as provided on the IUCN Red List Site does not include the project site. A cross-check of Kew Royal Botanic Gardens' Plants of the World Online database shows that this species is actually listed as a Transcaucasus regional species, with records from Georgia, Armenia, Azerbaijan and the transcauscaus portion of Russia. Note that on the POWO database, the synonym *Astrgaalus geminus* is the accepted synonym for *Astragalus albanicus.*

Figure 5-2 Distribution Map of *Astragalus albanicus* as per Kew RBG POWO Database

We have determined that the POWO database is more accurate and will be referring to this as the true EOO for the assessment of these species, as:

- The IUCN Red List states the assessment was done in 2006 (Astragalus albanicus), and it is written that it "Needs Updating".
- The species being found in our project site indicates that the original IUCN EOO is not correct as it excludes our project site.

This EOO based on the POWO database covers an area of approximately 500,000 km^2.

The total coverage of the EAAA for *Astragalus albanicus* (1650 km^2) constitutes 0.33 % of the EOO (500,000 km^2), which is under the threshold needed to trigger criticality.

This species will be considered as a PBF for assessment in the ESIA, with a NNL requirement as per the BAP; and will be subject to protection measures outlined those as well as other biodiversity documentation.

5.1.2 Theodor's Saint John's Wort (*Hypericum theodori*)

Theodor's Saint John's Wort was recorded during 2020 botanical surveys of the wind farm site, as reported within the "Complete Botany Data Set" excel file provided by the surveying botanist. The number of individual specimens were not recorded, but the density and occurrence recorded on site was listed as "Rare" as per the DAFOR scale (Dominant, Abundant, Frequent, Occasional, Rare).

Theodor's Saint John's Wort can be found in Shamakhi – Agsu and the middle mountain belt, 1,000 to 1,500 m altitude within habitat defined by limestone rocks and dry slopes.

The EAAA for the project site has been defined on the basis of suitable contiguous mountain steppe habitat substrate.

Figure 5-3 EAAA of *Hypericum theodori* as per Habitat Requirements

The total size of the EAAA for *Hypericum theodori* (which includes both WF projects in the same EAAA patch) is 981 km^2. This species has a geographic range provided on IUCN Red List database which appears to be outdated. The full EOO as provided on the IUCN Red List Site does not include the project site for both species. A cross-check of Kew Royal Botanic Gardens' Plants of the World Online database shows that this species is actually listed as a Transcaucasus regional species, with records from Georgia, Armenia, Azerbaijan and the transcaucasus portion of Russia.

Figure 5-4 Distribution Map of *Hypericum theodori* as per Kew RBG POWO Database

We have determined that the POWO database is more accurate and will be referring to this as the true EOO for the assessment of these species, as:

- The IUCN Red List states the assessment was done in 2008 (*Hypericum theodori),* and it is written that it "Needs Updating".
- The species being found in our project site would indicate the original IUCN EOO is not correct as it excludes our project site.

This EOO based on the POWO database covers an area of approximately 500,000 km^2.

The total coverage of the EAAA for *Hypericum theodori* (981 km^2) constitutes 0.19 % of the EOO (500,000 km2) which is under the threshold needed to trigger criticality.

This species will be considered as a PBF for assessment in the ESIA, with a NNL requirement as per the BAP; and will be subject to protection measures outlined those as well as other biodiversity documentation.

5.2 Nationally Threatened Species

The following lists all species located within the Azerbaijan RDB which were encountered at least once throughout the baseline surveys as reported within the "Complete Botany Data Set" excel file provided by the surveying botanist. No additional RDB species are considered likely to occur regularly as per the local expert(s).

The National RDB of Azerbaijan was not prepared following IUCN status categories and criteria. However, a national expert was consulted to "translate" the national RDB status of each

species into rough equivalency with IUCN status categories. In the present analysis, only species with national RDB status roughly equivalent to IUCN CR/EN/VU status are considered.

In order to trigger criticality under Criterion ii, the species should have a national status of EN or CR; and the EAAA must contain an important concentration and/or represent a core, vital habitat for the species national population.

Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.

Table 5-1 Nationally Threatened Flora

SPECIES	ABUNDANCE	RDB STATUS	CONCLUSION
Anabasis salsa (C.A.M.) Bnth.	Occasional	VU A2cd+3cd	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.
Anogramma leptophylla L.	Rare	EN B1ab (i,ii,iii,iv)+2ab (i,ii,iii,iv)	Transcontinental species See subsection below.
Astragalus bakuensis Bunge.	Rare	CR B1ab (i,ii,iii,iv,v)	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1 million km2. Total AOO unknown See subsection below.
Cotoneaster saxatilis Pojark.	Rare	EN B2ab(ii,iii,iv,v)	Considered as PBF due to Azer RDB listing. See subsection below.
Crocus speciosus M.B.Fl.	Rare	CR B1ab (i,ii,v)+2ab(i,ii,v)	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1 million km2. Total AOO unknown See subsection below.
Dianthus schemachensis Schishk.	Rare	EN B1ab (iii,iv,v) c(iii,iv)+2ab (ii)c(ii,iii)	Present in Azerbaijan, Armenia, Georgia, Russia and Turkey. Total EOO > 2 million km2. Total AOO unknown. See subsection below.
Ferula persica Willd	Occasional	VU A2c+3c; B1ab(iii)	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.

SPECIES	ABUNDANCE	RDB STATUS	CONCLUSION
Iris acutiloba C.A.Verz.	Rare	EN B2ab(iii) c(v)	Present in North Caucus, Transcaucus, Iran, Turmenistan, and Turkey. Total EOO > 2 million km2. Total AOO unknown. See subsection below.
Iris grossheimii Woronov.	Rare	VU2c+3cd	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.
Linaria schirvanica Fom.	Rare	VU B1 ab(i,ii,iii) +2ab(ii,iii,iv)	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.
Platanthera chlorantha Cust	Rare	VU D2	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.
Sternbergia fischeriana Roem.	Rare	EN A2c+3c; B2ab(i,ii,iii,v)	Present in Iran, Iraq, Lebanon-Syria, Tadzhikistan, Transcaucasus, Turkey, Turkmenistan, Uzbekistan Considered as PBF due to Azer RDB listing See subsection below.
Tulipa biebersteiniana Schult. et Schult.	Rare	VU A2c+3c	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.
Tulipa biflora Pall.	Rare	VU A2c+3c & LC	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.
(FROM OHTL ALINGMENT ONLY)			
Acantholimon schemahense A.Grossh.	frequent	VU D2	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.

5.2.1 *Anogramma leptophylla* L.

This species is listed as Endangered in the National Red Data Book. It grows in the shady forest formations and rock crevices of the lower and middle mountain belt. The EAAA was defined on the basis of suitable contiguous habitat substrate.

Figure 5-5 EAAA of *Anogramma leptophylla* as per Habitat Requirements

The geographic range of this species in Azerbaijan is presented below (extracted from Red Data Book):

It is worth noting that the project location does not fall within any of the known locations as per the Red Data Book map.

Whilst the Gobustan – Khizi region certainly supports this species, the distribution within this region is not considered a significant core national populaion, evidenced by the other known locations (the southern tip would be considered a more significant core population with a larger regional EOO and high AOO). The EAAA of the species associated with the project site is therefore not supporting a significant core population. Therefore this species will be treated as a PBF with NNL requirements in place.

5.2.2 *Astragalus bakuensis* Bunge

This species is listed as Critically Endangered in the National Red Data Book. It grows primarily in sandy dune habitat near the coastline. The EAAA was defined on the basis of suitable contiguous habitat substrate.

Figure 5-6 EAAA of *Astragalus bakuensis* as per Habitat Requirements

The geographic range of this species in Azerbaijan is presented below (extracted from Red Data Book):

The regional botanist has provided polygons indicating the core national population.

Figure 5-7 Core National Distribution of *Astragalus bakuensis*

The distribution within the EAAA associated with the project site is not supporting a significant core population. Therefore this species will be treated as a PBF with NNL requirements in place.

5.2.3 *Cotoneaster saxatilis* Pojark.

This species is listed as Endangered in the National Red Data Book. It is found growing on rocky cliffs amongst bushes. The EAAA was defined on the basis of suitable contiguous habitat substrate.

Figure 5-8 EAAA of *Cotoneaster saxatilis* as per Habitat Requirements

The geographic range of this species in Azerbaijan is presented below (extracted from Red Data Book):

The regional botanist has provided polygons indicating the core national population.

Figure 5-9 Core National Distribution of *Cotoneaster saxatilis*

The distribution within the EAAA associated with the project site is not supporting a significant core population. Therefore this species will be treated as a PBF with NNL requirements in place.

5.2.4 *Crocus speciosus* M.B.Fl.

This species is listed as Critically Endangered in the National Red Data Book. It grows in lowland to subalpine belt, among shrublands, forest edges, grassy slopes and ploughed fields. The EAAA was defined on the basis of suitable contiguous habitat substrate.

Figure 5-10 EAAA of *Crocus speciosus* as per Habitat Requirements

The geographic range of this species in Azerbaijan is presented below (extracted from Red Data Book):

It is worth noting that the project location does not fall within any of the known locations as per the Red Data Book map.

The distribution within the EAAA associated with the project site is not supporting a significant core population. Therefore this species will be treated as a PBF with NNL requirements in place.

5.2.5 *Dianthus schemachensis* Schishk.

This species is listed as Endangered in the National Red Data Book. This species can be found from the plain to the middle mountain belt, on dry, clayey and stony slopes, rocks, wormwood semi-deserts, and diverse herbaceous groups. The EAAA was defined on the basis of suitable contiguous habitat substrate.

Figure 5-11 EAAA of Dianthus schemachensis as per Habitat Requirements

The geographic range of this species in Azerbaijan is presented below (extracted from Red Data Book):

Whilst the Gobustan – Khizi region certainly supports this species, the distribution within this region is not considered a significant core national populaion, evidenced by the other known locations. The EAAA of the species associated with the project site is therefore not supporting a significant core population. Therefore this species will be treated as a PBF with NNL requirements in place.

5.2.6 *Iris acutiloba* C.A.Verz.

This species is listed as Endangered in the National Red Data Book. The EAAA was defined on the basis of suitable contiguous habitat substrate.

Figure 5-12 EAAA of *Iris acutiloba* as per Habitat Requirements

The geographic range of this species in Azerbaijan is presented below (extracted from Red Data Book):

It is worth noting that the project location does not fall within any of the known locations as per the Red Data Book map.

Whilst the Gobustan – Khizi region certainly supports this species, the distribution within this region is not considered a significant core national populaion, evidenced by the other known locations. The EAAA of the species associated with the project site is therefore not supporting a significant core population. Therefore this species will be treated as a PBF with NNL requirements in place.

The distribution within the EAAA associated with the project site is not supporting a significant core population. Therefore this species will be treated as a PBF with NNL requirements in place.

5.2.7 *Sternbergia fischeriana* Roem.

This species is listed as Endangered in the National Red Data Book.

It is found in the lower and middle mountain belt, on dry slopes.

The EAAA was defined on the basis of suitable contiguous habitat substrate.

Figure 5-13 EAAA of *Sternbergia fischeriana* as per Habitat Requirements

The geographic range of this species in Azerbaijan is presented below (extracted from Red Data Book):

It is worth noting that the project location does not fall within any of the known locations as per the Red Data Book map.

The distribution within the EAAA associated with the project site is not supporting a significant core population. Therefore this species will be treated as a PBF with NNL requirements in place.

5.2.8 *Alcea kujsariensis* Iljin.

This species is listed as Endangered in the National Red Data Book.

Alcea kusjariensis anis an Alpine Meadow species and the altitude of the project site and the type of habitat present is generally not considered suitable for this species. Therefore, it is considered that the project site may have supported vagrant individuals. With this in mind, it is not considered possible for the project site and EAAA to be supporting a 'significant national population' and criticality has not been triggered (although it will be treated as a PBF).

5.3 Range-restricted Species

Although the surveying botanist had identified a range of plants considered to be range-restricted from expert opinion, none of the species (other than the previously identified threatened species) originally identified during screening or surveying have EOOs of less than 50,000 km2. **Therefore, based on IFC designations, no plant species are considered to be "range restricted" and cannot trigger criticality**. However, all plant species noted by national botanist are being treated as PBFs and NNL will be in place accordingly.

Table 5-2 Flora Considered as Regional Endemics by Botanist

SPECIES	ABUNDANCE	STATUS
Astragalus bakuensis Bunge.	Rare	Regionally Endemic
Bellevalia fominii Woronow.	Rare	Regionally Endemic
Cousinia orientalis	Rare	Regionally Endemic
Dianthus schemachensis Schishk.	Rare	Regionally Endemic
Erodium schemachense A.Grossh.	Rare	Regionally Endemic
Gypsophila capitata M.B.	Rare	Regionally Endemic
Iris grossheimii Woronov.	Rare	Regionally Endemic
Linaria schirvanica Fom.	Rare	Regionally Endemic
Merendera eichleri Boiss.	Rare	Regionally Endemic
Onobrychis biebersteinii G.Sir.	Rare	Regionally Endemic
Onobrychis petraea Fisch.	Rare	Regionally Endemic

SPECIES	ABUNDANCE	STATUS
Pinus eldarica Medw.	Frequent	Regionally Endemic
Pyrus salicifolia Pall.	Occasional	Regionally Endemic
Silene grossheimii Schischk.	Rare	Regionally Endemic
Stachys fruticulosa M.BFl.	Occasional	Regionally Endemic
Thesium szowitsii A.DC.	Rare	Regionally Endemic
Acantholimon schemachense A.Grossh.	Abundant	Regionally Endemic
Astragalus schemachensis	Frequent	Regionally Endemic
Thymus hadzhievii A.Grossh.	Abundant	Regionally Endemic
Thymus karjaginii	Rare	Regionally Endemic

These species will be listed as Priority Biodiversity Features and will be assessed and managed accordingly in the ESIA and other biodiversity documentation (i.e. Biodiversity Action Plan).

6 TERRESTRIAL MAMMALS

A number of mammal species were identified during CHA Screening that belong within Criterion ii - threatened species.

The following lists all species of IUCN Red List CR/EN/VU status that were identified during the screening process, as well as any additional IUCN CR/EN/VU species that were recorded during the surveys.

6.1.1.1 GOITERED GAZELLE

This species is listed as VU on the IUCN Red List. It is also listed within the Azerbaijan RDB. An isolated population of Goitered Gazelle is distributed within the Absheron peninsula. Reintroduction programs in Azerbaijan have been ongoing.

This gazelle inhabits a wide range of semi-desert and desert habitats.

Two individuals were sighted during surveys.

The current global estimates for this species range from 42,000-49,000 individuals, with 4,000-6,000 estimated for Azerbaijan.

It is not considered likely that criticality would be triggered in the EAAA, which might be taken to include the project footprint and uninterrupted terrestrial habitat suitable for the Gazelle, extending approximately 20-30km from the project area.

However, this species will be listed as a Priority Biodiversity Feature and will be assessed and managed accordingly in the ESIA and other biodiversity documentation (i.e. Biodiversity Action Plan).

6.1.1.2 MARBLED POLECAT

This species is listed as VU on the IUCN Red Data List. It is also listed within the Azerbaijan RDB. This species is distributed throughout eastern Azerbaijan.

This mammal inhabits a wide range of semi-desert and desert habitats; it is a specialized predator, feeding mainly on desert and steppe rodents such as gerbils, and ground squirrels.

No individuals or spoor were recorded during the site surveys. However it is expected that this species could occur.

It is not considered likely that criticality would be triggered in the EAAA, which could be taken to include the project footprint and uninterrupted terrestrial habitat suitable for the polecat, extending approximately 20-30km from the project area.

However, this species will be listed as a Priority Biodiversity Feature and will be assessed and managed accordingly in the ESIA and other biodiversity documentation (i.e. Biodiversity Action Plan).

7 HERPTILES

A few species were identified during CHA Screening that belong within Criterion ii - threatened species.

The Mediterranean Spur-thighed Tortoise (*Testudo graeca*) is listed as VU on the IUCN List as well as on the Azerbaijan RDB. A total of 4 individuals were recorded during herpetology surveys. Multiple burrows and discarded pelvises were also identified. The EAAA for tortoise may be considered as the project footprint, extending a maximum of 2-5km buffer within contiguous suitable habitat. The species is quite far-ranging and although Vulnerable, it is unlikely that a sufficient population exists within the EAAA to trigger criticality.

However, this species will be listed as Priority Biodiversity Features and will be assessed and managed accordingly in the ESIA and other biodiversity documentation (i.e. Biodiversity Action Plan).

8 INVERTEBRATES

No globally or nationally threatened or endemic/range restricted invertebrate species were recorded during the surveys (nor were identified during screening).

9 CONCLUSION

9.1 Summary of Findings

No species have triggered Critical Habitat for the project.

9.2 Final List of PBFs

The complete list of Priority Biodiversity Features for Area 1 WF is as per the table below. The table includes PBF species that, though were not recorded during the baseline surveys, may possibly occur in the project area. These species are to be considered as PBFs and will be assessed accordingly in the ESIA, with mitigation provided to meet No Net Loss as required.

Table 9-1 Priority Biodiversity Features

Common Name	Globally Threatened	Nationally Threatened	Range-restricted (Regional Endemic)	Migratory/ Congregatory
Lesser White-fronted Goose	X			
Marbled Teal	X			
Common Pochard	X			
White-headed Duck	X			
Sociable Lapwing	X			
Black Stork		X		
Great White Pelican		X		
Dalmatian Pelican		X		
Osprey		X		
Pallas' Fish-eagle	X			
Bearded Vulture		X		
Steppe Eagle	X			
Egyptian Vulture	X			
Cinereous Vulture		X		

Common Name	Globally Threatened	Nationally Threatened	Range-restricted (Regional Endemic)	Migratory/ Congregatory
Eurasian Griffon Vulture		X		
European Honey-Buzzard		X		
Long-legged Buzzard		X		
Short-toed Snake-Eagle		X		
Greater Spotted Eagle	X			
Booted Eagle		X		
Imperial Eagle	X			
Golden Eagle		X		
White-tailed Eagle		X		
Saker Falcon	X			
Lanner Falcon		X		
Peregrine Falcon		X		
Red-footed Falcon	X			
Pallid Harrier		X		
Levant Sparrowhawk		X		
Black Kite		X		
Merlin		X		
Eurasian Hobby		X		
Lesser Kestrel		X		
Little Bustard		X		
European Turtle-Dove	X			
Goitered Gazelle	X			

Common Name	Globally Threatened	Nationally Threatened	Range-restricted (Regional Endemic)	Migratory/ Congregatory
Marbled Polecat	X			
Greater Horseshoe Bat				X
Geoffrey's Bat				X
Whiskered Myotis				X
Alcathoe Bat				X
Brown Long-eared Bat				X
Eastern Barbastelle				X
Common Noctule				X
Lesser Noctule				X
Nathusius's Pipistrelle				X
Kuhl's Pipistrelle				X
Soprano Pipistrelle				X
Savii's Pipistrelle				X
Particolored Bat				X
Serotine Bat				X
European Free-tailed Bat				X
Mediterranean Spur-thighed Tortoise	X			
Caspian Knotweed	X			
Dodder Astragalus	X			
Theodor's Saint John's Wort (Hypericum theodori)	X			
Marazinian Astragalus	X			
Albanian Astragalus	X			

Common Name	Globally Threatened	Nationally Threatened	Range-restricted (Regional Endemic)	Migratory/ Congregatory
Caspian Bilacunaria	X			
Caspian Treacle Mustard	X			
Coastal Bastard Toad-flax	X			
Wedge-leaved Meadow Saxifrage	X			
Anabasis salsa (C.A.M.) Bnth.		X		
Anogramma leptophylla L.		X		
Alcea kusjariensis Iljin.		X		
Acantholimon schemahense A.Grossh.		X		
Astragalus bakuensis Bunge.		X		
Astragalus schemachensis		X		
Cotoneaster saxatilis Pojark.		X		
Crocus speciosus M.B.Fl.		X		
Dianthus schemachensis Schishk.		X		
Ferula persica Willd		X		
Iris acutiloba C.A.Verz.		X		
Iris grossheimii Woronov.		X	X	
Linaria schirvanica Fom.		X	X	
Platanthera chlorantha Cust		X		
Sternbergia fischeriana Roem.		X		

Common Name	Globally Threatened	Nationally Threatened	Range-restricted (Regional Endemic)	Migratory/ Congregatory
Tulipa biebersteiniana Schult. et Schult.		X		
Tulipa biflora		X		
Acantholimon schemachense A.Grossh.			X	
Astragalus bakuensis Bunge.			X	
Bellevalia fominii Woronow.			X	
Cousinia orientalis			X	
Dianthus schemachensis Schishk.			X	
Erodium schemachense A.Grossh.			X	
Gypsophila capitata M.B.			X	
Merendera eichleri Boiss.			X	
Onobrychis biebersteinii G.Sir.			X	
Onobrychis petraea Fisch.			X	
Pinus eldarica Medw.			X	
Pyrus salicifolia Pall.			X	
Silene grossheimii Schischk.			X	
Stachys fruticulosa M.BFl.			X	
Thesium szowitsii A.DC.			X	

Common Name	Globally Threatened	Nationally Threatened	Range-restricted (Regional Endemic)	Migratory/ Congregatory
Thymus karjaginii			X	
Thymus hadzhievii			X	

9.3 Requirements for Development

As the project has listed a number of Priority Biodiversity Features, biodiversity management must be in place to ensure NNL for those features.

The Biodiversity Action Plan outlines the PBFs and the mitigation and monitoring strategies in place to adaptively manage PBF for NNL outcomes.

APPENDIX B – COLLISION RISK MODELLING (CRM) REPORT

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23 June, 2022 (updated 12J January, 2023)

Reem Jabr
Senior Environmental Consultant
Five Capitals Environmental and Management Consultancy
Sheikh Zayed Road, Dubai, UAE

Dear Ms. Jabr,

This memorandum contains Xenops Environmental, LLC (Xenops)' results for the bird collision risk modeling (CRM), covering the spring, 2022 bird Vantage Point survey period for the Area 1 Wind Energy Project (A1WEP), per the contract between Xenops and Five Capitals Environmental and Management Consultancy (5C). The A1WEP is a proposed 78 MW wind energy facility to be located in the eastern end of the Caucasus Mountains, roughly 3.5 km NNE of Gobustan, Azerbaijan. This analysis was performed using the Band (2012) model, following Scottish Natural Heritage (SNH) guidance, with collision avoidance rate parameters derived from an original review of technical literature, supported by expert judgment, where specific information on certain species of interest was not available in previously published studies. Input data for the modeling effort were provided by a team of local ornithologists led by Azerbaijani ornithologist, Elchin Sultanov (contracted by Ecoenergy, LLC) based on a total of 102 hours of Vantage Point (VP) survey data collected by Dr. Sultanov and his associates from March 17 through May 27, 2022 at a series of three vantage points that cover the site. This analysis was conducted based on a proposed turbine layout provided by 5C, consisting of 12 Envision EN 171- 6.5 wind turbines. This analysis, and the spring 2022 VP survey effort were prepared as a supplement to the 2020-2021 VP surveys and associated CRM analysis, the latter presented in a report from Xenops dated 16 June, 2022, and hereafter referred to as the "2020-2021 CRM report."

In summary, the spring 2022 CRM analysis resulted primarily in minor changes to the spring seasonal, as well as annual predicted collision rates for target bird species, confirming the general consistency of the newer results, which were based on marginally improved Vantage Point survey methodology, with the results of the 2020-2021 Vantage Point surveys. Some notable differences resulting from the spring 2022 Vantage Point surveys and associated CRM analysis include moderate increases in predicted collision risk for Egyptian, Cinereous, and Eurasian Griffon Vultures, and Lesser Kestrels, and a variety of mostly minor revisions to predicted collision rates of other species, some with increased risk and some with decreased risk relative to the earlier analysis. A detailed description of the methods and results of this analysis, including comparison of the spring 2022 results to the results from previous spring seasons, and resulting revision of annual predicted collision rates, is included below.

Please do not hesitate to contact me if you have any questions or comments regarding the analysis or results.

Sincerely,

Caleb Gordon, Ph. D.
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Spring 2022 Bird Collision Risk Modeling Analysis for the Area 1 Wind Energy Project

Caleb Gordon and Phoebe Gordon, Xenops Environmental, LLC

Introduction

Collision Risk Modeling (CRM) using the model developed and refined by William Band, has become a standard method in international industry practice for obtaining quantitative predictions of estimated fatality rates of birds at wind farms, where suitable field observation data from Vantage Point (VP) surveys have been collected, conforming to the data input assumptions of the Band (2012) model, and following the guidance for such surveys and subsequent CRM promulgated by Scottish Natural Heritage (SNH 2017). The Band CRM predicts the expected collision rates of particular bird species or species groups at a given wind farm based on the specific dimensions and physical characteristics of the rotors, the birds, the wind farm, and the density of bird flights recorded in the wind farm area. The latter parameter is termed "bird density" and is derived from the VP survey data, further differentiated with regard to the altitude of the birds' flights relative to the rotor swept altitudes of the rotors. While the basic mechanism of the Band model does not incorporate the ability or tendency of birds to alter their flight paths in response to the presence of wind turbines (avoidance), such behavior is believed to be a very important dynamic influencing actual bird collision rates at wind farms (Cook et. al. 2012), hence a "collision avoidance rate" parameter is typically applied for each bird species or species group when conducting CRM for wind farms using the Band model (Whitfield and Madders 2006a, 2006b, Garvin et al. 2011, Band 2012, SNH 2014, Whitfield and Urquhart 2015).

We conducted CRM using the Band (2012) model for the purpose of obtaining quantitative predictions of collision risk during the spring season for target bird species, based on their observed patterns of seasonal abundance and use of airspace at the site, as described by observations gathered during VP surveys. Xenops performed a previous CRM analysis (the 2020-2021 CRM) for each of five seasons of data covering a 1.5 year monitoring period that spanned 2020 and 2021, based on VP survey data gathered at the A1WEP site during the corresponding seasons. The current report presents a new CRM analysis of additional VP survey data that was collected at the A1WEP during the spring of 2022 (mid March through late May) as a supplement to the existing baseline information and the previous CRM analysis.

The VP survey protocol implemented in 2022 was intended to conform with SNH (2017) recommendations, in order to provide input data suitable for performing CRM with the Band (2012) model. The team was led by Azerbaijani ornithologist Elchin Sultanov, who enlisted other qualified local ornithologists to assist him in performing the VP surveys. Dr. Sultanov also led the 2020-2021 VP survey effort, which was also intended to conform with SNH guidance, but one difference between the spring 2022 VP survey effort and the earlier VP survey effort was that in 2022, prior to the initiation of surveys, Xenops prepared a terms of reference and conducted a conference call with Dr. Sultanov to ensure that the surveyors followed field methodologies that were aligned with SNH guidance, and the data input assumptions required for Band CRM. Another difference between the 2020-2021 VP surveys and the spring 2022 VP surveys was the specific location of the VP survey points, though in both survey efforts the points covered the same general project area. For the spring 2022 VP survey data, as with the

earlier data, Dr. Sultanov produced primary data spreadsheets for each individual VP survey, which Xenops used to extract the necessary input data on survey effort and bird flight activity. While this communication provides some assurance that the input data used for this CRM effort conform to SNH guidance and the model's input assumptions, the reliability of the results of this CRM is ultimately dependent on the qualifications and diligence of the field observers, as well as the veracity of their results, as they were reported to Xenops by the local ornithology team.

The species for which CRM was conducted included all "target" bird species that were observed at least once during the VP survey effort. Target species classification was developed by Xenops based on the following criteria:

- Tier 1 target species: Species classified as CR or EN on the IUCN Red List of Threatened Species[1]
- Tier 2 target species: Species with elevated conservation/protection status on the Azerbaijan Red List[2] but with status VU or lower on the IUCN global red list, plus any additional species with VU or NT status on the IUCN global red list[3].
- Tier 3 target species: any additional raptors, vultures, or owls

Table 1: Summary of conservation/sensitivity status and numbers of VP survey observations for each bird species observed during the spring season either in the 2020-2021 Vantage Point survey effort, or in the spring 2022 survey effort for the Area 1 Wind Energy Project. IUCN Conservation/protected status are as follows: EN = Endangered; VU = Vulnerable; NT = Near Threatened; (blank) = Least Concern (IUCN). Color-coding of species' project-sensitivity classification is as follows: pink = tier 1 target species; yellow = tier 2 target species; green = tier 3 target species.

Scientific Name	English Common Name	Azbjn status[4]	IUCN status[5]	Spring Vantage Point Survey Observations		
				2020	2021	2022
Neophron percnopterus	Egyptian Vulture	VU	EN	3	4	12
Aquila nipalensis	Steppe Eagle	CR	EN	43	12	21
Ciconia nigra	Black Stork	CR			1	
Pelecanus onocrotalus	Great White Pelican	VU		35		
Pelecanus crispus	Dalmatian Pelican	VU	NT	85		

[1] https://www.iucnredlist.org/ accessed 22 November, 2021

[2] Ministry of Ecology and Natural Resources of Azerbaijan Republic, and Institute of Zoology, National Academy of Science, 2013. Red Book of the Republic of Azerbaijan, Fauna, II Edition. National status categories are expressed in terms of the equivalent IUCN redlist categories, based on the translation/assessment of Azerbaijani ornithologist, Elchin Sultanov.

[3] Meadow Pipit (*Anthus pratensis*, IUCN NT) was the only species meeting tier 2 target species criteria that was excluded from the CRM exercise based on basic deficiencies in scientific understanding of collision avoidance and other pertinent parameters for songbirds

[4] Ministry of Ecology and Natural Resources of Azerbaijan Republic, and Institute of Zoology, National Academy of Science, 2013. Red Book of the Republic of Azerbaijan, Fauna, II Edition. National status categories are expressed in terms of the equivalent IUCN redlist categories, based on the translation/assessment of Azerbaijani ornithologist, Elchin Sultanov.

[5] IUCN Red List of Threatened Species, accessed 22 November, 2021

Scientific Name	English Common Name	Azbjn status[4]	IUCN status[5]	Spring Vantage Point Survey Observations		
				2020	2021	2022
Pernis apivorus	European Honey-Buzzard	VU			2	1
Aegypius monachus	Cinereous Vulture	EN	NT	3	149	105
Gyps fulvus	Eurasian Griffon	VU		45	104	97
Gyps or Aegypius	Unidentified Vulture[6]			10		12
Circaetus gallicus	Short-toed Snake-Eagle	CR			2	2
Hieraaetus pennatus	Booted Eagle	EN		4	3	1
Aquila heliaca	Imperial Eagle	EN	VU		1	1
Aquila chrysaetos	Golden Eagle	EN		6		7
Accipiter gentilis	Northern Goshawk	VU				1
Milvus milvus	Red Kite	EN				3
Milvus migrans	Black Kite	VU			4	5
Buteo rufinus	Long-legged Buzzard	EN		16	6	80
Falco naumanni	Lesser Kestrel	VU		111	46	151
Falco subbuteo	Eurasian Hobby	VU				2
Clanga pomarina	Lesser Spotted Eagle			7		1
Circus aeruginosus	Eurasian Marsh-Harrier			1	5	12
Circus cyaneus	Hen Harrier				4	5
Circus pygargus	Montagu's Harrier			7	1	
Accipiter nisus	Eurasian Sparrowhawk				2	
Buteo buteo	Common Buzzard			1	9	
Asio flammeus	Short-eared Owl				2	
Falco tinnunculus	Eurasian Kestrel			20	22	2

Model Input Data

Data inputs for the CRM analysis were derived from the results of the VP surveys, as well as various additional sources, depending on the type of information needed. Specific sources and pertinent assumptions for each type of input data used in the CRM are described further below.

Turbine and wind farm data

Specific physical parameters of the turbines, towers, and wind farm used for the CRM are based on the specifications and layout provided by 5C in November, 2021, and are detailed and explained in Table 2.

Table 2: Model input data on physical characteristics of the turbines, towers, and wind farm configuration used in the Collision Risk Modeling for the Area 1 Wind Energy Project, along with notes and explanations of each.

Parameter	Value(s) used in Modeling	Explanation
Turbine model	Envision EN 171/6.5	Provided by developer
# blades	3	from manufacturer's specifications
Rotation speed (rpm)	8.52	Average value provided by developer
Rotor radius (m)	85.5	from manufacturer's specifications

[6] The VP survey data included numerous observations ascribed to "vulture sp." that were likely either Eurasian Griffon or Cinerous Vulture. Therefore, we modeled collision risk in "Unidentified Vulture" using all of the "Vulture sp." observations shown in this table, plus all of the observations of Eurasian Griffon and Cinereous Vulture.

Parameter	Value(s) used in Modeling	Explanation
Hub height (m)	100	Provided by developer
Percent of time operational	Monthly values ranging from 63.8% to 84.6%	Project specific data not available, representative values taken from SOSS example
Maximum blade width (m)	4.5	From manufacturer's specifications
Pitch (degrees)	47.5	Mean value from manufacturer's specifications
# turbines	12	Provided by developer
latitude	40.5	Approximate midpoint of A1WEP area
Rotor swept altitude range (risk height, m)	14.5-185.5	Based on rotor diameter and hub height

Data on Physical and Observational Characteristics of Birds

In addition to bird densities derived from VP survey data, CRM using the Band model requires certain data on the physical and observational characteristics of each modeled species of bird. Input values used in the CRM analysis are presented in Table 3. As a general rule, data on physical dimensions of birds were derived from Cornell Lab of Ornithology's Birds of the World[7], while information specific to the VP survey observations, such as typical flight speeds, flight styles, and maximum effective radius of observation/identification were generated by Xenops using input from the local ornithologist, Elchin Sultanov, based on his observations at the site and expert judgment, as well as information from technical literature.

Table 3: Physical and observational characteristics of each bird species included within the Collision Risk Modeling analysis for the Area 1 Wind Energy Project for the spring season. Color-coding of species' project-sensitivity classification is as follows: pink = tier 1 target species; yellow = tier 2 target species; green = other (non-target) modeled species.

Scientific Name	English Common Name	Length (m)	Wingspan (m)	Flight type[8]	Flight speed (m/sec)[9]	Detection distance (km) [10]
Neophron percnopterus	Egyptian Vulture	0.62	1.6	Gliding	9.4	1
Aquila nipalensis	Steppe Eagle	0.7	1.9	Gliding	11.1	1
Ciconia nigra	Black Stork	0.98	1.5	Flapping	8.3	2
Pelecanus onocrotalus	Great White Pelican	1.58	2.93	Gliding	8.3	2
Pelecanus crispus	Dalmatian Pelican	1.7	3.28	Gliding	8.3	2
Pernis apivorus	European Honey-Buzzard	0.56	1.34	Gliding	11	0.5

[7] https://birdsoftheworld.org/bow/home, accessed 22-28 November, 2021

[8] The model does not permit inclusion of multiple flight styles, hence only the most prevalent flight type was used for each species, based on the judgment of Xenops

[9] Based on Xenops review and synthesis of flight speeds reported in Alerstam et. al. (2007), Mellone et. al. (2012), Nygård et. al. (2016) and extrapolated by Xenops for similarly-built species.

[10] Maximum reliable detection distance estimated for each species by Xenops based on information provided by E. Sultanov regarding the field survey conditions and procedures, and accounting not only for the distance at which each species could be reliably *observed*, but also the distance at which each species could be reliably *distinguished from other species* (identified)

Scientific Name	English Common Name	Length (m)	Wingspan (m)	Flight type[8]	Flight speed (m/sec)[9]	Detection distance (km) [10]
Aegypius monachus	Cinereous Vulture	1.1	2.73	Gliding	9.4	2
Gyps fulvus	Eurasian Griffon	1.01	2.52	Gliding	9.4	2
Gyps or Aegypius	Unidentified Vulture[11]	1.06	2.63	Gliding	9.4	2
Circaetus gallicus	Short-toed Snake-Eagle	0.66	1.77	Gliding	9.16	0.8
Hieraaetus pennatus	Booted Eagle	0.47	1.26	Gliding	9.16	0.8
Aquila heliaca	Imperial Eagle	0.71	1.9	Gliding	11.1	1
Aquila chrysaetos	Golden Eagle	0.77	2.03	Gliding	11.1	1
Accipiter gentilis	Northern Goshawk	0.58	1.06	Flapping	12.5	0.3
Milvus milvus	Red Kite	0.66	1.57	Gliding	9.5	0.5
Milvus migrans	Black Kite	0.55	1.37	Gliding	9.5	0.5
Buteo rufinus	Long-legged Buzzard	0.53	1.3	Gliding	11	0.5
Falco naumanni	Lesser Kestrel	0.31	0.66	Flapping	9	0.3
Falco subbuteo	Eurasian Hobby	0.32	0.76	Flapping	12.5	0.3
Clanga pomarina	Lesser Spotted Eagle	0.61	1.57	Gliding	9.16	0.8
Circus aeruginosus	Eurasian Marsh-Harrier	0.48	1.3	Gliding	8.3	0.4
Circus cyaneus	Hen Harrier	0.46	1.1	Gliding	8.3	0.4
Circus pygargus	Montagu's Harrier	0.44	1.13	Gliding	8.3	0.4
Accipiter nisus	Eurasian Sparrowhawk	0.34	0.67	Flapping	12	0.3
Buteo buteo	Common Buzzard	0.46	1.23	Gliding	11	0.5
Asio flammeus	Short-eared Owl	0.38	1.03	Flapping	8.3	0.3
Falco tinnunculus	Eurasian Kestrel	0.31	0.68	Flapping	9	0.3

VP Survey Data Used to Derive Bird Density

Bird density inputs in CRM analysis represent the density of birds flying within the surveyed area at any given moment in time. These values are calculated based on the observations gathered during the VP surveys, and then further differentiated based on the percent of such flights that occurred within "risk height" equivalent to the range of altitudes swept by the turbines to be installed. The instantaneous survey area is based on the species-specific maximum effective detection radius at a single VP (Table 3). The duration of the bird's flight within the observation area was recorded by the observers for all species. A summary of the VP survey data used to calculate bird density values in the spring 2022 season is presented in Table 4. Note that this table shows cumulative values for the season, but in the CRM analysis, the data are broken down further by month.

[11] The VP survey data included numerous observations ascribed to "vulture sp." that were likely either Eurasian Griffon or Cinerous Vulture. Therefore, we modeled collision risk in "Unidentified Vulture" using bird measurements and characteristics intermediate between Eurasian Griffon and Cinereous Vulture.

Table 4: Observational data from the Vantage Point surveys used to derive bird density inputs for the spring 2022 Collision Risk Modeling analysis for the Area 1 Wind Energy Project. For all species, the total duration of observations was equivalent to the total of 102 hours, or 5310 minutes of VP survey effort conducted at the Project during the spring 2022 season. Color coding of species by project-specific priority level follows that of Table 1.

Scientific Name	English Common Name	Number of observations[12]	% at rotor swept height[13]	Total bird minutes	Effective survey area (km^2)
Neophron percnopterus	Egyptian Vulture	12	100	36	3.142
Aquila nipalensis	Steppe Eagle	21	100	51	3.142
Pernis apivorus	European Honey-Buzzard	1	100	0.75	0.7854
Aegypius monachus	Cinereous Vulture	105	96.19	1197	12.57
Gyps fulvus	Eurasian Griffon	97	98.97	461.1	12.57
Gyps + Aegypius	"Vulture sp"	214[14]	95.98	1672	12.57
Circaetus gallicus	Short-toed Snake-Eagle	2	100	2.5	2.011
Hieraaetus pennatus	Booted Eagle	1	100	1	2.011
Aquila heliaca	Imperial Eagle	1	100	1	3.142
Aquila chrysaetos	Golden Eagle	7	100	11.75	3.142
Accipiter gentilis	Northern Goshawk	1	100	0.75	0.2827
Milvus milvus	Red Kite	3	100	3	0.7854
Milvus migrans	Black Kite	5	100	13	0.7854
Buteo rufinus	Long-legged Buzzard	80	86.25	120.2	0.7854
Falco naumanni	Lesser Kestrel	151	83.44	387.6	0.2827
Falco subbuteo	Eurasian Hobby	2	100	1.75	0.2827
Clanga pomarina	Lesser Spotted Eagle	1	100	2	2.011
Circus aeruginosus	Eurasian Marsh-Harrier	12	91.67	21.17	0.5027
Circus cyaneus	Hen Harrier	5	100	15	0.5027
Falco tinnunculus	Eurasian kestrel	2	100	1.333	0.2827

Collision Avoidance Parameter

Published, validated collision avoidance (CA) parameters are not available for most of the target species we modeled at the A1WEP, yet the CA parameter is well-known to be a very important parameter in

[12] Based on methodological discussions with the lead field ornithologist, all observations reported during the VP surveys were assumed to be within the species-specific maximum reliable detection radius and included in the CRM analysis.

[13] Bird flight altitudes were recorded in the field in terms of altitude relative to the observer, rather than the typical practice for VP survey data to be used in Band CRM, which is to record altitude of the bird over the ground directly below the bird. Therefore, to calculate the % of bird flights that overlapped rotor swept altitude of the turbines (14.5-185.5m above ground level), we either applied quantitative adjustments to the reported flight altitudes, or accepted them at face value on a point by point basis, depending on the ground elevation (above sea level) at the survey point in relation to the nearest turbines. If the elevation of the survey point was intermediate between the elevations of the nearby turbine and the magnitude of the difference in elevation between the VP survey point and any of the proximate turbines exceeded 25% of the maximum installed blade tip height (185.5m therefore 25% = 46m), then all bird flights reported from that point were assigned as "risky" flights, potentially overlapping the rotor swept zone.

[14] Inclusive of all spring VP observations of *Gyps fulvus*, *Aegypius monachus*, and "vulture sp."

Band CRM analysis, with outcomes very sensitive to slight variation in CA (Cook et. al., 2012). For each species included within the CRM analysis for the A1WEP, we developed a "most realistic" CA parameter value, bounded by a "conservative" low parameter estimate, and a high estimate, reflecting an upper bound, based on a comprehensive review of available literature, interpreted with species- and site-specific information. The values used for each species are presented in Table 5, and then a brief explanation/justification is presented for each species or species group below.

Table 5: Collision avoidance parameters used for each bird species included within any of the Collision Risk Modeling analyses for the Area 1 Wind Energy Project for the spring season (see text for explanation and justification). Color coding of species by project-specific sensitivity categories follows that of previous tables.

Scientific Name	English Common Name	Lower bound value	Most realistic value	Upper bound value
Neophron percnopterus	Egyptian Vulture	0.99	0.9958	0.999
Aquila nipalensis	Steppe Eagle	0.981	0.9958	0.999
Ciconia nigra	Black Stork	0.95	0.99	0.995
Pelecanus onocrotalus	Great White Pelican	0.95	0.99	0.995
Pelecanus crispus	Dalmatian Pelican	0.95	0.99	0.995
Pernis apivorus	European Honey-Buzzard	0.978	0.995	0.999
Aegypius monachus	Cinereous Vulture	0.98	0.99	0.995
Gyps fulvus	Eurasian Griffon	0.98	0.99	0.995
Gyps + Aegypius	Unidentified Vulture[15]	0.98	0.99	0.995
Circaetus gallicus	Short-toed Snake-Eagle	0.981	0.9958	0.999
Hieraaetus pennatus	Booted Eagle	0.981	0.9958	0.999
Aquila heliaca	Imperial Eagle	0.981	0.9958	0.999
Aquila chrysaetos	Golden Eagle	0.981	0.9958	0.999
Accipiter gentilis	Northern Goshawk	0.99	0.995	0.999
Milvus milvus	Red Kite	0.98	0.992	0.9985
Milvus migrans	Black Kite	0.98	0.992	0.9985
Buteo rufinus	Long-legged Buzzard	0.978	0.995	0.999
Falco naumanni	Lesser Kestrel	0.873	0.969	0.999
Falco subbuteo	Eurasian Hobby	0.995	0.998	0.999
Clanga pomarina	Lesser Spotted Eagle	0.981	0.9958	0.999
Circus aeruginosus	Eurasian Marsh-Harrier	0.95	0.99	0.999
Circus cyaneus	Hen Harrier	0.95	0.99	0.999
Circus pygargus	Montagu's Harrier	0.95	0.99	0.999
Accipiter nisus	Eurasian Sparrowhawk	0.99	0.995	0.999
Buteo buteo	Common Buzzard	0.978	0.995	0.999
Asio flammeus	Short-eared Owl	0.95	0.99	0.995
Falco tinnunculus	Eurasian Kestrel	0.873	0.969	0.999

Eagles (genera Aquila, Circaetus, Hieraaetus, Clanga)

The Golden Eagle (*Aquila chrysaetos*) has been the subject of several empirical research studies designed toward the objective of defining the most appropriate Collision Avoidance (CA) parameters for

[15] The VP survey data included numerous observations ascribed to "vulture sp." that were likely either Eurasian Griffon or Cinerous Vulture. Therefore, we modeled collision risk in "Unidentified Vulture" using all of the "Vulture sp." observations, plus all of the observations of Eurasian Griffon and Cinereous Vulture.

use with this species in modeling its risk of colliding with wind turbines, using the Band CRM. The low bound CA parameter value of 0.981 selected for the present analysis, corresponds to the lowest CA value estimated for Golden Eagles in Whitfield and Madders (2006a), based on their analysis of data from wind farms in California. This value is likely to be conservative, underestimating the true extent of Golden Eagles' avoidance of collisions with wind turbines, as Whitfield and Madders (2009) suggested that a CA parameter of 0.99 is "precautionary" for this species. The CA value selected as "most likely" for the present analysis, 0.9958, corresponds to the mean adjusted CA estimate for Golden Eagles at the Altamont Wind Facility in California, USA, presented by Whitfield and Madders (2009), and is very close to the median CA value for this species of 0.995, presented by Whitfield and Madders (2006a). The upper bound CA value of 0.999 for Golden Eagles was selected based on the upper bound of 100% CA presented for Golden Eagles by Whitfield and Madders (2006a). No published estimates of CA were available for Steppe Eagle (*Aquila nipalensis*), or Imperial Eagle (*Aquila heliaca*), so we used the same CA values for this species as we did for Golden Eagle, based on the similarity of these congeneric species in terms of size, shape, behavior, and flight morphology. Although the Short-toed Snake-Eagle (*Circaetus gallicus*), Booted Eagle (*Hieraaetus pennatus*), and Lesser Spotted Eagle (*Clanga pomarina*) are in different genera and are smaller than *Aquila* eagles, we also used the same CA values for these species in the absence of published, species-specific CA estimates. This choice was justified both based on the generally similar ecology and flight morphology of *Aquila* and these slightly smaller eagles, and also based on a similar proportion of wind turbine collision events for Short-toed Snake-Eagles in relation to numbers of flights, and "at risk" flights, in a three year aggregate dataset from 13 wind farms in northern Spain, discussed in Whitfield and Madders (2006a).

Egyptian Vulture

No published CA values were available for this species. However, the aggregate dataset from northern Spain discussed in Whitfield and Madders (2006a) indicates that Egyptian Vulture has a strong tendency to avoid collisions with wind turbines, as zero collisions were detected in datasets containing 134 observations of Egyptian Vultures at wind farms, including 30 "at risk" flights. Based on this evidence, and the overall similar size and flight morphology between Egyptian Vulture and *Aquila* eagles, we applied the same CA values for Egyptian Vulture as we did for the *Aquila* eagles, with the exception of applying the slightly higher lower bound value of 0.99, described as a "precautionary" CA value for Golden Eagles by Whitfield and Madders (2009).

Eurasian Griffon and Cinereous Vulture

To represent the CA values for these two closely-related, morphologically and ecologically similar species, we used a range of values following the recommendations of Vasilakis et. al. (2016), who generated empirically-based estimates of 0.99 and 0.995 CA parameters for Cinereous Vulture in a study comparing flight behaviors and wind farm collision fatality rates at wind farms in eastern Mediterranean Europe. We used these two values as the median and upper bound CA values, respectively for these two species. Vasilakis et. al. (2016) also suggested that the CA value for Cinereous Vulture could be as low as 0.98 taking into account potential sources of error and uncertainty in their analysis, hence we used this as our lower bound CA parameter value for these two vulture species.

Kestrels (genus Falco)

Kestrels (including both Eurasian and Lesser kestrels, *F. tinnunculus* and *F. naumanni*, respectively) are characterized by a set of characteristics associated slower flight in relation to most other falcons, including lower wing loading, and a tendency to hunt for ground-based prey from perches, or using

hovering flights. These characteristics likely lead to a lower tendency to avoid collisions with turbines, and hence, greater susceptibility to collisions, compared to the faster falcons. We represented both kestrel species in the model using a range of CA values developed for the congeneric American Kestrel (*Falco sparverius*) based on the analysis of Whitfield and Madders (2006a), with 0.873 representing the lower bound CA value, 0.969 representing the median value, and 0.999 substituted for 1 (100% avoidance), as the upper bound CA value.

Eurasian Hobby

The Eurasian Hobby (*Falco subbuteo*) is a fast-flying falcon species that may be differentiated from the kestrels in possessing a set of morphological and behavioral features associated with high speed flight. These characteristics, including high wing loading, and hunting behavior consisting of high speed flights in pursuit of aerial prey in open environments, likely correlate to similar collision avoidance tendencies in this species, though species-specific collision avoidance parameters have not been published for it. To fill this gap, we used values empirically derived by Whitfield and Madders (2006a) for the ecologically similar Prairie Falcon (*Falco mexicanus*), with 0.995 representing the low bound, 0.998 representing the median CA value, and 0.999 substituted for 1 (100% avoidance) as the upper bound.

Harriers (genus Circus)

We used published CA values empirically derived for the Hen Harrier (*Circus cyaneus*) to represent the collision avoidance tendencies of all four of the *Circus* species observed during the VP surveys at the A1WEP (*C. aeruginosus, C. cyaneus, C. pygargus, C. macrourus*). In their review of wind farm impacts to Hen Harriers, Whitfield and Madders (2006b) concluded that a CA value of 0.95, used by some authors for this species, was "too low," suggesting that a value of 0.99 was "more realistic." Accordingly, we used the value of 0.95 as a lower bound CA value, and 0.99 as our most likely value. We used a CA value of 0.999 as the upper bound for modeling harrier collision risk in our analysis, corresponding to the median CA value for *Circus cyaneus* presented in Whitfield and Madders (2006a).

Accipiter Hawks

No published CA values were available for the Eurasian Sparrowhawk (*Accipiter nisus*) or Northern Goshawk (*A. gentilis*). For the purpose of the modeling effort, we based our hypothesized CA values for these species on very limited data on susceptibility of *Accipiter* species (including *Accipiter nisus*) to wind farm collisions presented in Whitfield and Madders (2006a), as well as the results of Garvin et al. (2011), which indicated a very strong tendency for *Accipiter* hawks to avoid collisions with wind turbines (100% avoidance), selecting CA values of 0.99, 0.995, and 0.999 to represent the low bound, most likely, and upper bound parameter estimates, respectively.

Buzzards and Honey-Buzzards

No published CA values were available for the two species of *Buteo* buzzard observed during the VP survey effort, or for the European Honey-buzzard (*Pernis apivorus*). To represent collision avoidance in these species, we relied on CA values empirically derived for a New World *Buteo* species, the Red-tailed Hawk (*Buteo jamaicensis*) suggested by Whitfield and Madders (2006a), as follows: lower bound – 0.978; median value (or "most likely" in our analysis) – 0.995; upper bound – 0.999 (substituted for the value of 1, or 100% avoidance, presented as the upper bound CA value by Whitfield and Madders [2006a]).

Milvus Kites

To represent the CA parameter for the Black Kite (*Milvus migrans*) and the Red Kite (*Milvus milvus*), we used a series of published parameter estimates and recommendations that have been developed for the latter species. SNH (2010) recommends a CA value of 0.98 for Red Kite, and we used this as the lower bound CA value for both kite species in our analysis. The value of 0.992 that we used as the most realistic CA parameter value is based on the empirical result of Urquhart and Whitfield (2016) for Red Kite. The upper bound value of 0.9985 is based on the data presented in Whitfield and Madders (2006a) regarding fatality rate in proportion to passage rates of Red Kites at wind farms.

Pelicans, Stork, and Owl

No published CA values were available for the Great White Pelican (*Pelecanus onocrotalus*), Dalmatian Pelican (*Pelecanus crispus*), Black Stork (*Ciconia nigra*), or Short-eared Owl (*Asio flammeus*), hence we based our hypothesized CA values for these species on the recommendations of Cook et. al. (2012), who suggested using 0.95, 0.99, and 0.995 as a range of CA values to represent species for which no species-specific information is available. We note that all of these birds are large-bodied birds, and that this set of CA values is generally similar to, and a bit conservative in relation to CA values that have been empirically derived for a variety of morphologically similar species, such as swans, geese, and cormorants (Cook et. al. 2012).

Results and Conclusions

The results of the spring 2022 CRM analysis for the A1WEP are presented alongside the spring season results from the 2020-2021 CRM analysis in Table 6, and the impact on the estimated total annual predicted collision rates is illustrated in Table 7. Key differences between the spring seasonal results across years are discussed below. Readers are referred to the 2020-2021 CRM report for additional detail regarding collision risk predictions for other seasons of the year.

Overall, the spring 2022 results were generally consistent with the previous springs' results, suggesting that the earlier effort was generally successful in implementing SNH-aligned VP survey methodology, in spite of the fact that the locally-based ornithology team did not receive specific training and guidance in such methodologies from experienced experts until prior to the spring 2022 surveys. The spring 2022 results did include some notable differences from the earlier springs' results in a few cases, with implications for collision risk management for the A1WEP. Some of these differences may reflect inter-annual variation, while others are likely attributable to marginal improvements in the VP survey methodology in 2022, compared with previous springs. As a default, we suggest that the spring 2022 results are more accurate, and should be weighted more heavily than the results from previous springs, based on the marginal methodological improvements implemented in the spring 2022 survey effort. The key differences between the spring 2022 CRM results and the results from previous springs are bulleted and briefly discussed below:

- There was an increase in predicted Egyptian Vulture risk in the spring 2022 data set relative to the 2020-2021 data set. This increase was reflected in both the number of spring observations, which roughly tripled in 2022 relative to both of the previous springs (Table 1), and the predicted collision risk (Tables 6, 7). This difference indicates between-year variation in the utilization of the site by this species, but the overall magnitude of the difference is small

enough that the change could be due to stochastic factors, and does not elevate the overall level of project-related risk for this species substantially.

- There was no spring migratory passage of Black Stork, Great White Pelican, or Dalmatian Pelican observed in spring 2022, whereas a small numbers of individuals or flocks were observed for these three species during spring of 2020 or 2021. This result likely reflects natural inter-annual variation in the extent of migratory passage of this species through the site. This had the effect of removing all collision risk for these species, as none of them were observed at the site in other seasons. In reality, the occasional and variable level of spring migratory passage of these species does indicate that they are exposed to some collision risk from the Project.

- Increased activity and collision risk of Eurasian Griffon and Cinereous Vultures was recorded in 2022 compared with the previous two spring seasons. The numbers of total observations of these species (Table 1) roughly paralleled the change in predicted collision risk (Tables 6, 7), suggesting that the difference was largely attributable to natural factors, as opposed to methodological artifacts. This was true for the composite category "Cinereous + Griffon," which includes both the single species data and the data on unidentified vultures pertaining to one or the other of these species. The overall magnitude of this increase was minor, and the numbers of observations in spring 2022 were very similar to those recorded in spring 2021 (spring 2020 was considerably lower), indicating that the spring 2022 data do not indicate a substantial or qualitative change to the overall level of predicted collision risk for these species.

- Two species of migratory raptors saw significantly higher spring migratory passage in spring 2022 compared with spring of 2020 or 2021, Long-legged Buzzard and Eurasian Marsh-Harrier. This result likely reflects natural inter-annual variation in the extent of migratory passage of these species through the site, as it is reflected both in the number of observations (Table 1) and the predicted collision risk (Tables 6, 7). Several additional less common spring migrants also appeared either for the first at the Project site in Spring 2022, or had relatively small increases in spring collision risk in 2022, compared with previous springs, including Northern Goshawk, Red Kite, Black Kite, Hen Harrier, and Eurasian Hobby. For all of these species with the exception of Long-legged Buzzard and possibly Eurasian Marsh-Harrier, the increase in number of individuals was small enough that the changes could be attributable to stochastic factors, as opposed to any biologically "real" increase in spring migrant activity. Furthermore, there were also some spring migrants observed in previous springs that were not observed in spring 2022, including Montagu's Harrier, Eurasian Sparrowhawk, Common Buzzard, and Short-eared Owl.

- There was a moderate (24%) increase in the predicted spring collision risk for Lesser Kestrel in spring 2022 compared with previous springs. This difference appears to be attributable to a modest, natural increase in flight activity of this species at the site, compared with previous springs, as opposed to a methodological artifact, as the trend in total numbers of observations

(Table 1) parallels the change in predicted collision risk (Tables 6, 7). In a parallel analysis for the associated Khizi 3 Wind Energy Project, the spring 2022 collision risk prediction increased substantially in relation to the prediction based on the 2020-2021 spring data, largely because of a 40-fold increase in the average duration of each individual flight. In the A1WEP datasets, the average duration of Lesser Kestrels did increase roughly 5-fold, from an average of 0.555 minutes per observation to an average of 2.5 minutes per observation, but the magnitude of this increase was dampened by a small decrease in the % of flights that occurred within the rotor swept zone. As noted for this, and other species in the context of the Khizi 3 Wind Farm spring 2022 CRM, where it seems to have had a much larger impact, the change in the way bird flight durations were compiled in 2022 relative to previous years is considered a marginal improvement in the methodology, and the default assumption should be that the 2022 CRM predictions are more accurate. This is because flight durations for many tier 2 target species and non-target species were not recorded by the field observers, and had to be estimated *a posteriori* for the 2020-2021 data sets based on the assumption that each observation consisted of a bird flying across the diameter of the observation area at its characteristic flight speed. By contrast, the duration of all bird flights recorded during the spring 2022 VP survey effort were estimated and recorded directly by the observers.

Table 6: Estimated rates of collisions per **spring** season for bird species at the Area 1 Wind Energy Project, predicted by Band Collision Risk Modeling analysis, under a range of Collision Avoidance (CA) parameter values (see Table 5 for specific CA values for each species, and see text for explanation and justification of each). Color coding of species by project-specific sensitivity level follows that of other tables. Only the species observed during the spring VP survey efforts are included in the table.

English Common Name	2020-2021 CRM analysis						Spring 2022 CRM analysis					
	Using lower bound CA value		Using most realistic CA value		Using upper bound CA value		Using lower bound CA value		Using most realistic CA value		Using upper bound CA value	
	Collisions/ spring	Years to 1 spring collision	Collisions/ spring	Years to 1 spring collision	Collisions/ spring	Years to 1 spring collision	Collisions/ spring	Years to 1 spring collision	Collisions/ spring	Years to 1 spring collision	Collisions/ spring	Years to 1 spring collision
Egyptian Vulture	0.0101	99	0.00425	235	0.00101	990	0.133	7	0.0558	17	0.0133	75
Steppe Eagle	0.256	3	0.0564	17	0.0134	74	0.292	3	0.0645	15	0.0154	65
Black Stork	0.00138	724	0.000275	3630	0.000138	7240	0	N/A	0	N/A	0	N/A
Great White Pelican	0.474	2	0.0948	10	0.0474	21	0	N/A	0	N/A	0	N/A
Dalmatian Pelican	1.19	<1	0.239	4	0.119	8	0	N/A	0	N/A	0	N/A
European Honey-Buzzard	0.00839	119	0.00191	523	0.000381	2620	0.0252	39	0.00573	174	0.00115	872
Cinereous Vulture	0.222	4	0.111	9	0.0556	17	1.29	<1	0.643	1	0.321	3
Eurasian Griffon	0.422	2	0.212	4	0.106	9	0.897	1	0.449	2	0.224	4
Cinereous + Griffon[16]	0.677	1	0.339	2	0.169	5	2.16	<1	1.08	<1	0.541	1
Short-toed Snake-Eagle	0.00579	172	0.00128	781	0.000305	3270	0.0294	34	0.00649	154	0.00155	647
Booted Eagle	0.0245	40	0.00543	184	0.00130	769	0.00414	241	0.000915	1090	0.000218	4590

[16] Collision risk for "Cinerous + Griffon" was calculated based on all flights of Eurasian Griffon, plus all flights of Cinereous Vulture, plus all flights ascribed to "vulture sp.," hence it is larger than the sum of Eurasian Griffon plus Cinereous Vulture due to the addition of the "vulture sp." data, but it should not be added to the collision risk of the other vulture species, as it already includes all collision risk for Eurasian Griffon and Cinereous Vulture.

Spring 2022 Bird Collision Risk Modeling Analysis for the Area 1 Wind Energy Project

English Common Name	2020-2021 CRM analysis						Spring 2022 CRM analysis					
	Using lower bound CA value		Using most realistic CA value		Using upper bound CA value		Using lower bound CA value		Using most realistic CA value		Using upper bound CA value	
	Collisions/ spring	Years to 1 spring collision	Collisions/ spring	Years to 1 spring collision	Collisions/ spring	Years to 1 spring collision	Collisions/ spring	Years to 1 spring collision	Collisions/ spring	Years to 1 spring collision	Collisions/ spring	Years to 1 spring collision
Imperial Eagle	0.00191	523	0.000422	2360	0.000100	10000	0.00296	338	0.000654	1520	0.000156	6420
Golden Eagle	0.0178	56	0.00394	253	0.00094	1060	0.0478	20	0.0106	94	0.00252	397
Northern Goshawk	0	N/A	0	N/A	0	N/A	0.0124	80	0.00621	161	0.00124	805
Red Kite	0	N/A	0	N/A	0	N/A	0.0951	10	0.0380	26	0.00713	140
Black Kite	0.0298	33	0.0119	84	0.00223	448	0.564	1	0.226	4	0.0423	23
Long-legged Buzzard	0.622	1	0.141	7	0.0283	35	2.59	<1	0.588	1	0.118	8
Lesser Kestrel	37.7	<1	9.22	<1	0.297	3	116	<1	28.4	<1	0.916	1
Eurasian Hobby	0	N/A	0	N/A	0	N/A	0.0340	29	0.0136	73	0.00679	147
Lesser Spotted Eagle	0.0666	15	0.0147	68	0.00351	284	0.0192	52	0.00423	236	0.00101	991
Eurasian Marsh-Harrier	0.208	4	0.0416	24	0.00416	240	3.05	<1	0.611	1	0.0611	16
Hen Harrier	0.0968	10	0.0194	51	0.00194	515	0.648	1	0.130	7	0.0130	77
Montagu's Harrier	0.288	3	0.0576	17	0.00576	173	0	N/A	0	N/A	0	N/A
Eurasian Sparrowhawk	0.0170	58	0.00853	117	0.00170	588	0	N/A	0	N/A	0	N/A
Common Buzzard	0.0575	17	0.0131	76	0.00262	381	0	N/A	0	N/A	0	N/A
Short-eared Owl	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Eurasian kestrel	4.91	<1	1.20	<1	0.0387	25	1.09	<1	0.267	3	0.00862	116

Table 7: Estimated rates of collisions per **year** for bird species at the Area 1 Wind Energy Project, predicted by Band Collision Risk Modeling analysis, under a range of Collision Avoidance (CA) parameter values (see Table 5 for specific CA values for each species, and see text for explanation and justification of each), and comparing values that use the two different spring data sets (2020-2021 vs 2022). Color coding of species in the left portion of the table refers to project-specific sensitivity level and follows that of other tables. Color coding in the columns with revised annual collision rate predictions based on the spring 2022 data set refers to the change relative to the previously presented value based on the spring 2020-2021 data set, as follows: blue = decreased risk in the newer analysis; no shading = no change; orange = increased risk in the newer analysis.

	Using Spring 2020-2021 data set						Using Spring 2022 data set					
	Using lower bound CA values for each season		Using most realistic CA values for each season		Using upper bound CA values for each season		Using lower bound CA values for each season		Using most realistic CA values for each season		Using upper bound CA values for each season	
English Common Name	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision
Egyptian Vulture	0.0270	37	0.0114	87	0.00270	370	0.150	6	0.0629	15	0.0150	66
Steppe Eagle	0.319	3	0.0706	14	0.0168	59	0.356	2	0.0787	12	0.0187	53
Little Bustard	1.18	<1	0.236	4	0.118	8	1.18	<1	0.236	4	0.118	8
Black Stork	0.00138	724	0.000275	3630	0.000138	7240	0	N/A	0	N/A	0	N/A
Great White Pelican	0.474	2	0.0948	10	0.0474	21	0	N/A	0	N/A	0	N/A
Dalmatian Pelican	1.19	<1	0.239	4	0.119	8	0	N/A	0	N/A	0	N/A
European Honey-Buzzard	0.674	1	0.153	6	0.0306	32	0.690	1	0.157	6	0.0313	31
Cinereous Vulture	0.672	1	0.336	2	0.168	5	1.74	<1	0.867	1	0.434	2
Eurasian Griffon	0.863	1	0.432	2	0.217	4	1.34	<1	0.670	1	0.335	2
Cinereous + Griffon[17]	2.04	<1	1.02	<1	0.511	1	3.52	<1	1.76	<1	0.882	1

[17] Collision risk for "Cinerous + Griffon" was calculated based on all flights of Eurasian Griffon, plus all flights of Cinereous Vulture, plus all flights ascribed to "vulture sp.," hence it is larger than the sum of Eurasian Griffon plus Cinereous Vulture due to the addition of the "vulture sp." data, but it should not be added to the collision risk of the other vulture species, as it already includes all collision risk for Eurasian Griffon and Cinereous Vulture.

Spring 2022 Bird Collision Risk Modeling Analysis for the Area 1 Wind Energy Project

English Common Name	Using Spring 2020-2021 data set						Using Spring 2022 data set					
	Using lower bound CA values for each season		Using most realistic CA values for each season		Using upper bound CA values for each season		Using lower bound CA values for each season		Using most realistic CA values for each season		Using upper bound CA values for each season	
	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision
Short-toed Snake-Eagle	0.0359	27	0.00793	126	0.00189	529	0.0595	16	0.0131	76	0.00313	319
Booted Eagle	0.0452	22	0.00996	100	0.00238	420	0.0247	40	0.00548	182	0.00131	764
Imperial Eagle	0.00793	126	0.00175	571	0.000417	2390	0.00898	111	0.00198	504	0.000473	2110
Golden Eagle	0.0351	28	0.00755	132	0.00185	540	0.0651	15	0.0144	69	0.00343	291
Northern Goshawk	0	N/A	0	N/A	0	N/A	0.0124	80	0.00621	161	0.00124	805
Red Kite	0	N/A	0	N/A	0	N/A	0.0951	10	0.0380	26	0.00713	140
Black Kite	0.0298	33	0.0119	84	0.00223	448	0.564	1	0.226	4	0.0423	23
White-tailed Eagle	0.0271	36	0.0136	73	0.00122	819	0.0271	36	0.0136	73	0.00122	819
Long-legged Buzzard	1.77	<1	0.403	2	0.0805	12	3.74	<1	0.849	1	0.170	5
Lesser Kestrel	252	<1	61.5	<1	1.99	<1	330	<1	80.8	<1	2.60	<1
Eurasian Hobby	0	N/A	0	N/A	0	N/A	0.0340	29	0.0136	73	0.00679	147
Lesser Spotted Eagle	0.0708	14	0.0157	63	0.00373	268	0.0234	42	0.00517	193	0.00195	514
Eurasian Marsh-Harrier	1.17	<1	0.234	4	0.0234	42	4.02	<1	0.803	1	0.102	9
Hen Harrier	0.0968	10	0.0194	51	0.00194	515	0.648	1	0.130	7	0.0130	77
Montagu's Harrier	0.288	3	0.0576	17	0.00576	173	0	N/A	0	N/A	0	N/A
Eurasian Sparrowhawk	0.0297	33	0.0149	67	0.00298	335	0.0127	78	0.00637	156	0.00127	787
Common Buzzard	0.0755	13	0.0172	58	0.00343	291	0.018	55	0.00409	244	0.000818	1220

English Common Name	Using Spring 2020-2021 data set						Using Spring 2022 data set					
	Using lower bound CA values for each season		Using most realistic CA values for each season		Using upper bound CA values for each season		Using lower bound CA values for each season		Using most realistic CA values for each season		Using upper bound CA values for each season	
	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision	Collisions/ year	Years to 1 collision
Short-eared Owl	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Eurasian Kestrel	6.66	<1	1.63	<1	0.0524	19	2.84	<1	0.693	1	0.0223	44

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