Khizi 3 Wind Farm Project
Khizi Region
Azerbaijan

Environmental & Social Impact Assessment (ESIA) - 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
CH	Critical Habitat
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 **Khizi 3 WF Project, which was disclosed on May 2022**. Following disclosure additional studies were undertaken as follows:

- Additional Vantage Point 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, Griffon Vulture and Bearded 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 bat 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

2.1.1 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).

2.1.2 Lenders Requirements

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.

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 (CHA)

'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 Critical Habitat Assessment 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 six potential species of concern merited further review, Steppe Eagle, Greater Spotted Eagle Eastern Imperial Eagle, Saker Falcon, Egyptian Vulture, and Sociable Lapwing.
- Stage Two: CHA Final Report, which investigated in-depth information on the identified species of concern 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 (PBF)
- 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 PBF in the project area (refer to CHA and/or baseline section 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 (AoI)

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 a 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 is located on the hilltops of Greater Caucasian Mountain range in the Khizi region, approximately 55km Northwest of Baku. The project falls within a mix of grassland and semi-desert ecosystems as well as high mountain ecosystems.

Figure 3-1 Project Ecosystems

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*. 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

CHEMONICS INTERNATIONAL INC.

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	*Pseudovesicaria 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	*Calligonum bakuense*	I
Liliaceae	*Fritillaria grandiflora*	I
	Lilium ledebourii	I
Gentianaceae	*Gentiana legodechiana*	R
Iridaceae	*Iris acutiloba*	En
	Iris camillae	I
	Iris iberica	I
Hyacinthaceae	*Ornithogalum arcuatum*	I
	Ornithogalum hyrcanum	I
Pinaceae	*Pinus brutia var. elderica*	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; and
- Each segment of the OHTL alignment was surveyed along the proposed routes using transects 12-25 km.

Coverage & Timing/Dates:

- Khizi WF area (including BOP, laydown and substation) was surveyed from May to June, 2020;

- Khizi BOP area was surveyed from April 21 till May 07, 2021;
- Khizi - Yashma OHTL Route (12km) was surveyed in June 2021;
- Khizi-Pirakashkul OHTL Route (25km) was surveyed in June and July 2021; and
- Pirakashkul-Gobu OHTL Route (25km) was surveyed in June 2021.

RESULTS

The below provides a summary of the findings.

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:

- Pockets of forest habitat, as well as
- Modified agricultural habitat.

Figure 3-2 Habitat Map

WF,BOP and Laydown Area (LDA) Flora

A little under 400 flora species were recorded in the Wind Farm area, BoP and the LDA. One IUCN Endangered species; Theodor's Saint John's Wort *Hypericum theodori* was recorded during both 2020 botanical surveys of the wind farm site and 2021 surveying botanical surveys of the footprint of the balance of plant, as reported within the "Complete Botany Data Set" excel file provided by the surveying botanist throughout the proposed wind farm area.

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). The CHA analysis found that this species does not trigger criticality, however it is listed as Priority Biodiversity Feature (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 species were recorded and 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.
Acantholimon schemahense A.Grossh.	Frequent	RDB VU D2 Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown;
Alcea kusjariensis Iljin.	Occasional	RDB EN B1ab(v)+B2ab(v)	Present in Azerbaijan, Armenia and Georgia. Total EOO > 200,000 km2. Total AOO unknown.
Anthemis fruticulosa M.B.Fl.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1 million km2. Total AOO unknown
Artemisia caucasica Willd.	Frequent	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Romania, Moldova, Bulgaria, Ukraine, Crimea and

Species	Abundance	Status	Notes
			Turkey. Total EOO > 2 million km2. Total AOO unknown.
Atropa caucasica Kreyer.	Rare	RDB VU B1b(i,iii)	Considered as PBF with NNL requirements.
Astragalus caspicus	Frequent	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran, Iraq and Turkey. Total EOO > 2 million km2. Total AOO unknown
Astragalus denudatus Stev.	Frequent	Regional Endemic	Present in Azerbaijan, Armenia, Georgia and Iran. Total EOO > 1 million km2. Total AOO unknown
Centaurea reflexa Lam.	Occasional	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran and Turkey. Total EOO > 2 million km2. Total AOO unknown
Cerastium multiflorum C.A.Mey.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown
Cirsium strigosum M.B.Fl.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran, and Turkey. Total EOO > 2 million km2. Total AOO unknown
Cladochaeta candidissima M.B.	Rare	RDB VU A2c+3c; B1ab(i,iii,iv)	Considered as PBF with NNL requirements.
Cousinia orientalis	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown
Draba incompta Stev.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown
Erodium schemachense A.Grossh.	Rare	Regional Endemic	Present in Azerbaijan and Georgia. Total EOO < 150,000 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
Hypericum karjagini Rzazade.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Iran, and Turkey. Total EOO > 2 million km2. Total AOO unknown
Hypericum theodori Woron.	Rare	IUCN EN 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.
Linaria schirvanica Fom.	Rare	RDB VU B1 ab(i,ii,iii) +2ab(ii,iii,iv) Regional Endemic	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.

Species	Abundance	Status	Notes
			Total EOO > 2 million km2. Total AOO unknown
Minuartia caucasica Ad.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Russia and Turkey. Total EOO > 2 million km2. Total AOO unknown
Nonea rosea M.B.	Occasional	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Russia, Iran, Iraq and Turkey. Total EOO > 3 million km2. Total AOO unknown.
Onobrychis vaginalis C.A.Mey	Occasional	Regional Endemic	Present in Azerbaijan, Armenia and Georgia. Total EOO > 200,000 km2. Total AOO unknown.
Ophrys caucasica G.Woron.	Rare	RDB VU A2c+3c	Considered as PBF with NNL requirements.
Orchis caspia Trautv.	Rare	RDB VU A2c+3cd	Considered as PBF with NNL requirements.
Ornithogalum schmalhausenii Albov.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Russia and Turkey. Total EOO > 2 million km2. Total AOO unknown
Pulsatilla albana (Stev.)	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Russia and Iran. Total EOO > 2 million km2. Total AOO unknown
Punica granatum L.	Rare	RDB VU B1ab (i,ii,iii,v)+2ab(i,ii,iii,v)	Considered as PBF with NNL requirements.
Ranunculus crassifolius A.Grossh.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Russia and Turkey. Total EOO > 1 million km2. Total AOO unknown
Serratula transcaucasica D.Sosn.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Georgia, Russia, Iran, Iraq and Turkey. Total EOO > 3 million km2. Total AOO unknown.
Taraxacum praticolum Schischk.	Rare	Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown
Thymus hadzhievii A.Grossh.	Abundant	Regional Endemic	Endemic to North Caucus. EOO < 200,000 km2. AOO unknown;
Viola caucasica Kolenat.	Rare	RDB EN B2ab(ii,iii,iv)	EOO includes North Caucasus, Transcauacsus. EOO > 200,000 km2; AOO unknown.

Figure 3-3 Locations of Azerbaijan Species of Interest

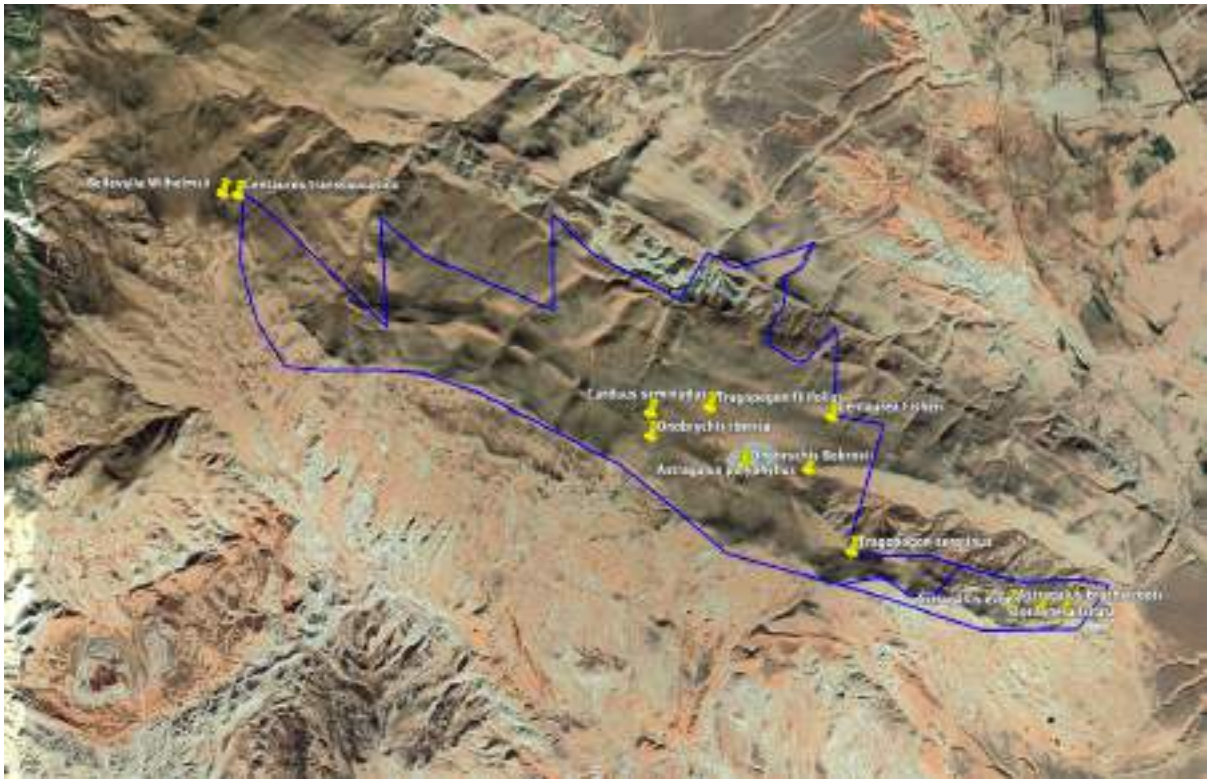
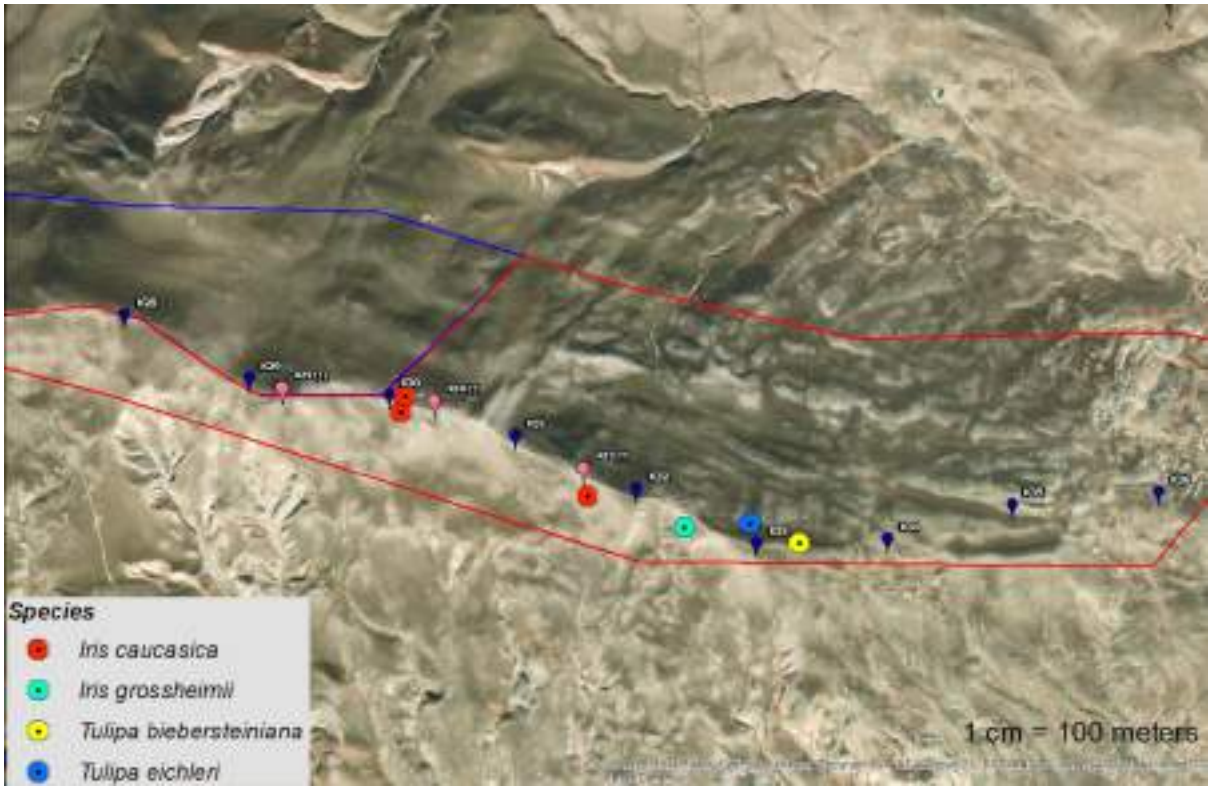


Figure 3-4 Locations of Azerbaijan Flora Species of Interest

Figure 3-5 Locations of Azerbaijan Flora Species of Interest



All other species recorded are considered to be common, and the majority of accessible areas have been degraded due to grazing pressures.

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 kusjariensis	Rare	RDB VU D2 Regional Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown;
Anabasis salsa (C.A.M.) Bnth.	Occasional	RDB VU A2cd+3cd	Total EOO > 10 million km2. Total AOO unknown;

Species	Abundance	Status	Notes
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 3-6 Species of Interest Recorded along Segment 1

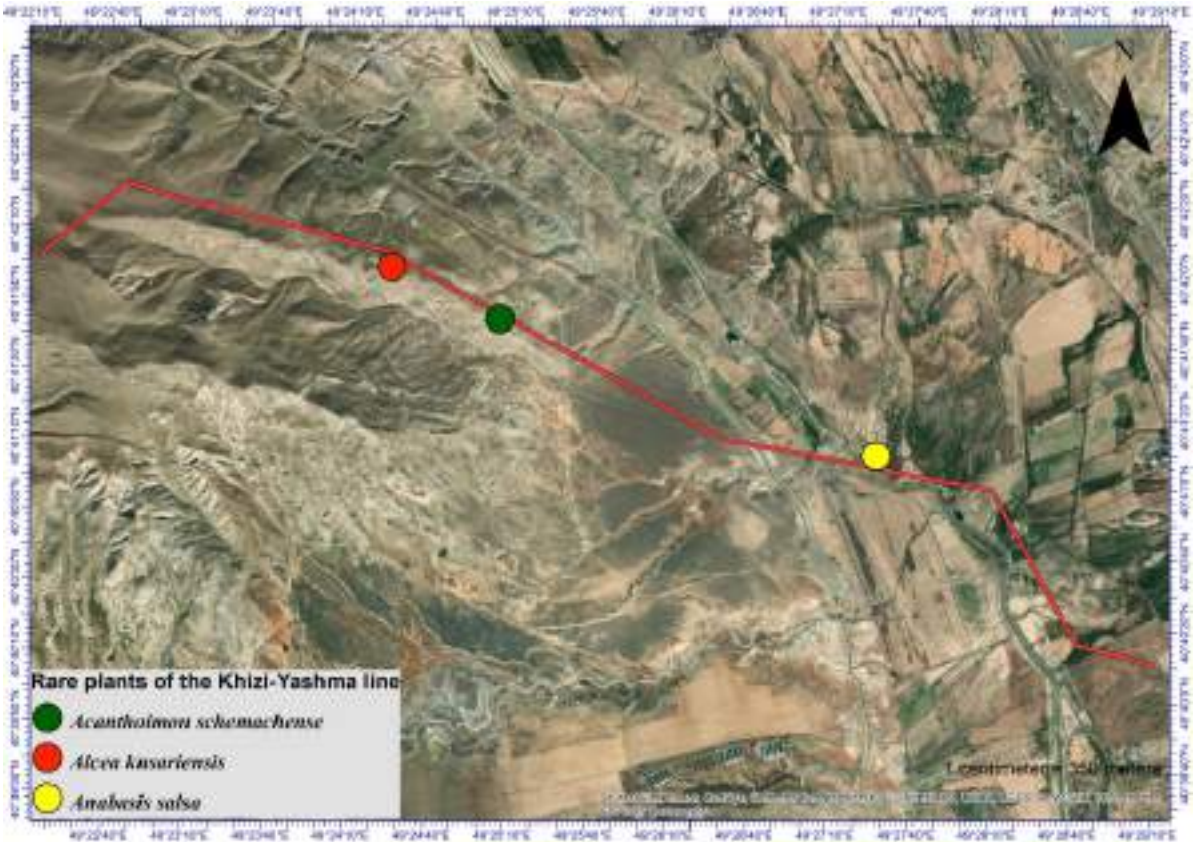


Figure 3-7 Location of Flora Species of Interest along Segment 1

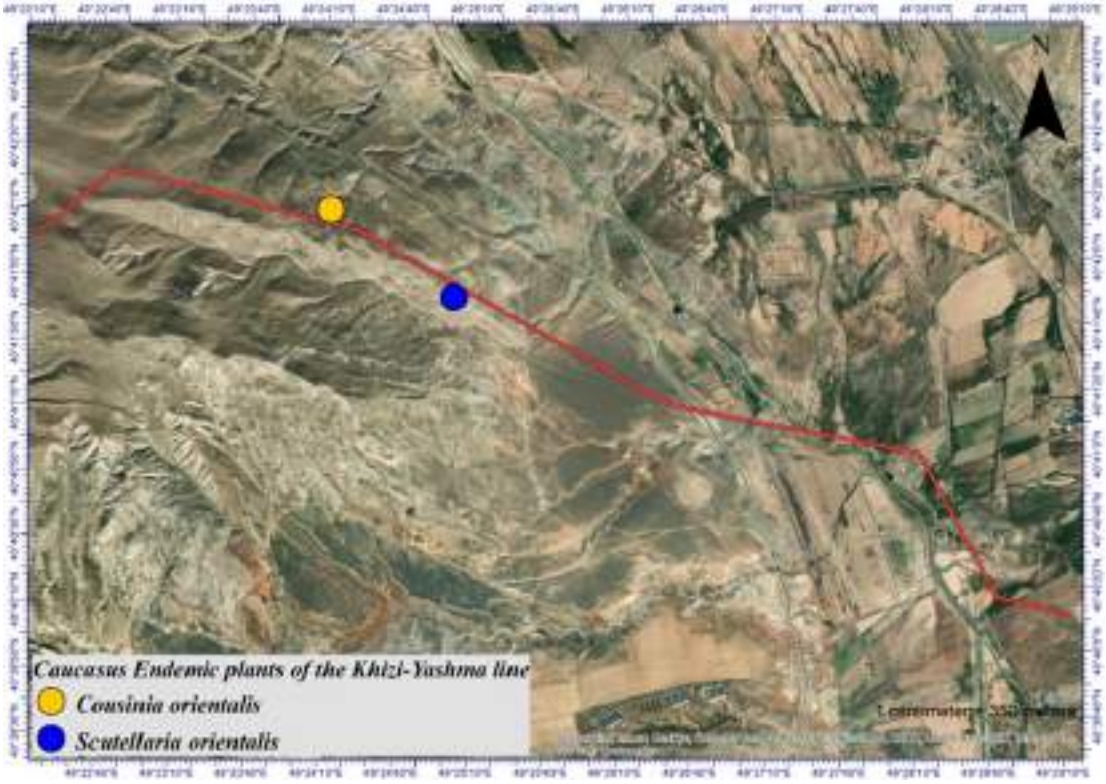
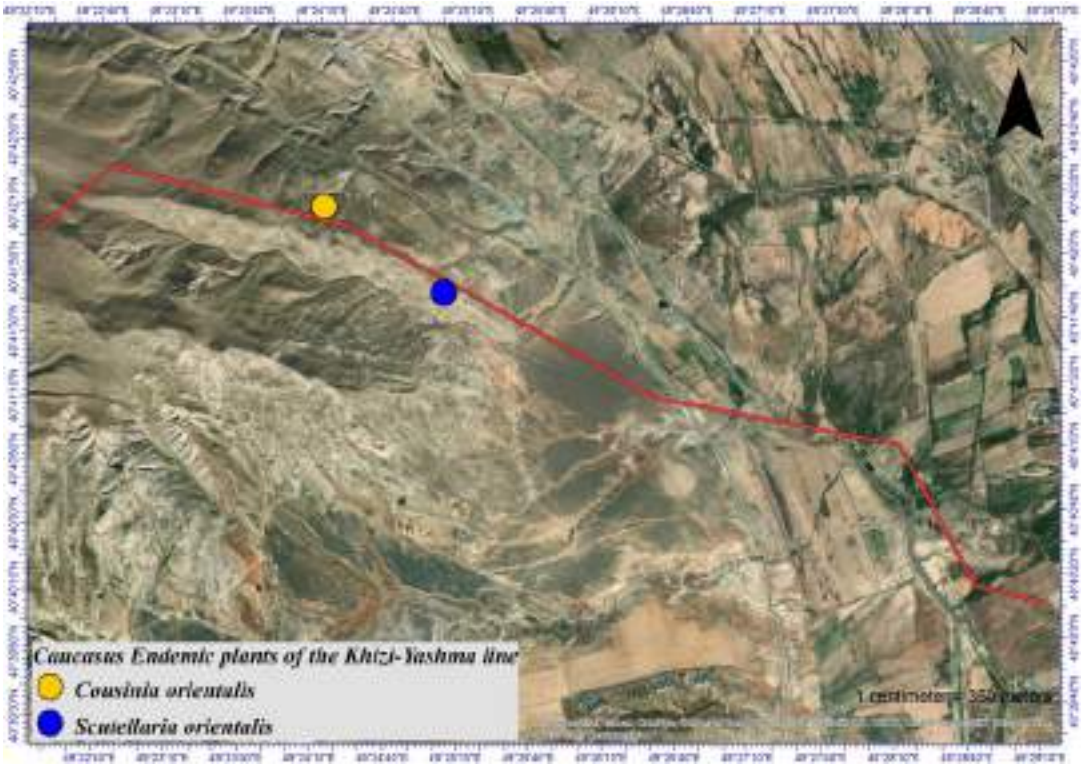


Figure 3-8 Flora Species Species of Interest along Segment 1



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 Endemics 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 kusjariensis	Rare	RDB EN B1ab(v)+B2ab(v)	Present in Azerbaijan, Armenia and Georgia. Total EOO > 200,000 km2. Total AOO unknown.RDB VU D2
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 3-9 Species of Interest Recorded along Segment 2

Figure 3-10 Location of Flora Species of Interest along Segment 2

Figure 3-11 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	Regionally Endemic	Present in Transcaucasus and Iran. Total EOO < 1million km2. Total AOO unknown
Centaurea reflexa	Occasional	Regionally Endemic	Present in Azerbaijan, Armenia, Georgia, Iran and Turkey. Total EOO > 2 million km2. Total AOO unknown;
Cousinia orientalis	Rare	Regionally Endemic	Present in Azerbaijan, Armenia, Russia and Georgia. Total EOO < 1million km2. Total AOO unknown
Thymus karjaginii	Occasional	Regionally Endemic	Present in Azerbaijan, Armenia and Georgia. Total

Species	Abundance	Status	Notes
			EOO > 200,000 km2. Total AOO unknown

Figure 3-12 Species of Interest Recorded along Segment 3

Figure 3-13 Location of Flora Species of Interest along Segment 3

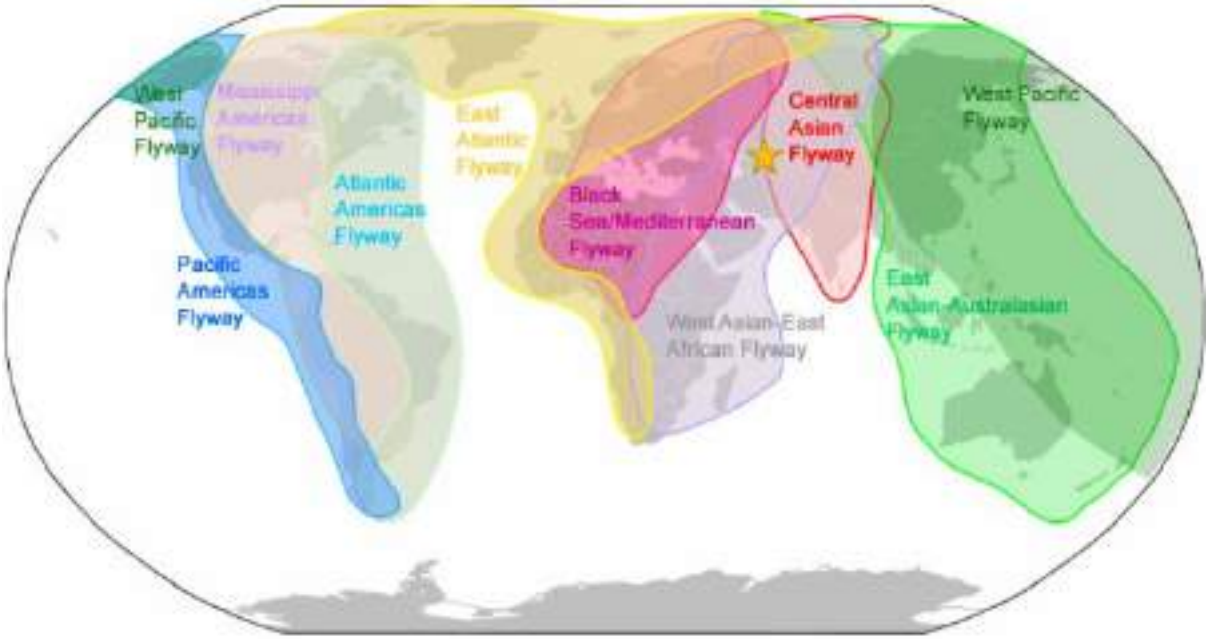
Figure 3-14 Location of Flora Species of Interest

3.3.2 Birds

REGIONAL CONTEXT

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

Figure 3-15 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; and
- Mount Kargabazar and Mount Gush-gaya.

Figure 3-16 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.

Figure 3-17 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 3-18 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 3-19 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	
Great Snipe	*Gallinago media*	Near Threatened	

Common Name	Latin Name	IUCN Global Red List Category	Azerbaijan Red Book Category
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 bird 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 (i.e. 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:

- Khizi WF area was surveyed via VP surveys during Spring (2020 and 2021), Winter 2021 and Autumn (2020 and planned 2021 for new VP);
- Khizi WF area, BOP and Laydown area breeding bird surveys were conducted during Summer 2020 and Summer 2021;
- 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 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 in Spring 2022 to capture more detailed migration data and the CRM was subsequently updated. 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	28 March to 6 May 2020	VP Survey: 166 hours
Bird Breeding Survey (2020) – Khizi WF area	June 2020 (5, 9, 11, 16 and 18 June 2020)	Transect Survey: 25 hours
Bird Autumn Migration Survey (2020) – WF VP Survey	10 September to 11 December 2020	VP Survey: 60 hours
Bird Winter Survey (2020) – WF VP Survey	30 December 2020 to 8 March 2021	VP Survey: 245 hours
Bird Spring Migration Survey (2021)- WF VP Survey	17 March to 20 April 2021	VP Survey: 109 hours
Bird Breeding Survey (2021) – Khizi WF, BOP	26 and 29 June 2021	Transect Survey:1 0Hours
WF VP Survey Summer 2021	04 May to 28 June 2021	VP Survey: 132 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 – 180 hours
Bird Breeding Survey (2022) – Khizi WF area	March - June 2022	Nesting Survey

Surveying Locations

Initially, four (4) Vantage Points (VPs) were selected for the project area which are shown in the Figure below.

In November 2020, an additional VP (VP X7) was added to cover the new WTGs around the dry lake based on revised WTG Layout. As of 23rd February 2021, it has been confirmed that Western Extension Area (WTG X51 to X59) is no longer being considered as part of the WF, therefore VP monitoring (VPX6 and VPX5) have been stopped. Locations of current VPs are shown in Figure below.

Table 3-8 Coordinates of VPs

VP	UTM	ELEVATION
VP X 1	39 T 355839 4509315	708 m
VP X2	39 T 365269 4505245	390 m
VP X3	39 T 359162 4507770	683 m
VP X 4	39 T 363100 4505764	503 m
VP X 7 (new VP added in November 2020)	39 T 362492 4507569	437 m

VP	UTM	ELEVATION
Cancelled VPs		
VP X 5 (stopped)	39 T 362492 4507569	1014 m
VPX 6 (stopped)	39 T 352241 4507085	867 m

Figure 3-20 All VPs for WF

Figure 3-21 Spring 2022 VPs

OHTL Locations

Figure 3-22 OHTL Segments 1 Khizi-Yashma (Red), Segment 2 Khizi- Pirakashkul (Blue) & Segment 3 Gobu-Pirakeshkul (Green)

RESULTS

The below tables provide a summary of the findings.

Wind Farm – Vantage Point Monitoring

In total, 381.38 hours of surveying was undertaken, over 5 Vantage Points and 5 seasons. VP surveys were undertaken for an additional season during Spring 2022 at 5 points where 36 survey hours were completed at each vantage point.

A total of 10 species of elevated global status were recorded as well as 22 additional species with elevated national status.

Four species are globally listed as endangered: Steppe Eagle, Pallas's Fish Eagle and Saker Falcon and Egyptian Vulture.

The following table provides a summary for nationally and globally listed (threatened) species that were recorded during VP surveys of Khizi 3.

Table 3-9 VP Survey Results Spring 2020 to Spring 2022

Scientific Name	English Common Name	National Status	IUCN status	VP Observations					
				Spring			Summer 2021	Autumn 2020	Winter 2021
				2020	2021	2022			
Tier 1									
Neophron percnopterus	Egyptian Vulture	VU	EN	2	5	2	12		
Aquila nipalensis	Steppe Eagle	CR	EN	80	57	41		7	6
Haliaeetus leucoryphus	Pallas's Fish-Eagle	-	EN		1				
Falco cherrug	Saker Falcon	EN	EN					1	
Tier 2									
Ciconia nigra	Black Stork	CR		1					
Pelecanus crispus	Dalmatian Pelican	VU	NT						4
Pandion haliaetus	Osprey	EN			1				
Gypaetus barbatus	Bearded Vulture	NT	NT	6		1		11	12
Pernis apivorus	European Honey-Buzzard	VU		26	36	2	20		
Pernis ptilorhynchus	Oriental Honey-Buzzard	VU					6		
Aegypius monachus	Cinereous Vulture	NT	NT	336	313	257	33	318	1226
Gyps fulvus	Eurasian Griffon	VU		1474	323	263	21	628	665
Gyps or Aegypius	Unidentified Vulture			229	11	656[1]	1	223	172
Circaetus gallicus	Short-toed Snake-Eagle	LC			3	1	6		
Hieraaetus pennatus	Booted Eagle	NT		4	1		9	2	
Aquila heliaca	Imperial Eagle	VU	VU	1		1			1
Aquila chrysaetos	Golden Eagle	VU		26	20	5	1	4	9
Circus macrourus	Pallid Harrier		NT		2			1	
Accipiter brevipes	Levant Sparrowhawk	VU		2					
Milvus migrans	Black Kite	VU		1	1	6		3	3
Haliaeetus albicilla	White-tailed Eagle	VU							7
Buteo rufinus	Long-legged Buzzard	VU		38	98	178	62	2	12
Falco naumanni	Lesser Kestrel	VU		28	78	207	256	133	

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

Scientific Name	English Common Name	National Status	IUCN status	VP Observations					
				Spring			Summer 2021	Autumn 2020	Winter 2021
				2020	2021	2022			
Falco vespertinus	Red-footed Falcon	NT	NT		1	1		2	
Falco columbarius	Merlin	LC			1	4			
Falco subbuteo	Eurasian Hobby	LC				2	2	1	
Falco biarmicus	Lanner Falcon	LC			1	5	8		2
Falco peregrinus	Peregrine Falcon	VU			1				2
Accipiter gentilis	Northern Goshawk	LC				2			
Tier 3									
Circus aeruginosus	Eurasian Marsh-Harrier			1	3			1	1
Circus cyaneus	Hen Harrier			1	7	5		2	2
Circus pygargus	Montagu's Harrier			3	3		10	1	
Accipiter nisus	Eurasian Sparrowhawk				6				2
Buteo lagopus	Rough-legged Hawk			4				1	
Buteo buteo	Common Buzzard			57	7	9	5		
Falco tinnunculus	Eurasian Kestrel			75	59	22	10	6	17

A total of 191 Steppe Eagles were recorded over the six seasons. Steppe Eagle was registered at highest densities during the spring seasons, followed by autumn, with the least birds per survey hour registered during the winter season. The average number of birds per survey hour were 5x higher in spring seasons than any other season.

Only a single Saker Falcon was recorded over the full monitoring period in the autumn, and a single Pallas's Fish-eagle likewise in the spring.

A total of 21 Egyptian Vultures were recorded over the six seasons. The vast majority were recorded during the summer season. Some were registered in the spring, and none were registered in the autumn and winter periods.

Of the 7 species listed as Vulnerable and Near Threatened globally, two vulture species stand out: the Bearded Vulture, of which 30 individuals were recorded over the full monitoring periods, as well as Cinereous Vulture, of which 2,483 were recorded over the surveying period. Bearded Vulture was recorded with highest bird per survey hour rates in the autumn and winter, followed by spring and none were recorded in the summer. Cinereous Vulture were recorded with highest bird per survey hour in the winter, with half the numbers recorded in spring and summer seasons.

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

- A total of 390 Long-legged Buzzards were recorded; autumn and winter saw the lowest rate of birds/survey hour, followed by a substantial increase in summer with highest numbers recorded in spring.
- A total of 3,374 Griffon Vultures were recorded; lowest numbers were recorded in summer, with higher numbers recorded in spring, autumn and winter.
- A total of 702 Lesser Kestrels were recorded; high numbers of birds/survey hour were recorded in summer, followed by spring and autumn, with none recorded in the winter period.

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 in the project area at abundances high enough to trigger criticality for endangered species. 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 VU and above species that were not recorded during the baseline surveys but may potentially occur have also been considered as PBFs. Refer to the Final CHA Report (provided in Appendix A) for the detailed qualification criteria. 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
- Pallas' Fish-eagle
- Bearded Vulture
- Egyptian Vulture
- Cinereous Vulture
- Eurasian Griffon Vulture
- Long-legged Buzzard
- Short-toed Snake-Eagle
- Greater Spotted Eagle
- Booted Eagle
- Imperial Eagle
- Golden Eagle
- White-tailed Eagle
- Saker Falcon
- Lanner Falcon
- Peregrine Falcon
- Red-footed Falcon
- Pallid Harrier
- Levant Sparrowhawk
- Black Kite
- Merlin
- Eurasian Hobby
- Lesser Kestrel
- Little Bustard
- European Turtle-Dove
- Steppe Eagle

Breeding Birds

Surveying during Summer 2020 and Summer 2021 included nest searches and transects focused on identifying breeding birds. The survey method used for breeding birds included walking a route that covered the entire site boundary and 6km buffer zone.

One Lesser Kestrel *Falco naumanni* colony was found within the project site's 2km buffer zone.

The Lesser Kestrel colony is located 120m from an existing track which will be upgraded into a permanent access road. An area of mountainous elevation separates the colony from the turbines. The estimated number of breeding pairs in the colony was not able to be recorded. CHA findings designate this species as a PBF.

Figure 3-23 Breeding Colonies and Nests

Nest search surveys were undertaken 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.

Five nesting locations were observed during the nest surveys of 2022:

1. Lesser Kestrel nesting colony (6 pairs) located 230m from the nearest turbine (K19).
2. Lesser Kestrel nesting colony (3 pairs) located 250m from the nearest turbine (K22).
3. Lesser Kestrel colony (10 pairs) located 1.7km away from the nearest turbine K27, and 150m away from the access road.

4. Lesser Kestrel nesting colony (7 individuals) located 1.9km from the nearest turbine (K27), and 420m away from the access road.

Long-legged Buzzard nesting location (1 pair) 530 m away from turbine K10 and 550 m away from turbine K11.

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 3-10 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
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 3-11 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
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 3-12 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	LC			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

Other

There is an operating poultry farm approximately 3.4km away from the nearest turbine. The poultry farm appears to regularly dump carcasses and other waste materials in an open area behind the farm; these conditions are attractive to a variety of vultures, which regularly visit the farm for foraging.

Figure 3-24 Location of Poultry Farm

A series of surveys during the summer of 2020 recorded over 20 Cinereous Vultures, a Griffon Vulture, and over 10 Bearded Vultures.

It is not certain if the presence of the farm is contributing to the high numbers of vulture flyovers within the Khizi WF area, as this could only be confirmed via a specified tagging research study.

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 3-13 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 0385196 0383950 4477965 4476494	[13]	19
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 3-25 Red Line indicates Pirakashkul-Gobu Segment passing by Lake Shoruchteppe (dotted line)

Figure 3-26 Location of bird carcasses and remains recorded during autumn OHTL survey

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

Table 3-14 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

LATIN NAME	ENGLISH NAME	AZB	IUCN	MMW1	MMW2
Gyps fulvus	Griffon Vulture	VU		41	0
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	VU		2	0

3.3.3 Bats

REGIONAL CONTEXT

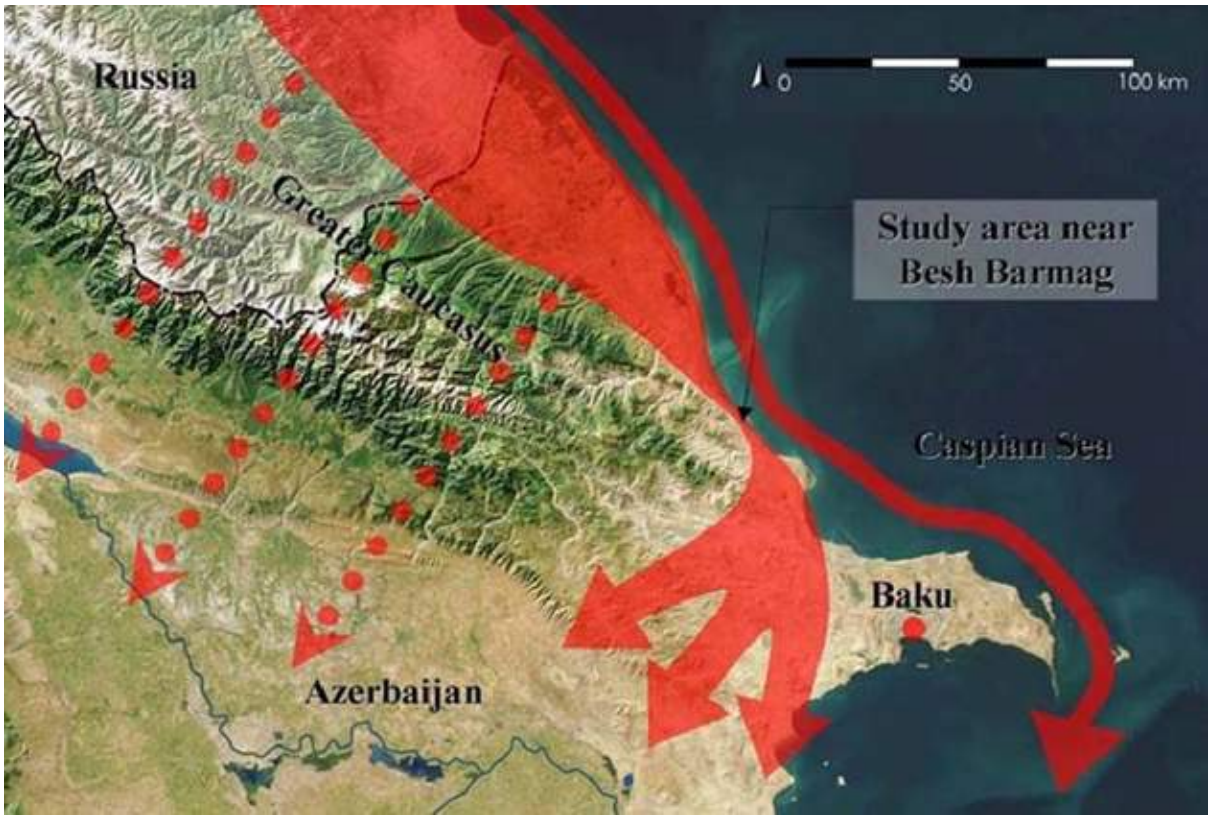
The following text has been extracted from the "Diverse Bat Fauna of Azerbaijan" [2] which provides an overview of bat fauna within Azerbaijan.

"The bat fauna southwest of Azerbaijan in the Minor Caucasus Range is especially unusual and diverse. The Common Pipistrelle (*Pipistrellus pipistrellus*), a species whose preferred habitat includes forest and cultured landscapes, is widespread, as is Kuhl's Pipistrelle (*P. kuhli*), ordinarily found in deserts or dry and mountainous steppes and almost exclusively inhabiting human dwellings. Other common species are Serontine Bats (*Eptesicus serotinus*), Greater Horseshoe Bats (*Rhinolophus ferrumequinum*), Lesser Horseshoe Bats (*R. hipposideros*), Lesser Mouse-eared Bats (*Myotis blythi*), and Geoffrey's Bats (*M. emarginatus*), all of which inhabit caves as well as buildings. Although widely distributed in Azerbaijan, several species of horseshoe bats are severely endangered or extirpated in other parts of Europe.

The proposed site is located on the northern shores of the Azerbaijani sector of the Caspian Sea between the Caspian Lowland and the south-western end of the Greater Caucasus Mountains. It is located within a broad route known to be used by migratory bats *Pipistrellus nathusii, Nyctalus noctula* and *Vespertilio murinus*.

[2] https://www.batcon.org/article/the-diverse-bat-fauna-of-azerbaijan-a-report-from-the-soviet-union/

Figure 3-27 Migratory Movements of Bats



SURVEY METHODOLOGY

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

Surveying Techniques:

- Roost searches to identify colonies and roosting location for WF areas;
- Surveys targeting potential swarming and migration movements using active bat detectors and mist net deployment for catch and release; and
- Deployment of passive acoustic detectors in the WF area.

Coverage and timing/dates

- WF area/BOP: the WF and BOP area was surveyed during Spring, Summer, and Autumn 2020 via a combination of mist-netting, manual searches, and acoustic monitoring; and
- OHTL: Late Spring and Summer 2021 (23, 28 May; 18-20, 25-27 June; 3-5, 24-26 July; 8, 21,22 August 2021); surveying included transects with active acoustic detectors.

Table 3-15 Passive Detectors

NAME	COORDINATES	LOCATION (WF / EXT / OTHER) + MAST NO. IF APPLICABLE	INSTALLATION HEIGHT OF MICROPHONE	START DATE - Installed	END DATE - decommissioned	TOTAL RECORDING NIGHTS
ANABAT MK1 2020	40.691315 / 49.388158	Mast No 1	35m	Sep 4, 2020	Oct 26, 2020	25
ANABAT MK2 2020	40.691315 / 49.388158	Mast No 2, btw X14-X15	22m	Jul 14, 2020	Oct 15, 2020	39
ANABAT MK2 2021	40.691315 / 49.388158	Mast No 2	44m	April 19, 2021	October 12, 2021	142
ANABAT MK3 2021	40.701783/49.353525	Mast No 3	41m	April? 2021	September 29, 2021	63

Surveying Locations:

The below showcases the transects utilized for bat surveys as well as the locations of the detectors.

Figure 3-28 Active Monitoring Transects and Passive Detectors Locations Khizi 3

Figure 3-29 Locations of Mist Netting & Roost Search Physical Inspections – Khizi 3 WF

Figure 3-30 Active Monitoring Transects – OHTL

RESULTS

The below provides a summary of the findings.

Wind Farm & BOP

The results of the combined bat survey efforts are provided in the below sections and Tables.

Passive Detector – Bat Activity Index

A total of 12 species were identified by Kalidescope Pro software and example sonograms for each were manually checked. However, *Tadarida teniotis* was flagged by the bat expert as a potential mistake as this species is not anticipated to occur in the area.

- *Eptesicus serotinus'*
- *Hypsugo savii;*
- *Nyctalus noctule;*
- *Nyctalus leisleri;*
- *Plecotus auratus;*
- *Vespertilio murinus;*

- *Barbastella capsica;*
- *Pipistrellus kuhlii;*
- *Pipistrellus nathusi;i*
- *Rhinolphus ferrumequinum*; and
- *Tadarida teniotis.*

Table 3-16 Overall BAI (Passive Detector)

Monitor Location and Season	Minimum BAI	Maximum BAI
ANABAT MK 1, Summer/Autumn	0.02	0.81
ANABAT MK 2, Summer/Autumn	0.01	0.69
ANABAT MK 2, Spring/Summer	0.01	2.71
ANABAT MK 3, Spring/Summer	0.01	0.47

Table 3-17 Active Transects – contacts/hour by month

Month	Average Contacts per Hour
April	3.00
May	5.35
June	1.98
July	1.83
August	2.50
September	4.38
October	2.33

Late spring (May) and early autumn (September) saw the relative highest amount of activity. This could be related to migration pass-through or alternatively breeding activity.

Table 3-18 Active Transects – contacts/hour by month

Species	MISTNET 1 Capture (No. Ind)	MISTNET 2 Capture (No. Ind)	MISTNET 3 Capture (No. Ind)	MISTNET 4 Capture (No. Ind)	MISTNET 5 Capture (No. Ind)
P.kuhlii	0	1	0	0	18
P.nathusii	0	0	0	0	1
M.alcathoe	0	0	0	0	1

The majority of individuals were caught by mist net at location 5, which is located relatively far from the wind farm location.

Physical Inspections for Roosts

No roosts or likely roosts were found within the WF area. Roosting areas were found along the water canal in Physical Inspection locations 1, 2 and 3, including species *M. alcathoe* and *Rh. Ferrumequinum*, as well as two additional species, *M mystacinus, and M. emargiinatus*.

Conclusion

Table 3-19 Recorded from Khizi 3 WF Surveys

Scientific name	Common name	Status ARDB / IUCN	Survey Capture	Other Notes
Rhinolphus ferrumequinum	Greater horseshore bat	**RDB**/LC	Passive detector, roost (outside of WF area)	Summer roost - at Ph.inspection sites 1-7
M. emargiinatus	Geoffroy's bat	**RDB**/LC	roost search only (outside of WF area)	
M mystacinus	Whiskered bat	No/LC	roost search only (outside of WF area)	
Myotis alcathoe	Alcathoe bat	**DD**/LC	mist netting and roosts found (outside of WF area)	Summer roost - at Ph.inspection sites 1-7
Plecotus auritus	Brown long-eared bat	No/LC	Passive detector	
Barbastella caspica	Eastern barbastelle	**RDB**/LC	Passive detector	
Nyctalus noctula	Lesser noctule	No/LC	Passive detector	
Nyctalus leisleri	Common noctule	No/LC	Passive detector	
Pipistrellus nathusii	Nathusius's pipistrelle	No/LC	Passive detector; mist netting	Summer roost - at Mistnet point 3 etc.
Pipistrellus kuhlii	Kuhl's pipistrelle	No/LC	Passive detector; mist netting	Summer roost - at Mistnet point 3 etc.
Hypsugo savii	Savii's pipistrelle	No/LC	Passive detector	
Vespertilio murinus	Particolored bat	No/LC	Passive detector	
Eptesicus serotinus	Serotine bat	No/LC	Passive detector	

Scientific name	Common name	Status ARDB / IUCN	Survey Capture	Other Notes
Tadarida teniotis	European free-tailed bat	**RDB**/LC	Passive detector	

OHTL

The results of the OHTL bat survey efforts are provided in the below table.

Table 3-20 Results-Bat Survey - Species Registered during Surveying along OHTL 2021

N	Scientific name	Line 1 (Gobu-Pirakashkul)	Line 2 (Khizi-Yashma)	Line 3 (Khizi-Pirekeshkul)
		observed, and/or recorded on hand-detector		
1	*Rhinolophus ferrumequinum*	+	+	+
2	*Myotis emarginatus*		+	
3	*Myotis mystacinus*		+	
4	*Myotis alcathoe*	+	+	+
5	*Myotis blythii*	+		
6	*Plecotus auritus*	+	+	+
7	*Barbastella caspica*	+	+	+
8	*Pipistrellus nathusii*	+	+	
9	*Pipistrellus kuhlii*	+	+	+
10	*Eptesicus serotinus*	+	+	+

The most abundant species of the study area are *P.kuhlii, E. serotinus, M.alcathoe*. All three bats are widespread, and roosts are often associated with urban areas, manmade structures.

All bat species recorded in the project area are insectivorous species. An insectivorous bat can eat anywhere between 300 and 3000 insects a night, depending on size of the bat and the size of the insects. As such, they are the primary biological control of night flying insect populations and are considered as keystone species that qualify as PBFs.

3.3.4 Mammals

REGIONAL CONTEXT

Some 106 species of mammals have been recorded in Azerbaijan, three (3) of which are introduced species. Mammals from seven orders are represented: Insectivores (13 species in three families), Chiroptera (bats; 27 species), Lagomorpha (rabbits and hares; 2 species), Rodentia (rodents; 36 species), Carnivora (carnivores; 19 species, including one species from the suborder Pinnipeda). The most widespread species of mammal in Azerbaijan include the water rat (*Arvicola terrestris*), gray rat (*Rattus norvegicus*), wolf (*Canis lupus*), jackal (*C. aureus*), fox (*Vulpes vulpes*), stone martin (*Martes foina*), badger (*Meles meles*) and wild boar (*Sus scrofa*).

Table 3-21 List of Rare and Threatened Mammals of Azerbaijan

Table 1. List of Rare and Threatened Mammals of Azerbaijan

Common Name	Species	ARDB	IUCN
Mediterranean Horseshoe Bat	*Rhinolophus euriale*	+	VU
Greater Horseshoe Bat	*Rhinolophus ferrumequinum*		Lr/cd
Lesser Horseshoe Bat	*Rhinolophus hipposideros*		VU
Mehely's Horseshoe Bat	*Rhinolophus mehelyi*		VU
Barbastelle bat	*Barbastella barbastellus*		VU
Bechstein's bat	*Myotis bechsteini*		VU
Geoffroy's Bat	*Myotis emarginatus*		VU
Lesser Noctule Bat	*Nyctalus leiseri*		Lr/nt
European Free-Tailed bat	*Tadarida teniotis*	+, U	
Schreiber's Long-Fingered Bat	*Miniopterus schreibersi*	+, U	Lr/nt
Caspian Tiger	*Panthera tigris virgata*	+, U	
Striped Hyaena	*Hyaena hyaena*	+, U	
Eurasian Lynx	*Felis lyns orientalis*	+	
Leopard	*Felis pardus tullianus*	+, U	
Wild Cat	*Felis libica caudata*	+	
Red Manul	*Otocolobus manul ferrugineous*	+, U	Lr/nt
Caspian Seal	*Phoca caspica*		VU
Marbled Polecat	*Vormela peregusna*	+, U	
Persian Gazelle	*Gazella subgutturosa*	+, U	Lr/nt
Chamois	*Rupicapra rupicapra caucasica*	+	VU
Wild Goat	*Capra aegagrus aegagrus*	+, U	VU
E. Caucasian Tur	*Capra cylindricornis*		VU
Argali	*Ovis ammon*	+, U	VU
Mouflon	*Ovis orientalis gmelinii*		VU
Long-tailed Marmot	*Marmota caudata*		Lr/nt
Persian Squirrel	*Sciurus anomalus*		Lr/nt
Armenian Birch Mouse	*Sicista armenica*		CR
N. Birch Mouse	*Sicista betulina*		Lr/nt
	Calomyscus urartensis		Lr/nt
Snow Vole	*Chionomys nivalis*		Lr/nt
Harvest Mouse	*Micromys minutus*		Lr/nt
Fat Dormouse	*Myoxus glis*		Lr/nt

SURVEY METHODOLOGY

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

Surveying Techniques:

- Transects carried out during day-time and night-time surveys
- Incidental sightings and records (visual and audible)
- Indirect records of tracks, burrows, droppings, and shelters
- Use of headlight and spotlighting during nocturnal surveying
- Burrow entrance counts to establish abundance of rodent species

Coverage & Timing/Dates:

- Khizi WF area was surveyed from May to October 2020;

- Khizi WF BOP was surveyed in May 2021;
- Khizi - Yashma OHTL Route was surveyed in June to Aug 2021;
- Khizi-Pirakashkul OHTL Route was surveyed in June to Aug 2021; and
- Pirakashkul-Gobu OHTL Route was surveyed in June to Aug 2021.

RESULTS

The below provides a summary of the findings.

Wind Farm

Mammals Recorded

A total of 2 insectivores, 5 rodents, 1 lagomorph and 3 carnivores were recorded. Additionally, the globally Vulnerable Goitered Gazelle was recorded to occur (listed on Azerbaijan Red Data Book as Vulnerable). As per EBRD PR6 criteria this species qualifies a PBF.

Table 3-22 List of Mammals Recorded at Wind Farm

Scientific name	Common name	STATUS	Abundance
Erinaceus concolor	White- breasted hedgehog	LC	Rare
Hemiechinus auritus	Long-eared hedgehog	LC	Rare
Allactaga elater	Small five-toed jerboa	LC	abundant
Allactaga williamsi	Williams's jerboa	LC	Rare
Cricetulus migratorius	Grey dwarf hamster	LC	Rare
Meriones libycus	Libyan jird	LC	abundant
Microtus socialis	Social vole	LC	Rare
Lepus europaeus	European hare		abundant
Canis aureus	Golden jackal	LC	abundant
Canis lupus	Grey wolf	LC	Rare
Vulpes vulpes	Red fox	LC	abundant
Gazella sugutturosa	Goitered Gazelle	CE(AzRDB)	Rare

OHTL Segment 1 Khizi- Yashma

A total of 3 insectivores, 5 rodents, 1 lagomorph, and 3 carnivores were recorded. All species recorded are listed as LC on the IUCN Red List as well as the Azerbaijan Red Data Book. The following table summarizes the findings from the mammal survey undertaken at Segment 1.

Table 3-23 List of Mammals Recorded at OHTL Segment 1 Khizi-Yashma

SCIENTIFIC NAME	COMMON NAME	STATUS
Erinaceus concolor	White-breasted Hedgehog	LC, Non RDB
Hemiechinus auritus	Long-eared Hedgehog	LC, Non RDB

Scientific Name	Common Name	Status
Crocidura guldenstaedti	Gueldenstaedt's Shrew	LC, Non RDB
Allactaga elater	Small Five-toed Jerboa	LC, Non RDB
Allactaga williamsii	Williams' Jerboa	LC, Non RDB
Cricetulus migratorius	Grey Dwarf Hamster	LC, Non RDB
Meriones libycus	Libyan Jird	LC, Non RDB
Microtus socialis	Social Vole	LC, Non RDB
Canis aureus	Golden Jackal	LC, Non RDB
Canis lupus	Grey Wolf	LC, Non RDB
Vulpes vulpes	Red Fox	LC, Non RDB
Lepus europaeus	Brown Hare	LC, Non RDB

OHTL Segment 2 Khizi-Pirakashkul

A total of 3 insectivores, 5 rodents, 1 lagomorph, and 3 carnivores were recorded. All species recorded are listed as LC on the IUCN Red List as well as the Azerbaijan Red Data Book. The following table summarizes the findings from the mammal survey undertaken along Segment 2 of the OHTL.

Table 3-24 List of Mammals Recorded at OHTL Segment 2 Khizi-Pirakashkul

Scientific Name	Common Name	Status
Erinaceus concolor	White-breasted Hedgehog	LC, Non RDB
Hemiechinus auritus	Long-eared Hedgehog	LC, Non RDB
Crocidura guldenstaedti	Gueldenstaedt's Shrew	LC, Non RDB
Allactaga elater	Small Five-toed Jerboa	LC, Non RDB
Allactaga williamsii	Williams' Jerboa	LC, Non RDB
Cricetulus migratorius	Grey Dwarf Hamster	LC, Non RDB
Meriones libycus	Libyan Jird	LC, Non RDB
Microtus socialis	Social Vole	LC, Non RDB
Canis aureus	Golden Jackal	LC, Non RDB
Canis lupus	Grey Wolf	LC, Non RDB
Vulpes vulpes	Red Fox	LC, Non RDB
Lepus europaeus	Brown Hare	LC, Non RDB

OHTL Segment 3 Pirakashkul-Gobu

A total of 2 insectivores, 3 rodents, 1 lagomorph, and 3 carnivores were recorded. Additionally, the globally Vulnerable Goitored Gazelle was recorded to occur (listed on Azerbaijan Red Data Book as Vulnerable). CHA found that this species did not occur in abundances to trigger criticality. However, being a VU species, the gazelle qualifies as a PBF as per EBRD PR6 criteria.

The following table summarizes the findings from the mammal survey undertaken at Segment 3 of the OHTL.

Table 3-25 List of Mammals Recorded at OHTL Segment 3 Pirakashkul-Gobu

SCIENTIFIC NAME	COMMON NAME	STATUS
Erinaceus concolor	White-breasted Hedgehog	LC, Non RDB
Hemiechinus auritus	Long-eared Hedgehog	LC, Non RDB
Allactaga elater	Small Five-toed Jerboa	LC, Non RDB
Meriones libycus	Libyan Jird	LC, Non RDB
Microtus socialis	Social Vole	LC, Non RDB
Canis aureus	Golden Jackal	LC, Non RDB
Vulpes vulpes	Red Fox	LC, Non RDB
Lepus europaeus	Brown Hare	LC, Non RDB
Gazella subgutturosa	Goitered gazelle	VU, RDB

3.3.5 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 3-26 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; and
- Early morning and evening surveys were conducted in line with highest herptile activity.

Coverage & Timing/Dates:

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

RESULTS

The below provides a summary of the findings.

Wind Farm and BOP

Surveys registered under mentioned three species of amphibians and eight species of reptiles during the studies conducted in the daytime by route survey on the territory of the project:

- Eastern Spadefoot (*Pelobates syriacus*) is widespread in arid climates. The digger leads a sedentary lifestyle, mostly in soft, sometimes hard clay soils. It is distributed along the Caspian Sea coast in the south-east (from Astara to Salyan), in the north-east (from Davachi to Khachmaz) and Nakhchivan AR.
- A single adult individual of the Eastern Spadefoot was recorded at night around a water spring about 400 m from point X13. It is an endemic species listed as Vulnerable in the Azerbaijan Red Data Book.
- CHA found the Eastern Spadefoot Toad qualifies as a PBF
- Mediterranean Spur-thighed Tortoise (*Testudo graeca*) is a species widely dispersed throughout the country and mainly in the eastern part of Azerbaijan. It is found in semi-desert or desert landscapes. It mainly leads a nocturnal lifestyle, but sometimes it is also observed in the daytime. Population in Khizi seems to be small and recorded only twice during field surveys in May-June. Both adult females were observed at X 04 where vegetation was dense.
- During the autumn survey, burrows of hibernating individuals were recorded. Individuals mainly prefer south-eastern slopes and foothills with favourable climatic conditions, dense vegetation and low slope.
- The carcasses of predated individuals were recorded in the survey area.
- A total of 5 individuals were recorded during the 13-day study in spring and autumn (2 adult females on the ground, 2 adult females in the shelter, and 1 predated).

- As per the CHA criteria, the Mediterranean Spur-thighed Tortoise (*Testudo graeca*) is classified as a PBF

Table 3-27 List of herptiles recorded during the herpetology baseline survey

Scientific name	Type	STATUS	WF Abundance	BOP Abundance
Pelobates syriacus	Toad	LC (IUCN) and VU Az Red Data Book)	1	
Butofes variabilis	Toad	LC (IUCN)	-	
Testudo graeca	Tortoise	VU (Az Red Book & IUCN)	5	1
Pelophylax ridibundus	Lizard	LC (IUCN)		
Ophisops elegans	Snake	LC (IUCN)	22	
Eirenis collaris	Snake	LC (IUCN)	12	3
Xerotyphlops vermicularis	Snake	LC (IUCN)	8	1
Eryx jaculus	Snake	LC (IUCN)	1	
Natrix tessellata	Snake	LC (IUCN)	1	
Malpolon insignitus	Snake	LC (IUCN)	3	
Mesobutus eupeus	Scorpion	LC (IUCN)		2

Figure 3-31 Survey Area - Reptiles

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 testudines 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 3-28 List of Reptiles recorded along the OHTL Segment 1 Khizi - Yashma

Scientific Name	Type	IUCN	National Status	Abundance
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 testudines' 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, the 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 3-29 List of Reptiles recorded along the OHTL Segment 2 Khizi – Pirakashkul

Scientific Name	Type	IUCN	National Status	Abundance
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 testudines 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, the Mediterranean Spur-thighed Tortoise qualifies as a PBF. The following table summarizes the findings from the herptile survey undertaken along Segment 3 of the OHTL.

Table 3-30 List of Reptiles recorded along the OHTL Segment 3 Pirakashkul-Gobu

Scientific Name	Type	IUCN	National Status	Abundance
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

3.3.6 Invertebrates

REGIONAL CONTEXT

The entomofauna of Azerbaijan is highly diverse as well as rich in regional endemism.

In August 2013, the 2nd edition of the Red book of Azerbaijan was published. The Red Book contains updated information on the status of rare, threatened and endangered wild plant and animal species for the entire territory of the country. The current version of the Red Book lists 223 species of fauna (including 74 insect species). This represents a significant increase in the number of rare, threatened and endangered species that were recorded in the 1st edition of the 'Red Book of Azerbaijan' (1989) - 108 animal species and 140 plant species. An upcoming third edition is being completed, which includes *Saga ephippigera*, which was recorded during Khizi invertebrate surveying efforts.

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;
- Two (2) transects were undertaken at the Khizi-Yashma and Khizi-Pirakashkul Segments. 4 transects were undertaken at the Pirakashkul-Gobu Segments; and
- Sweep netting and manual collection were used, as conditions were not favourable for deployment of pit traps.

Coverage & Timing/Dates:

- Khizi WF area was surveyed during May, June and July 2020;
- Khizi BOP area were surveyed during May and June 2021; and
- OHTL segments were surveyed during July.

RESULTS

The below provides a summary of the findings.

Wind Farm

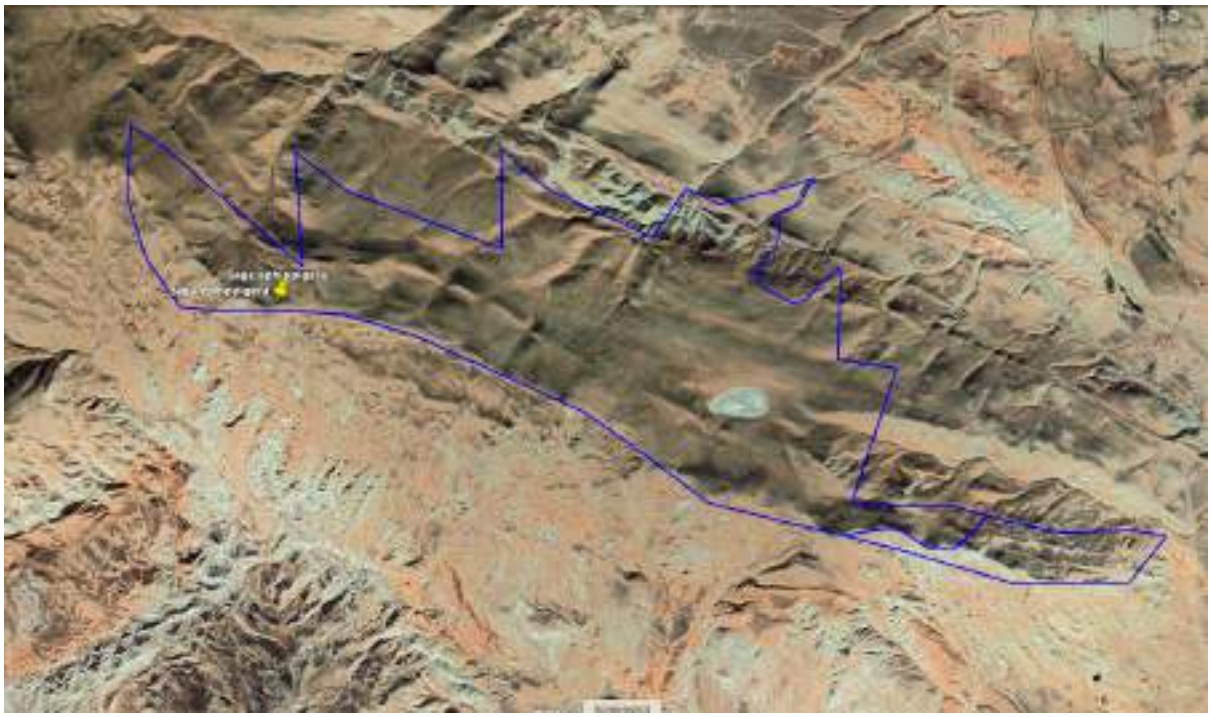
Fieldwork in the Khizi-3 area showed that entomofauna in this site is represented by 61 species belonging to 8 orders (Orthoptera – 15 species, Mantodea - 2 species, Blattodea 1, Hemiptera 1, Hymenoptera-2 species, Coleoptera – 23 species, Neuroptera 3, Lepidoptera - 14 species). According to abundance registered in the studied site 7 species are rare (*Saga ephippigera* Fischer von Waldheim, 1846, *Empusa pennicornis* (Pallas, 1773, *Polyphaga aegyptiaca*

(Linnaeus, 1758), *Zygaena (Mesembrynus) brizae shemachensis* (Holik & Sheljuzhko,1955), *Zygaena (Agrumenia) loti* ((Denis & Schiffermuller), 1775), *Jordanita* sp. 1, *Jordanita* sp. 2), 14 are not abundant and 40 are abundant.

Among insect species recorded in the Khizi-3 project site *Saga ephippigera* is a threatened species that is likely to be listed as VU in the 3rd edition of Azerbaikan Red Data book. Survey recorded a rather dense population of the *S.ephippigera* in the Khizi-3. The CHA qualifies this species as PBF.

The locations where *Saga ephippigera* were noted are located as per the below map.

Figure 3-32 Location Map of *Saga Ephippigera*



OHTL Segment 1 Khizi – Yashma

A total of 24 species of 16 orders and 7 families of the phylum Arthropoda were recorded during the OHTL Entomology survey of Segment 1 Kizhi-Yashma. *Saga ephippigera* is a threatened species that is likely to be listed as VU in the 3rd edition of Azerbaikan Red Data book. The CHA qualifies this species as a PBF. All species recorded during the survey are listed as LC on the IUCN Red List.

Table 3-31 Summary of Threatened and Endemic Species in Segment 3

ORDER	FAMILY	SPECIES
Odonata	Libellulidae	*Orthetrum coerulescens*
		Orthetrum brunneum
		Crocothemis erythraea
	Coenagrionidae	*İschnura elegans*
Orthoptera	Tettigoniidae	*Saga ephippigera*
	Acrididae	*Calliptamus barbarus barbarus*
		Sphingonotus savignyi
		Sphingonotus coerulipes
		Dociostaurus maroccanus
	Pamphagidae	*Asiotmethis muricatus muricatus*
	Dericorythidae	*Dericorys tibialis*
Mantodea	Mantidae	*Bolivaria brachyptera*
Hymenoptera	Formicidae	*Cataglyphis aenescens*
		Messor laboriosus
		Messor caducus
	Mutilidae	*Dasylabris maura arenaria*
	Vespidae	*Polistes sp.*
	Pompilidae	*Cryptocheilus (Cryptocheilus)annulatus*
	Sphecidae	*Podalonia affinis*
		Sphex flavipennis
Lepidoptera	Pieridae	*Colias hyale*
Coleoptera	Tenebrionidae	*Dissonomus picipes*
	Carabidae	*Acinopus sp.*
Blattodea	Corydiidae	*Polyphaga aegyptiaca*

OHTL Segment 2 Kizhi-Pirakashkul

A total of 25 species of 15 orders and 7 families of the phylum Arthropoda were recorded during the OHTL Entomology survey of Segment 2 Kizhi-Pirakashkul. *Bubopsis andromache* is a threatened species listed as VU in the Azerbaijan Red Data book. It is not recorded on the IUCN Red List.

Table 3-32 Arthropod Species Recorded during the Entomology Survey of Segment 2

ORDER	FAMILY	SPECIES
Odonata	Libellulidae	*Orthetrum coerulescens*
		Orthetrum brunneum
		Crocothemis erythraea
	Coenagrionidae	*İschnura elegans*
Orthoptera	Acrididae	*Acrida bicolor*
		Calliptamus barbarus barbarus
		Sphingonotus savignyi
		Sphingonotus coerulipes
		Dociostaurus maroccanus
	Pamphagidae	*Asiotmethis muricatus muricatus*
	Dericorythidae	*Dericorys tibialis*
Mantodea	Mantidae	*Bolivaria brachyptera*
Hymenoptera	Formicidae	*Cataglyphis aenescens*
		Messor laboriosus
		Messor caducus
	Mutilidae	*Dasylabris maura arenaria*
	Pompilidae	*Cryptocheilus (Cryptocheilus)annulatus*
	Vespidae	*Polistes sp.*
	Sphecidae	*Podalonia affinis*
		Sphex flavipennis
Coleoptera	Tenebrionidae	*Adesmia fischeri*
		Dissonomus picipes
	Carabidae	*Acinopus sp.*
Neuroptera	Ascalaphidae	*Bubopsis andromache*
Lepidoptera	Sphingidae	*Hyles zygophylli*

OHTL Segment 3 Pirakashkul-Gobu

A total of 19 species of 11 orders and 4 families of the phylum Arthropoda were recorded during the OHTL Entomology survey of Segment 3 Pirakashkul-Gobu. No threatened species were recorded along the OHTL segment.

Table 3-33 Arthropod Species Recorded during the Entomology Survey of Segment 3

ORDER	FAMILY	SPECIES
Orthoptera	Acrididae	*Acrida bicolor*
		Calliptamus barbarus barbarus
		Sphingonotus savignyi
		Sphingonotus coerulipes
		Dociostaurus maroccanus
	Pamphagidae	*Asiotmethis muricatus muricatus*
	Dericorythidae	*Dericorys tibialis*
Mantodea	Mantidae	*Bolivaria brachyptera*
Hymenoptera	Formicidae	*Cataglyphis aenescens*
		Messor laboriosus

Order	Family	Species
		Messor caducus
	Mutilidae	*Dasylabris maura arenaria*
	Pompilidae	*Cryptocheilus (Cryptocheilus)annulatus*
	Vespidae	*Polistes sp.*
	Sphecidae	*Podalonia affinis*
		Sphex flavipennis
Coleoptera	Tenebrionidae	*Adesmia fischeri*
		Dissonomus picipes
	Carabidae	*Acinopus sp.*

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 an un-surveyed 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 3-34 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
	Forest woodland	OHTL	Wooded habitats are increasingly fragmented and removed and are considered critically threatened in the region.	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.	High
Endangered Flora (PBF)	*Hypericum theodori (IUCN EN)*	WF	Listed as endangered on IUCN Red List. PBF as per EBRD PR6 requirements.	Very High
Nationally Endangered Flora (PBF)	*Alcea kusariensis; Viola caucasica; Iris acutiloba C.A.Verz.*	WF, BOP, OHTL	Listed as endangered in the Azerbaijan Red Data Book. PBF as per EBRD PR6 requirements.	High

Group	Receptor(s)	Area	Justification	Value
Vulnerable Flora (PBF)	*Acantholimon schemahense;* *Anabasis salsa (C.A.M.) Bnth.* *Atropa caucasica* *Cladochaeta candidissima M.B.* *Ferula persica Willd* *Linaria schirvanica Fom.* *Ophrys caucasica G.Woron.* *Orchis caspia Trautv.* *Punica granatum L.*	WF, BOP, OHTL	Listed as vulnerable in the Azerbaijan Red Data Book.	Medium
Near Threatened Flora	*Asyneuma campanuloides; Pulsatilla albana; Pyrus salicifolia; Iris caucasica; Festuca ovina*	WF, BOP; Laydown	Listed as near threatened in the Azerbaijan Red Data Book.	Medium
Non-Threatened Range-restricted Flora (PBF)	*Anthemis fruticulosa M.B.Fl.* *Astragalus caspicus* *Astragalus denudatus Stev.* *Astragalus schemachensis* *Centaurea reflexa Lam.* *Cerastium multiflorum C.A.Mey.* *Cirsium strigosum M.B.Fl.* *Cousinia orientalis* *Draba incompta Stev.* *Erodium schemachense A.Grossh.* *Gypsophila capitata M.B.* *Hypericum karjagini Rzazade.* *Merendera eichleri Boiss.* *Minuartia caucasica Ad.* *Nonea rosea M.B.* *Onobrychis vaginalis C.A.Mey* *Ornithogalum schmalhausenii Albov.* *Pulsatilla albana (Stev.)* *Ranunculus crassifolius A.Grossh.* *Serratula transcaucasica D.Sosn.* *Taraxacum praticolum Schischk.* *Thymus hadzhievii A.Grossh.*	WF, BOP; Laydown	Although not threatened, regionally range-restricted; PBF as per EBRD PR6 requirements.	Medium

Group		Receptor(s)	Area	Justification	Value
		Thymus karjaginii			
Endangered Birds	**Highly Sensitive Raptors**	Egyptian Vulture (PBF) Steppe Eagle (PBF) Saker Falcon (PBF) Pallas's Fish Eagle (PBF)	WF & OHTL Confirmed Possible in all areas	Listed as critically endangered or endangered on IUCN Red List. The Egyptian Vulture is an Edge of Extinction Species. CHA designated Steppe Eagle, Egyptian Vulture and Saker Falcon as PBFs Perching raptors and large-bodied birds are particularly vulnerable to wind farm and transmission line developments.	Very High
	Highly Sensitive Waterbirds	White-headed Duck (PBF) Sociable Lapwing (PBF)	Not Confirmed but Possible in all areas	Listed as critically endangered or endangered on IUCN Red List. Though not recorded during the baseline survey, classified as PBF as per EBRD PR 6 criteria Large-bodied birds and gregarious species are particularly vulnerable to wind farm and transmission line developments.	Very High
Threatened Birds	**Sensitive Raptors**	Cinereous Vulture (PBF) Eastern Imperial Eagle (PBF) Greater Spotted Eagle (PBF) Pallid Harrier (PBF) Red-footed Falcon (PBF)	Not Confirmed but Possible in all areas	Listed as vulnerable or Near threatened on the IUCN Red List. Eastern Imperial Eagle and Greater Spotted Eagle are PBFs as per EBRD PR6 requirements. Perching raptors and large-bodied birds are particularly vulnerable to wind farm and transmission line developments.	High
	Sensitive Waterbirds	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	Not Confirmed but Possible in all areas	Listed as vulnerable or near threatened on IUCN Red List. Some species are designated as PBFs as per EBRD PR6 requirements. Large-bodied birds and gregarious species are particularly vulnerable to wind farm and transmission line developments.	High

Group		Receptor(s)	Area	Justification	Value
		Northern Lapwing Eurasian Oystercatcher Black-tailed Godwit Eurasian Curlew Great Snipe Black Stork (PBF)			
	Sensitive Groundbirds	Great Bustard 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. 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) Golden Eagle (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		Black Kite (PBF) Booted Eagle (PBF) Griffon Vulture (PBF) White-tailed Sea-eagle (PBF) Lesser Kestrel (PBF) Bearded Vulture (PBF) European Honey Buzzard (PBF) Short-toed Eagle (PBF)	WF & OHTL 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's. Perching raptors and large-bodied birds are particularly vulnerable to wind farm and transmission line developments.	Medium

Group	Receptor(s)	Area	Justification	Value
	Lanner Falcon (PBF) Merlin (PBF) Eurasian Hobby (PBF) White-tailed Sea-eagle (PBF) Lesser-spotted Eagle			
Threatened Bats (PBF)	Greater horseshoe bat (Confirmed) Geoffroy's bat European free-tailed bat	Possible	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	High
Non-threatened Bats (PBF)	Whiskered bat Alcathoe bat Brown long-eared bat Eastern barbastelle Lesser noctule Common noctule Lesser noctule Nathusius's pipistrelle (Confirmed) Kuhl's pipistrelle Savii's pipistrelle Particolored bat Serotine bat Eptesicus species Soprano Pipistrelle (not confirmed)	WF BOP, OHTL	Bats are known to be particularly vulnerable to wind developments. However, these species are generally common and widespread. 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)	WF/BOP/OHTL Confirmed	This species is listed as critically endangered in the Azerbaijan Red Data Book and Vulnerable on the IUCN Red List. However, gazelle and other terrestrial, mobile mammals are not considered to be especially effected by wind developments, as wind farms and	High

Group		Receptor(s)	Area	Justification	Value
				turbines have relatively lesser habitat loss and mortality than other types of developments.	
Non-threatened Mammals	**Carnivores**	*Vulpes vulpes* *Canis aureus* *Canis lupus*	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
	Insectivores	*Erinaceus concolor* *Hemiechinus auritus*	WF/BOP /OHTL Confirmed	Hedgehogs are an important top-down control for various invertebrate populations. However, these species are not threatened or endemic and are common and widespread.	Medium
	Lagomorph	European Hare	WF/BOP /OHTL Confirmed	Rabbits are an important prey species for many carnivores and raptors. However, these species are not threatened or endemic and are common and widespread.	Medium
	Rodents	*Cricetulus migratorius* (Grey dwarf hamster) *Allactaga elater* (Small five-toed jerboa) *Allactaga williamsi* (Williams's jerboa) *Meriones libycus* (Libyan jird) *Microtus socialis* (Social vole)	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	This 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

Group		Receptor(s)	Area	Justification	Value
		Emys orbicularis	OHTL Confirmed	This turtle is listed as NT on IUCN Red List As a burrowing reptile, this species will be at risk of earthworks during construction period.	High
		Pelobates syriacus (PBF)	WF Confirmed	This toad species is listed as Vulnerable on the Azerbaijan Red Data Book. It is an endemic species	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	*Ophisops elegans*	WF/BOP OHTL Confirmed	These species are not threatened or endemic and are common and widespread.	Medium
	Snakes	*Eirenis collaris* *Xerotyphlops vermicularis* *Eryx jaculus* *Natrix tessellate* *Malpolon insignitus*	WF/BO OHTL P Confirmed	These species are not threatened or endemic and are common and widespread.	Medium
Threatened Invertebrates		*Saga ephippigera (PBF)*	WF/BOP /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)	WF/BOP /OHTL Confirmed	Some of the species found are important predators whilst others are important pollinators. However, these species are not	Medium

Group	Receptor(s)	Area	Justification	Value
	Hymenoptera (Wasps/Bees/Ants) Blattodea (Cockroaches/Termites) Hemiptera (Aphids/Cicadas/Shield Bugs) Coleoptera (Beetles) Neuroptera (Lacewings/Antlions) Lepidoptera (Butterflies/Moths)		threatened or endemic and are common and widespread.	

3.5 Potential Impacts, Mitigation, Management & Residual Impact

3.5.1 Construction Phase

HABITAT LOSS, FRAGMENTATION AND DEGRADATION

Habitat Loss

Clearing, grading, excavation and other earthworks during early construction stages results in habitat loss over the 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 3-35 Natural Habitat Loss

HABITAT	HABITAT LOSS BASED ON 30 M BUFFER FOR WTGS AND 10 M BUFFER FOR BOP AND ACCESS ROAD (WORSE CASE)
Semi Desert	0.078 km2
Marsh Area	0.0007 km2
Shrubs and Trees	0.00001km2
Mountain Steppe	0.714 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 3-36 Significance of Habitat Loss

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Semi desert	High	Minor	Minor to moderate
Marsh area	High	Minor	Minor to moderate
Shrubs & Trees	High	Minor	Minor to moderate
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 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.

Table 3-37 Residual Natural Habitat Loss

HABITAT	HABITAT LOSS BASED ON 30 M BUFFER FOR WTGS AND 10 M BUFFER FOR BOP AND ACCESS ROAD (WORSE CASE)
Mountain Steppe	0.217 km^2

Table 3-38 Residual Significance of Habitat Loss

RECEPTOR	VALUE/ SENSITIVITY	MAGNITUDE	RESIDUAL
Marsh area	High	Negligible	Minor
Shrubs & Trees	High	Negligible	Minor
Mountain steppe	High	Negligible	Minor
Semi desert	High	Negligible	Minor

BIODIVERSITY LOSS – DIRECT MORTALITY, LOWERED REPRODUCTION AND SURVIVORSHIP

Clearing, Excavation, Earthworks

Clearing of existing vegetation will result 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.

The Mediterranean Spur-thighed Tortoise (VU), a burrowing species and the Eastern Spadefoot *Pelobates syriacus* are considered as a PBFs at the project site. These species are 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 3-39 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
Mediterranean Spur-thighed Tortoise	High	Moderate	Moderate to Major
Non-threatened Herptiles	Medium	Moderate	Moderate
Saga ephippigera	High	Moderate	Moderate to Major
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 reptiles, Mediterranean Spur-thighed Tortoise away from the construction corridor. This will be undertaken via pre-construction survey to identify viable release sites, 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 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.

Table 3-40 Residual Significance of Construction Earthworks Impact

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

Receptor	Value/Sensitivity	Magnitude	Residual
Non-threatened Flora	Medium	Negligible	Negligible to minor
Mediterranean Spur-thighed Tortoise	High	Negligible	Minor
Non-threatened Herptiles	Medium	Minor	Minor
Saga ephippigera	High	Negligible	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 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.

Table 3-41 Significance of Construction Vehicular Collision Impact

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
Goitered Gazelle	High	Negligible	Minor
Non-threatened Carnivores	Medium	Negligible	Negligible to minor
Non-threatened Mammals (non-carnivores)	Medium	Minor	Minor
Mediterranean Spur-thighed Tortoise	High	Minor	Minor to moderate

Receptor Group	Value/Sensitivity	Magnitude	Significance
Non-threatened Herptiles	Medium	Minor	Minor
Saga ephippigera	High	Negligible	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.

Table 3-42 Residual Significance of Construction Vehicular Collision Impact

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
Goitered Gazelle	High	No change	Neutral
Non-threatened Carnivores	Medium	No change	Neutral
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
Saga ephippigera	High	Negligible	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.

Table 3-43 Significance of Construction "Take" Impact

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, Mediterranean Spur-thighed Tortoise	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.

Table 3-44 Residual Significance of Construction "Take" Impact

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, Mediterranean Spur-thighed Tortoise	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.

Table 3-45 Significance of Construction Littering Impact

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

Table 3-46 Residual Significance of Construction Littering Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	Minor
Threatened Birds, Bats, Mammals, Herptiles, Invertebrates	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.

Table 3-47 Significance of Construction Disturbance Impact

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

Table 3-48 Residual Significance of Construction Disturbance Impact

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

Receptor	Value/Sensitivity	Magnitude	Residual
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

Biodiversity Displacement

Dispersal and Competition

Shy 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 leve,l 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.

Proliferation of Generalists

Poor 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 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.

Table 3-49 Significance of Construction Proliferation Impact

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.

Table 3-50 Residual Significance of Construction Proliferation Impact

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.

Table 3-51 Significance of Introduced Pathogen/Invasive Species Impact

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.

Table 3-52 Residual Significance of Introduced Pathogen/Invasive Species Impact

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

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.

Table 3-53 Significance of Construction Air Pollution Impact

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

Table 3-54 Residual Significance of Construction Air Pollution Impact

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

Receptor	Value/Sensitivity	Magnitude	Residual
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.

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

Table 3-55 Significance of Construction Noise Impact

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

Table 3-56 Residual Significance of Construction Noise Impact

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

Table 3-57 Significance of Construction Lighting Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Moderate	Major
Threatened Birds	High	Moderate	Moderate to Major
Non-threatened Birds	Medium	Moderate	Moderate
Threatened Bats	High	Major	Major
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
Threatened Invertebrates (*Saga ephippigera*)	High	Moderate	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.

Table 3-58 Residual Significance of Construction Lighting Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	Minor
Threatened Birds	High	Negligible	Minor
Non-threatened Birds	Medium	Negligible	Negligible to minor
Threatened Bats	High	Negligible	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
Threatened Invertebrates (*Saga ephippigera*)	High	Negligible	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.

Table 3-59 Significance of Construction Contamination Risk Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
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.

Table 3-60 Residual Significance of Construction Contamination Risk Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
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 3-61 Significance of Soil Compaction Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFIANCE
Semi Desert	High	Moderate	Moderate to Major
Marsh Area	High	Moderate	Moderate to Major
Shrubs and Trees	High	Moderate	Moderate to Major
Mountain Steppe	High	Moderate	Moderate to Major

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

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 beneficial 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.

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

Table 3-62 Residual Significance of Soil Compaction Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFIANCE
Semi Desert	High	Negligible	Minor
Marsh Area	High	Negligible	Minor
Shrubs and Trees	High	Negligible	Minor
Mountain Steppe	High	Negligible	Minor
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

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.

The OHTL may result in fragmentation for species that exhibit strong avoidance behaviour.

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 3-63 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
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 (1) turbine locations and (2) weather conditions (visibility / flight ability). Therefore, even low predicted collision 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 spanning 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 CRM analysis in the table below. Refer to the CRM reports (provided in Appendix B) for additional detail regarding methodology and analysis of collision risk predictions.

Table 3-64 Total Annual Predicted Mortality Rates Using Collision Risk Modelling[3]

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	0.01345	74	0.0114	87
Steppe Eagle	0.187	5	0.288	3
Pallas's Fish-Eagle	0.00144	692	0	N/A
Saker Falcon	0.00315	317	0.00315	317
Tier 2				
Black Stork	0	N/A	0	N/A

[3] 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.

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
Dalmatian Pelican	0	N/A	0	N/A
Osprey	0.000466	2145	0	N/A
Bearded Vulture	0.0781	12	0.0706	14
European Honey-Buzzard	0.3953	2	0.0439	22
Oriental Honey-Buzzard	0	N/A	0	N/A
Cinereous Vulture	7.31	<1	6.69	<1
Eurasian Griffon	11.7	<1	7.95	<1
Unidentified Vulture[4] [5]	23.5	<1	20.9	<1
Short-toed Snake-Eagle	0.00818	122	0.00849	117
Booted Eagle	0.06550	15	0.0544	18
Imperial Eagle	0.00131	763	0.00228	437
Golden Eagle	0.121	8	0.0288	34
Pallid Harrier	0.0736	13	0.0579	17
Levant Sparrowhawk	0.01383	72	0	N/A
Black Kite	0.0863	11	0.138	7
White-tailed Eagle	0.0522	19	0.0522	19
Long-legged Buzzard	0.599	1	1.17	<1
Lesser Kestrel	26.9	<1	122	<1
Red-footed Falcon	0.145	6	0.534	1
Merlin	0	N/A	0	N/A
Eurasian Hobby	0.0115	86	0.0115	86
Lanner Falcon	0.023	43	0.0592	16
Peregrine Falcon	0.00177	564	0.00148	675
Tier 3				
Eurasian Marsh-Harrier	0.0648	15	0.0287	34
Hen Harrier	0.110	9	0.0692	14
Montagu's Harrier	0.148	6	0.0391	25
Eurasian Sparrowhawk	0.0454	22	0.0270	37
Rough-legged Hawk	0.0442	22	0.0246	40
Common Buzzard	0.253	3	0.0904	11

[4] 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 bird measurements and characteristics intermediate between Eurasian Griffon and Cinereous Vulture.

[5] 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
Eurasian Kestrel	8.62	<1	11.3	<1

A detailed analysis of the results of the CRM is provided in the Spring 2022 CRM report and a summary of the results is provided below.

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 5 years under the most likely collision avoidance rate scenarios modelled. Three tier 2 target species are predicted to experience more than one fatality per year under the most likely collision avoidance rate scenarios modelled (Cinereous Vulture – 7.31 fatalities predicted per year; Eurasian Griffon – 11.7 fatalities predicted per year; and Lesser Kestrel – 26.9 fatalities predicted per year). 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 (8.62 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:

Very little spring migratory passage of European Honey Buzzard was observed in spring 2022 compared with spring of 2020 or 2021. This result is likely due to interannual variation as it iis reflected both in the number of observations) and the predicted collision risk which estimates 0.0439 collision per year.

Reduced activity and collision risk of Eurasian Griffon and Cinereous Vultures was recorded in 2022 compared with the previous two spring seasons. The predicted spring collision risk for the individual species went down by 37% and 85% for Cinereous Vulture and Eurasian Griffon, respectively. However, the collision risk for the "Cinerous + Griffon" Vulture category, which is based on flight densities of both single species plus that of "unidentified vulture" went down by only 36%. This result may be due to a combination of factors such as an increase in the proportion of unidentified vultures ("Cinerous + Griffon" in Spring 2022, a decrease in the overall number of vulture observations in Spring 2022 compared to Spring 2020 and a marginal improvement in the accuracy of the field methodology.

The 2022 CRM shows a 92% reduction in the collision risk of Golden Eagles compared with the previous two springs suggesting natural cause which could include possible biological and/or stochastic influences on inter-annual variation in the occupancy of the site by this species.

Significantly higher spring migratory passage of Long-legged Buzzard was observed in spring 2022 compared with 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, as it is reflected both in the number of observations and the predicted collision risk (1.17 collisions per year).

There was a very large (20-fold) increase in the predicted spring collision risk for Lesser Kestrel in spring 2022 (321 collisions per year) compared with previous springs (32.79 collisions per year). This result may be due to a combination of factors such as a minor increase in the numbers of Spring 2022 observations and a major increase in the average duration of individual flights recorded as a consequence of the marginal improvements in the accuracy of the field methodology. However, in this instance, based on expert judgement, there is a significantly high degree of uncertainty in the Lesser Kestrel predicted collision risk rate due to the high sensitivity of the Band Model to small variations in observation radii and collision avoidance parameters (CA).

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 3-65 Significance of Bird Turbine Collision Impact

RECEPTOR	VALUE	MAGNITUDE	SIGNIFICANCE
Egyptian Vulture	Very High	Negligible	Minor
Steppe Eagle	Very High	Minor	Moderate to Major
Pallas's Fish-Eagle	Very High	Negligible	Minor
Saker Falcon	Very High	Negligible	Minor
Black Stork	Medium	Negligible	Negligible to Minor
Dalmatian Pelican	High	Negligible	Minor
Osprey	Medium	Negligible	Negligible to Minor
Bearded Vulture	High	Minor	Minor to Moderate
European Honey-Buzzard	Medium	Moderate	Moderate
Oriental Honey-Buzzard	Medium	Minor	Minor
Cinereous Vulture	High	Major	Major
Eurasian Griffon	Medium	Major	Moderate to Major
Short-toed Snake-Eagle	Medium	Negligible	Negligible to Minor
Booted Eagle	Medium	Minor	Minor
Imperial Eagle	High	Negligible	Minor
Golden Eagle	Medium	Minor	Minor
Pallid Harrier	High	Minor	Minor to Moderate

RECEPTOR	VALUE	MAGNITUDE	SIGNIFICANCE
Levant Sparrowhawk	Medium	Negligible	Negligible to Minor
Black Kite	Medium	Minor	Minor
White-tailed Eagle	Medium	Minor	Minor
Long-legged Buzzard	Medium	Moderate	Moderate
Lesser Kestrel	Medium	Major	Moderate to Major
Red-footed Falcon	High	Minor	Minor to moderate
Merlin	Medium	Negligible	Negligible to Minor
Eurasian Hobby	Medium	Negligible	Negligible to Minor
Lanner Falcon	Medium	Negligible	Negligible to Minor
Peregrine Falcon	Medium	Negligible	Negligible to Minor
Eurasian Marsh-Harrier	Low / Lower	Minor	Negligible to Minor
Hen Harrier	Low / Lower	Minor	Negligible to Minor
Montagu's Harrier	Low / Lower	Minor	Negligible to Minor
Eurasian Sparrowhawk	Low / Lower	Minor	Negligible to Minor
Rough-legged Hawk	Low / Lower	Minor	Negligible to Minor
Common Buzzard	Low / Lower	Minor	Negligible to Minor
Eurasian Kestrel	Low / Lower	Major	Minor to Moderate

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 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 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 3-66 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	0.0135	0.0114	0.0014	0.0011
Steppe Eagle	0.187	0.288	0.0187	0.0288
Bearded Vulture	0.0781	0.0706	0.0078	0.0071
Cinereous Vulture	9.03575	9.54921	0.9036	0.9549
Eurasian Griffon	14.46425	11.35079	1.4464	1.1351

These measures reduce the intensity and likelihood of the impact occurring and thus the magnitude of impact is reduced accordingly.

Table 3-67 Residual Significance of Bird Turbine Collision Impact

Receptor	Value	Magnitude	Significance
Steppe Eagle	Very High	Negligible	Minor
Egyptian Vulture	Very High	Negligible	Minor
Saker Falcon	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 3-68 Turbine Collision Risk of Bat Species

Scientific Name	Common Name	Flight Altitude -m	Migratory Behavior	Collsision Risk Estimation[6]
Rhinolophus ferrumequinum	Greater horseshoe bat	10m to few hundred	Sedentary	Low
Myotis emarginatus	Geoffroy's bat	Up to 15 in the canopy	Sedentary	Low
Myotis mystacinus	Whiskered bat	Up to 15 in the canopy	Sedentary	Low
Myotis alcathoe	Alcathoe bat	Up to 15 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	10m to few hundred	Migratory	High
Nyctalus leisleri	Common noctule	above canopy, >25->50 (forging & direct flight)	Sedentary	High
Pipistrellus nathusii	Nathusius's pipistrelle	1-20 foraging, 30-50 migration,	Migratory	High
Pipistrellus kuhlii	Kuhl's pipistrelle	1-10m up to few hundred,	Sedentary	High
Hypsugo savii	Savii's pipistrelle	10m to few hundred	Sedentary	High
Vespertilio murinus	Particolored bat	20-40, above canopy (foraging), >40-50 in direct flight	Migratory	High

[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 Behavior	Collsision Risk Estimation[6]
Eptesicus serotinus	Serotine bat	>25, foraging above canopy, >40-50 in direct flight	Sedentary	Medium
Tadarida teniotis	European free-tailed bat	10-300	Sedentary	High

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

Table 3-69 Significance of Bat Turbine Collision Impact

Receptor	Value/Sensitivity	Magnitude	Significance
Greater horseshoe bat	High	Minor	Minor to Moderate
Geoffroy's bat	High	Minor	Minor to Moderate
Whiskered bat	Medium	Minor	Minor
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
Savii's pipistrelle	Medium	Major	Moderate to Major
Particolored bat	Medium	Major	Moderate to Major
Serotine bat	Medium	High	Moderate to Major
European free-tailed 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 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 behavioural 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 Moderate or less for all species.

<u>OHTL Electrocution - Birds</u>

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.

Table 3-70 Electrocution Risk of various Bird Species

GROUPING VALUE	SPECIES OF CONCERN (IDENTIFIED/SUSPECTED)	WINGSPAN	PERCHING BEHAVIOUR	ELECTROCUTION RISK (I=UN LIKELY; II=POSSIBLE; III=HIGHLY PROBABLE)
Endangered Birds: Highly Sensitive Raptors (VH Value)	Steppe Eagle	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

Grouping Value	Species of Concern (Identified/Suspected)	Wingspan	Perching Behaviour	Electrocution Risk (I=un likely; II=possible; III=highly probable)
	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.

Table 3-71 Significance of Bird OHTL Electrocution Impact

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. 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:

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

Table 3-72 Residual Significance of Bird OHTL Electrocution Impact

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).

Table 3-73 OHTL Collision Risk of Various Bird Species

Grouping Value	Species of Concern (identified/suspected)	Risky Flight Indicators	Collision Risk (I=un likely; II=possible; III=highly probable)
Endangered Birds: Highly Sensitive Raptors (VH Value)	Steppe Eagle		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

Grouping Value	Species of Concern (identified/suspected)	Risky Flight Indicators	Collision Risk (I=un likely; II=possible; III=highly probable)
	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 Migratory	II
	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 Groundbirds (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

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

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

Table 3-74 Significance of Bird OHTL Collision Impact

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 off-taker. The following mitigation measures are recommended to reduce the impacts:

The optimal design mitigation to completely remove collision 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:

- 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.

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

Table 3-75 Residual Significance of Bird OHTL Collision Impact

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

BIODIVERSITY DISPLACEMENT

Dispersal and Competition

Shy 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 support similar habitat type 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.

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 3-76 Background noise levels (linear regression)

Wind Speed	Location A	Location B	Location C
2 m/s	20 dB	20 dB	20 dB
8 m/2	35 dB	28 dB	35 dB
10 m/s	35 dB	32 dB	38 dB
10 m/s derived	37 dB at SR closest to turbine (>2,000m)		
10 m/s (modelled)	37.2 dB at SR closest to turbine(>2,000m)		

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 elvels of 30 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 3-77 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
Endangered Fauna	Very High	Minor	Moderate to Major
Threatened Fauna	High	Minor	Minor to 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.

Table 3-78 Significance of Operational Lighting Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	SIGNIFICANCE
Endangered Birds	Very High	Moderate	Major
Threatened Birds	High	Moderate	Moderate to Major
Non-threatened Birds	Medium	Moderate	Moderate
Threatened Bats	High	Major	Major
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
Threatened Invertebrates (Saga ephippigera)	High	Moderate	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; and
- Longer wavelengths are less disruptive to the majority of wildlife.

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

Table 3-79 Residual Significance of Operational Lighting Impact

RECEPTOR	VALUE/SENSITIVITY	MAGNITUDE	RESIDUAL
Endangered Birds	Very High	Negligible	Minor
Threatened Birds	High	Negligible	Minor
Non-threatened Birds	Medium	Negligible	Negligible to minor
Threatened Bats	High	Negligible	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
Threatened Invertebrates (Saga ephippigera)	High	Negligible	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.

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.

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), inclusive of:
    - 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 Biodiversity Offset Plan
- Preparation of Collision Risk Management Plan (CRMP) and Bird and Bat Fatality Monitoring Plan (BBFMP)
- Carry out preconstruction surveys, and implementation of actions as per the above plans.
- Preparation of Framework CESMP, inclusive of:
    - General Site Controls
    - Solid Waste Control Plan
    - 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

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.

POST-CONSTRUCTION

The following outline the mitigation requirements post-construction:

- Biodiversity Monitoring and Evaluation Requirements as outlined in the BAP.

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.
Chance Find Procedure (Part of CESMP)	Construction	The Biodiversity Chance Find Procedure provides a clear instruction to the construction team on the protocol to be followed in the event that any elements of concern are

Plan / Procedure	Project Phase	Purpose and Key Requirements
		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 Kestrel, 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 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, operation and decommissioning works, to protect species of conservation concern. The plans will include:

Plan / Procedure	Project Phase	Purpose and Key Requirements
		• 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, 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 for bird species produced by additive collision 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

[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.

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
Red-footed Falcon	0.145	0.534
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. Again, 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.

Figure 5-1 Northbound Spring Migration

Figure 5-2 Northbound Spring Migration

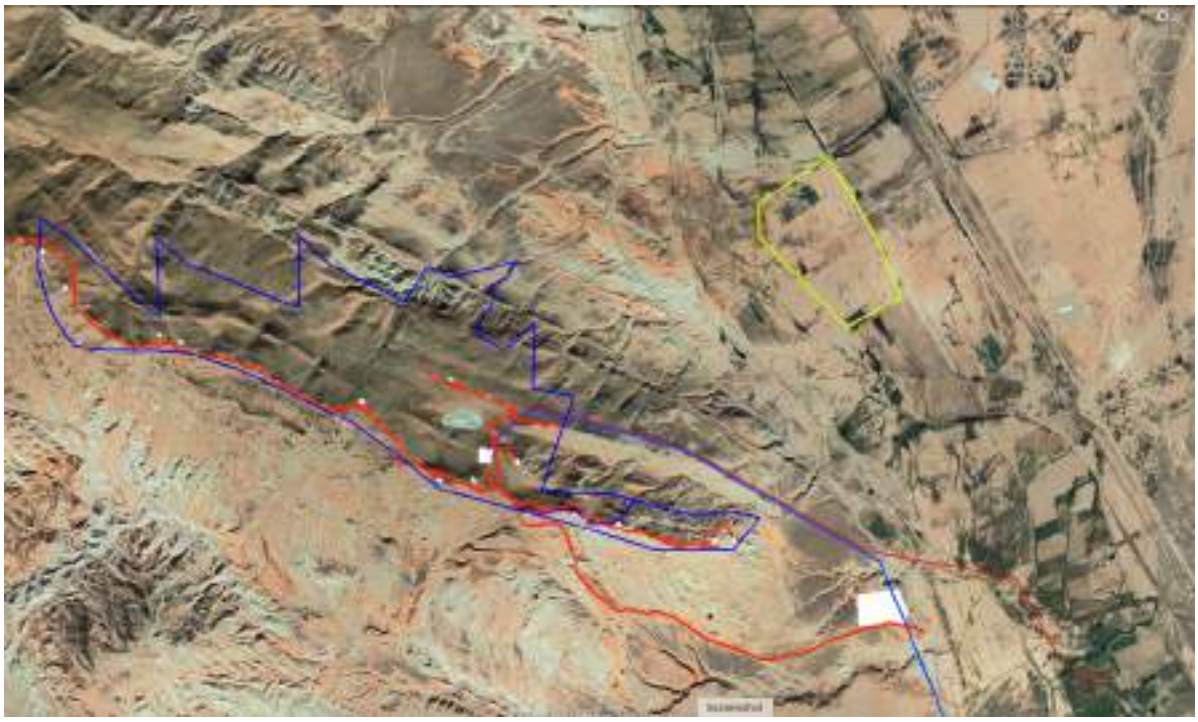
Southbound Autumn Migration

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 behavioural 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.

<u>OHTL Electrocution - Birds</u>

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. 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. 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

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.
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.

Project	Operation
	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

Khizi 3 Wind Farm Project
Khizi Region
Azerbaijan

Critical Habitat Assessment – Final Report

Prepared for:

March 2023, V8

DOCUMENT INFORMATION

PROJECT NAME	Khizi-3 Wind Farm Project, Khizi Region, Azerbaijan
5CS PROJECT NUMBER	1305/001/088
DOCUMENT TITLE	Critical Habitat Assessment (CHA) – Final Report
CLIENT	ACWA Power
5CS PROJECT MANAGER	Eva Oberholzer
5CS PROJECT DIRECTOR	Ken Wade

DOCUMENT CONTROL

VERSION	VERSION DATE	DESCRIPTION	AUTHOR	REVIEWER	APPROVER
1	26 May 2021	Critical Habitat Assessment (CHA) – Targeted	SB	RMJ	KRW
2	6 December 2021	Updated Critical Habitat Assessment (CHA) – Targeted	SB	KRW	KRW
3	20 April 2022	Updated Critical Habitat Assessment (CHA) – Targeted	SB	KRW	KRW
4	17th May 2022	Final Report for Disclosure	SB	ST/KRW	KRW
5	24 June 2022	Updated as per MG (RINA) Comments	SB	RMJ	KRW
5.1	29 June 2022	Updated as per CG comments	SB	RMJ	KRW
6	27 Oct 2022	Final Report	SB	RMJ	KRW
8.0	30th March 2023	Final Report	SB	KRW/EMO	KRW

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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' 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 organizations 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

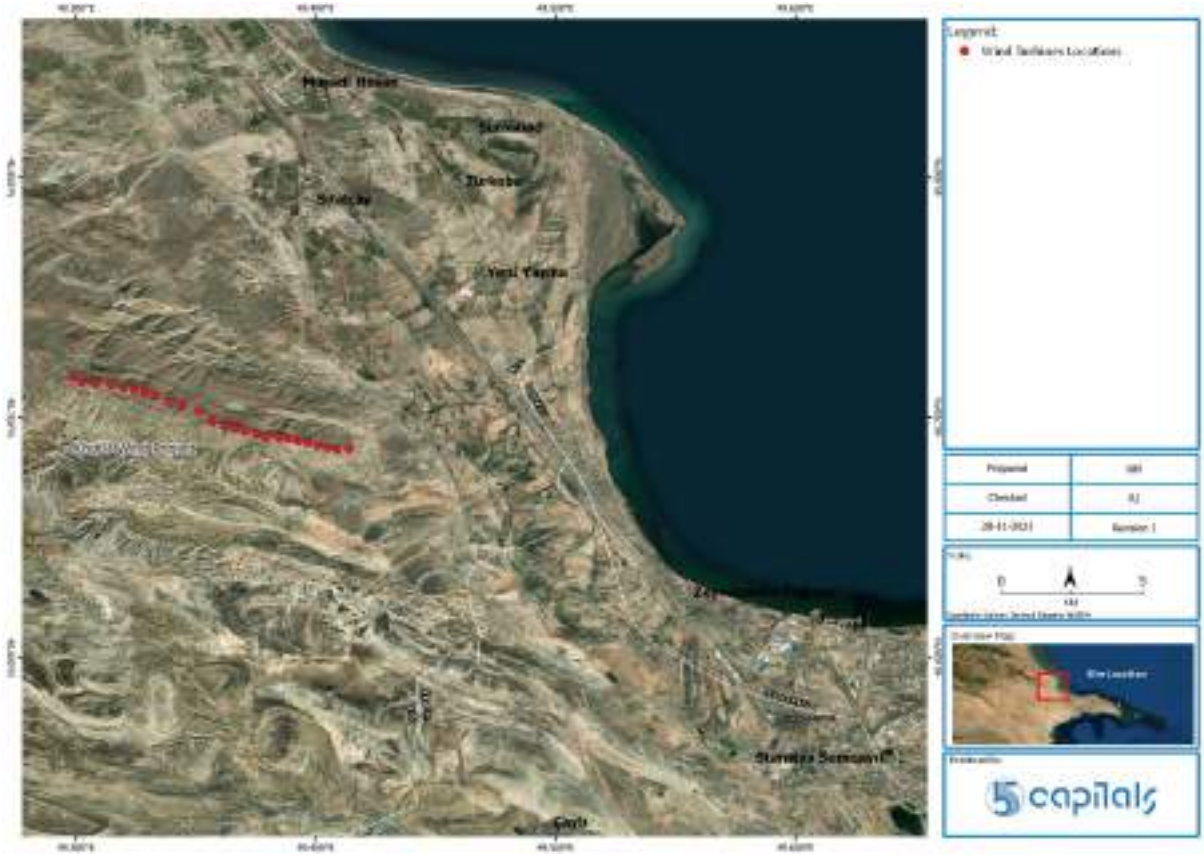
A CHA Screening exercise was previously undertaken for the project, which identified species of concern which have the potential to trigger criticality.

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

The project is a proposed wind farm project, which lies within the Absheron-Gobustan region in eastern Azerbaijan.

Figure 1-1 Project Area



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;

A. 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 OHTL Location Map

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

EBRD, IFC, and ADB have each produced criteria for defining Critical Habitat. While generally aligned, there is some variation among the CH criteria used by these different lenders. All of the CH criteria from these three institutions were used in the present analysis, and are listed and summarized below, grouped in terms of rough equivalency across the institutions:

- 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); and
- 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:

a) 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:

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

a) 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:

a) 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.

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] 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.

1. Determine the largest Area of Influence for the species based on the project's identified impacts and the species' ecology (e.g. 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 (e.g. home range size). The EAAA would be considered as the project boundaries plus the buffer. However, the entire Project footprint needs 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 a 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 of Project's footprint is utilized 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 real 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 the '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 areas, 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 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.

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 honors 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 than 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.
- The EAAA for Eastern Spadefoot (a toad) may be considered as quite restricted due to its habitat requirements, and likely would not extend beyond a 2km 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, nest searches and transect surveys. Habitat does not appear suitable for stopovers or	Global population currently estimated at 5300-8700 individuals. Therefore >26 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
		wintering (no water bodies).		
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 multiple survey efforts.	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	This species was not identified during Screening as it is vagrant in the region. It's known range typically does not extend west of the eastern boundary of the Caspian Sea. A single record was obtained during one field survey.	Global population currently estimated at 1000-2499 individuals. Therefore >5 individuals would need to be present within the EAAA to trigger CH.	Although one individual was recorded, it was considered a vagrant sighting. Criticality is unlikely. However, will be considered a PBF with NNL requirements in place.
*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.				

Species	IUCN	Baseline Study	Global Population	Conclusion
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.
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.

Species	IUCN	Baseline Study	Global Population	Conclusion
Red-footed Falcon	VU	Recorded during multiple survey efforts.	Global population currently estimated at 287500-400000 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.
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.
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. A total of 1 individual was recorded during VP surveys from Spring 2020-2021 during the month of April. OHTL Surveys were undertaken. A total of 5 observations were made during Summer 2021 and 1 observations during Autumn 2021.	~20	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.
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 9 observations were recorded during VP surveys from Spring 2020-Spring 2021 during the months of May and June. An additional 1 observation was recorded in Spring 2022 in May. During Breeding Bird surveys in 2021, 1 individual was recorded, although no nests were found or breeding behavior. 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	~100	The EAAA is not considered an important

Species	RDB Status	Survey Results	National Population	Conclusion
		a passage migrant and winter visitor in the Absheron-Gobustan Region. A total of 29 observations were recorded during VP surveys from Spring 2020-Spring 2021 during the months of January, March, April, September and October. An additional 1 observation was recorded in Spring 2022 in May. During Breeding Bird surveying in Summer 2020, an estimated 10 birds were recorded. (Number of birds estimated by surveyor). None were observed during Summer or Autumn 2021 OHTL surveying.		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. A total of 2,226 observations were recorded during VP surveys from Spring 2020-2021 throughout all months excepting December. Additionally, a total of 636 observations of "unidentified Vulture" of which likely 1/3 to 1/2 is attributable to Cinereous Vulture were recorded during VP surveys from Spring 2020-2021 throughout all months. A total of 257 observations were recorded during Spring 2022 (March, April and May). During Breeding Bird surveying in Summer 2020, an estimated 14 birds were recorded. (Number of birds estimated by surveyor). During Breeding Bird surveying in Summer 2021, a total of 3 observations were recorded, although no on-site breeding was recorded. OHTL Surveys were undertaken. A total of 11 observations were made during Summer 2021 and 233 observations during Autumn 2021.	~300	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
		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.		
Long-legged Buzzard	EN	It is a native breeding bird within the Absheron-Gobustan Region. A total of 212 observations were recorded during VP surveys from Spring 2020-Spring 2021. The highest number of observations occurred during the months of May and June. A total of 178 observations were recorded during Spring 2022 (March, April and May). During Breeding Bird surveying in Summer 2020, an estimated 6 birds were recorded. (Number of birds estimated by surveyor). During Breeding Bird surveying in Summer 2021, 12 observations were recorded. A probable nesting location was identified but not yet confirmed in Summer 2021. During raptor nest surveys in Spring 2022, one pair was observed nesting, and the nest location is located 530m and 550m away from planned WTF K10 and K11 respectively. OHTL Surveys were undertaken. A total of 78 observations were made during Summer 2021 and 58 observations during Autumn 2021.	~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.
Booted Eagle	EN	It is a passage migrant within the Absheron-Gobustan Region. A total of 16 observations were recorded during VP surveys from Spring 2020-Spring 2021 during the months of March, April, May, and	~100	The EAAA is not considered an important concentration or core, vital habitat for this species'

Species	RDB Status	Survey Results	National Population	Conclusion
		October. None have been recorded during Summer or Autumn OHTL surveying.		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 60 observations were recorded during VP surveys from Spring 2020-Spring 2021, the majority recorded during the months of March, April and May. An additional 5 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 5 observations were recorded during VP surveys from Spring 2020-2021 during the month of January. An additional single observation was made in February and an additional single observation was made in March making 7 observations in total. 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. A total of 3 observations were recorded during VP surveys from Spring 2020-Spring 2021 during the months of February and April. OHTL Surveys were undertaken. A total of 1 observations were made	~100	The EAAA is not considered an important concentration or core, vital habitat for this species' national population. Criticality is unlikely. However,

Species	RDB Status	Survey Results	National Population	Conclusion
		during Summer 2021 and 2 observations during Autumn 2021.		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, 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.

ECOLOGY & CONSERVATION

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.

The primary threat is presumed to be illegal hunting during migration and on wintering grounds, resulting in low adult survival.

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.

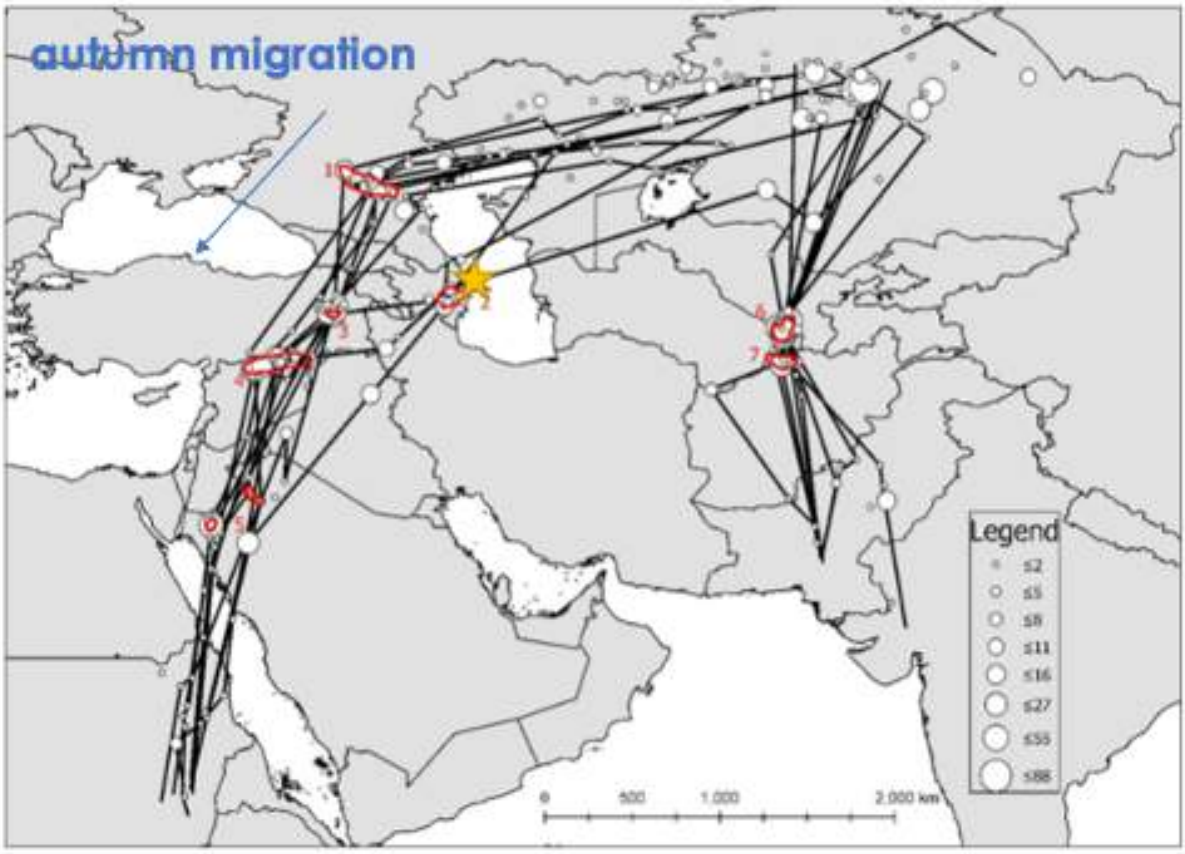
Figure 3-1 Sociable Lapwing Distribution

Figure 3-2 Sociable Lapwing Distribution (cont.)

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

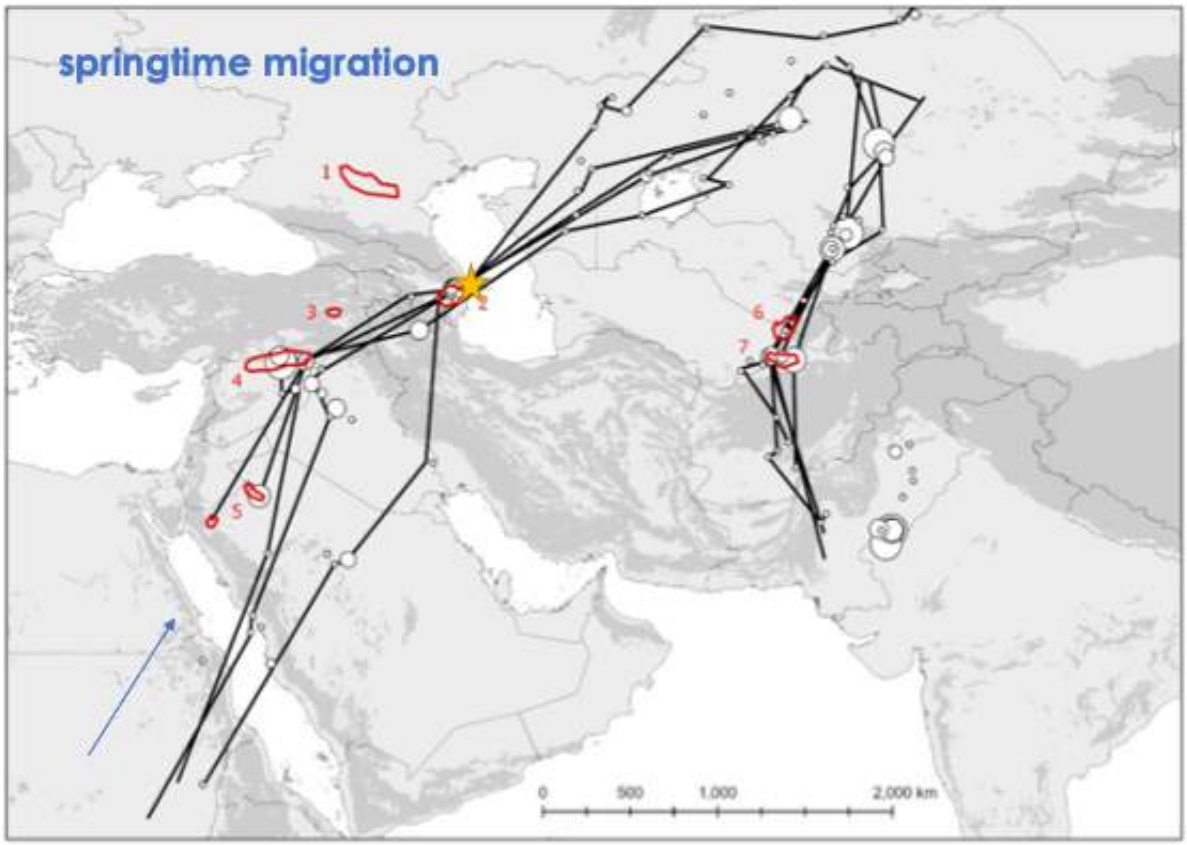


This figure, extracted from "Migration strategy, site fidelity and population size of the globally threatened Sociable Lapwing *Vanellus gregarius*" (2021) shows the southbound autumn migration of birds leaving from breeding grounds and heading towards overwintering areas.

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.

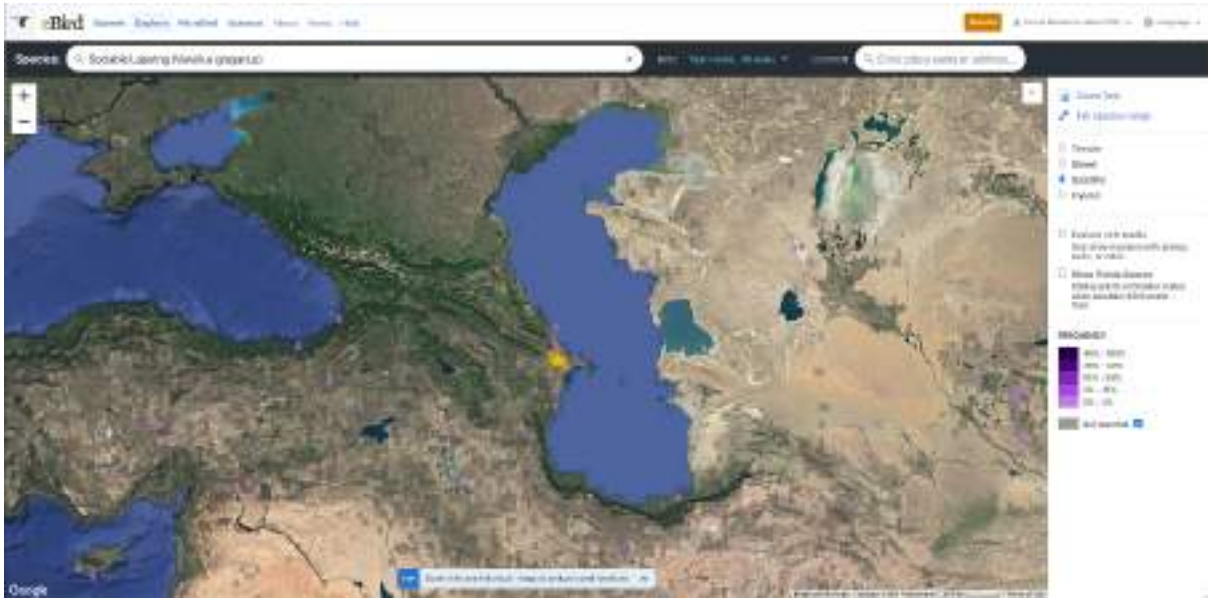
Typically, the birds spent longer time periods at multiple stopovers and staging areas during the southbound autumn migration, but during the spring return to breeding grounds took more direct pathways. It would appear that the potential crossovers in spring return migration across the Absheron peninsula (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.

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.

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

Stakeholder Consultations

As part of the ESIA stakeholder consultation process, communications with Ministry of Environment and Natural Resources (MENR), the Environmental Regulator regarding the existing Yani Yeshma Wind Farm was undertaken. 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 3.8km to the north of the proposed project area.

Figure 3-8 Location of Yani Yashma Wind Farm

As part of the CHA, Sociable Lapwing leading researcher 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; and
- 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

Project Surveys

Bird surveys that have been undertaken include:

- Vantage Point Surveys as per Scottish Natural Heritage (now NatureScot) Guidelines, during the seasons of Spring 2020, Autumn 2020, Winter 2020-2021, Spring 2021, Summer 2021, and Spring 2022;
- OHTL Surveys were undertaken in Summer 2021 and Autumn 2021;
- Breeding Bird / Nest Surveys were undertaken in Summer 2020 and Spring 2022; and
- Transect Line Surveys were undertaken in Spring 2022.

Data shows that the period of highest likelihood for presence of Sociable Lapwing in project area is between early March to mid-April. Survey efforts during Spring have been robust, with VP, transect and breeding bird surveys having taken place throughout Spring 2020, Spring 2021 and Spring 2022.

To date, no biodiversity surveys spanning Spring 2020 - Spring 2022 have recorded this species within the project site.

ANALYSIS

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.

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, it is 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, due to rapid population decline across much of its global range.

ECOLOGY & CONSERVATION

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.

DISTRIBUTION

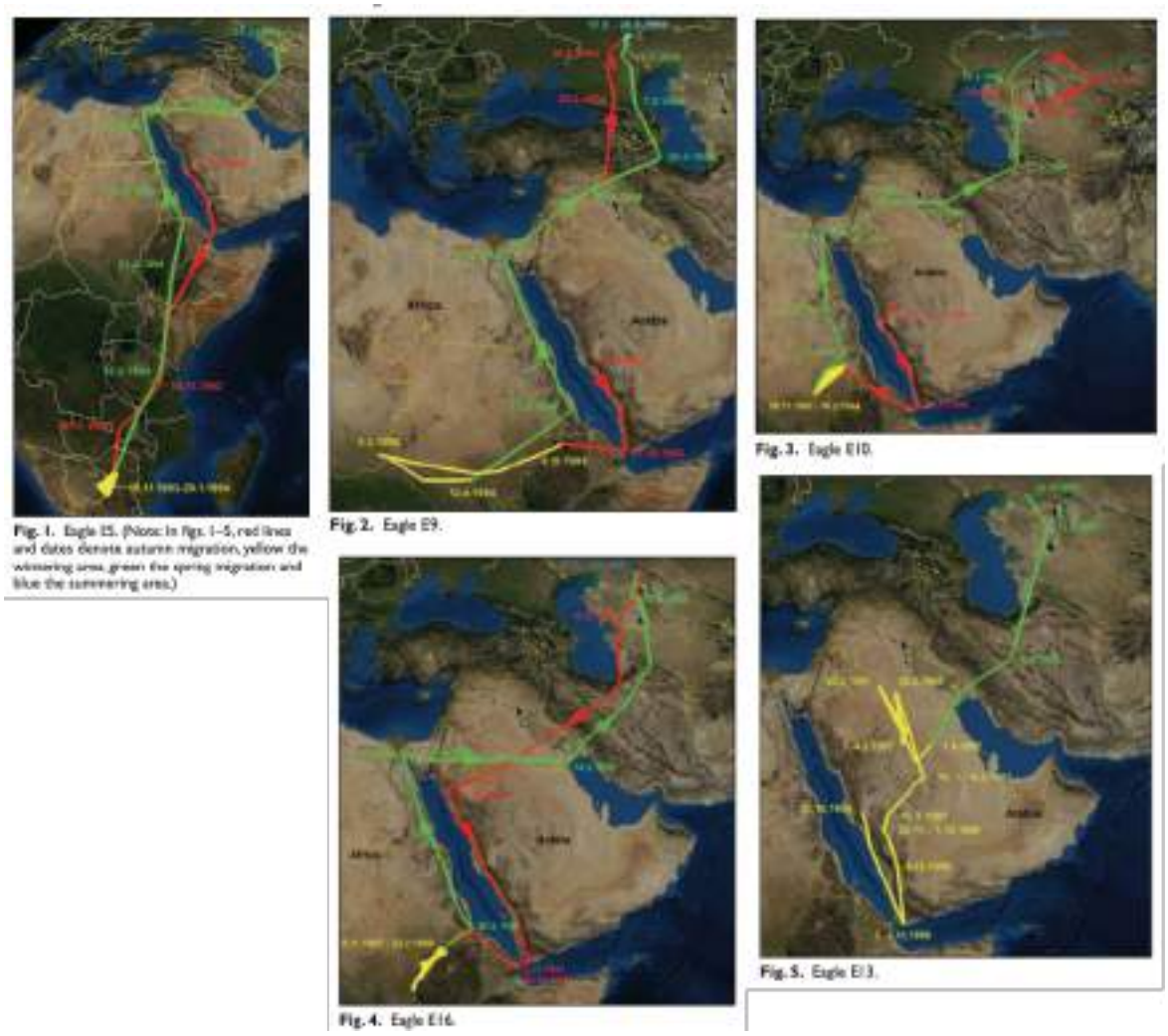
It is a passage migrant through Azerbaijan, crossing southbound in the autumn months and returning northbound in the spring months to breed in the summer months. Migrants leave their breeding grounds between August and October/November, returning between January and May. It avoids sea crossings and thus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

Figure 3-10 Steppe Eagle Distribution

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.

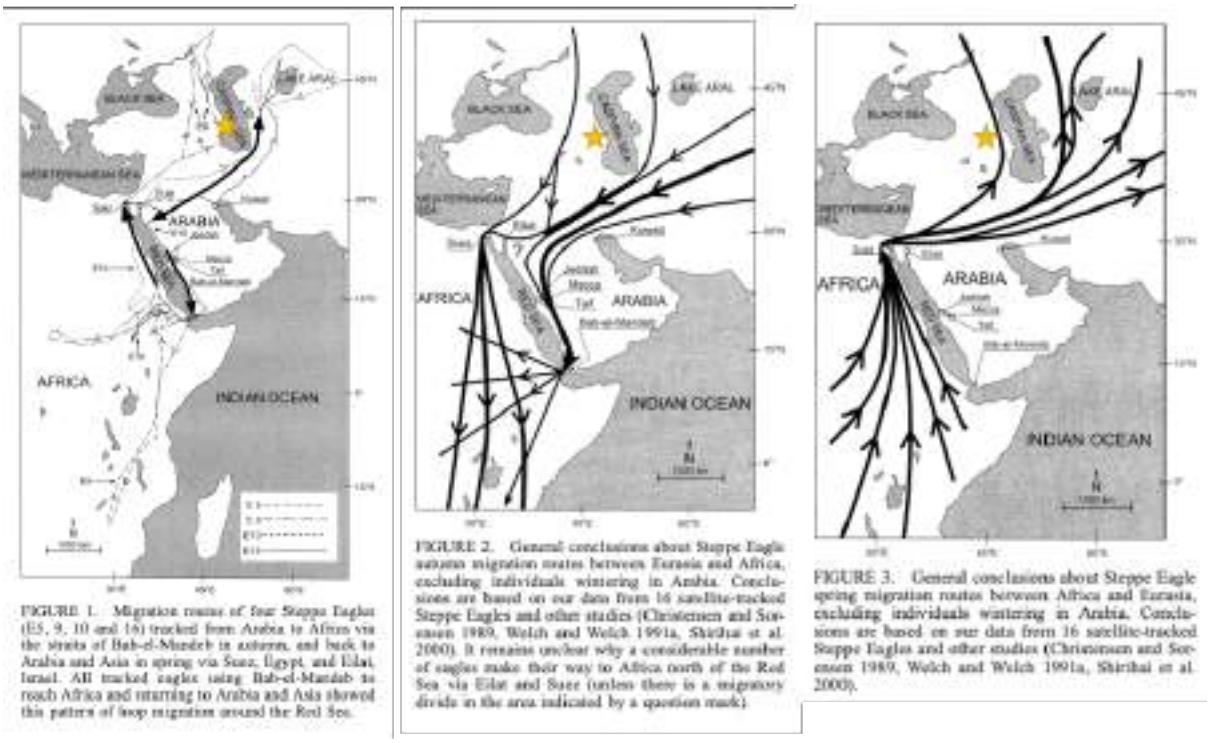
Figure 3-11 Steppe Eagle Migration Flight Paths[3]



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.

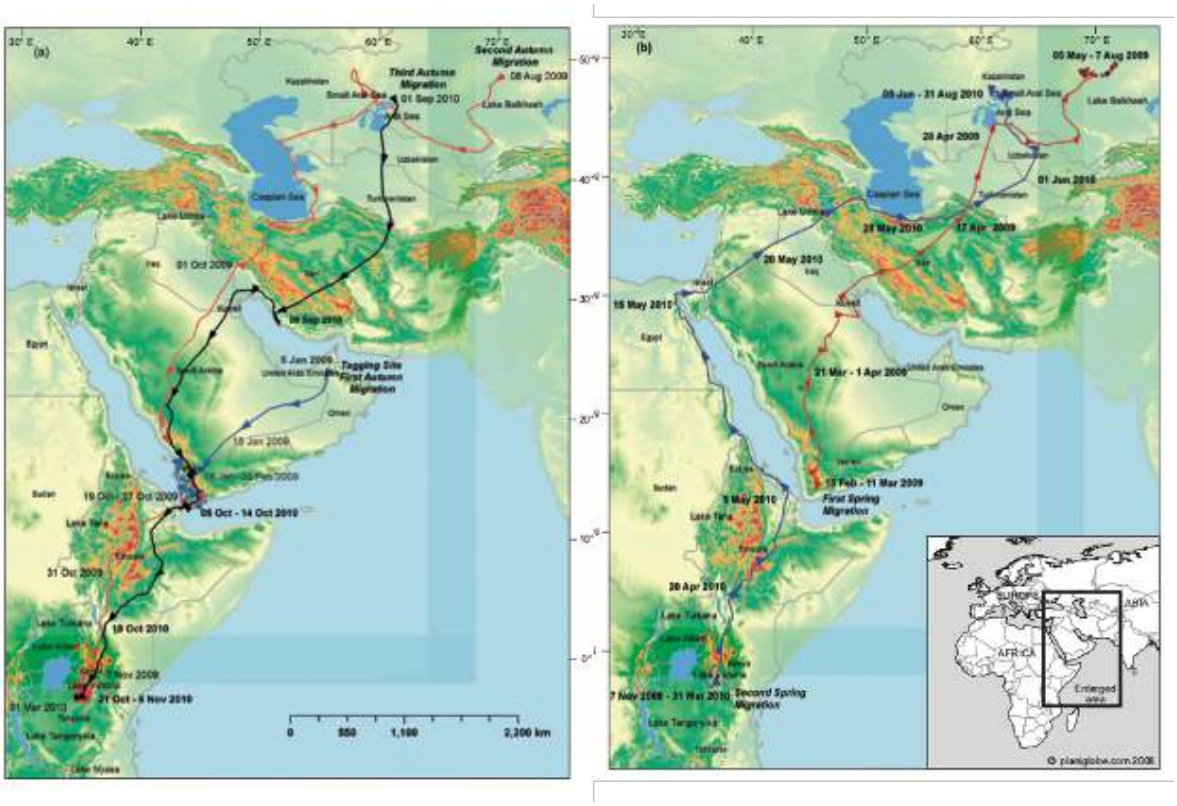
Figure 3-12 Steppe Eagle Migration Flight Paths[4]



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.

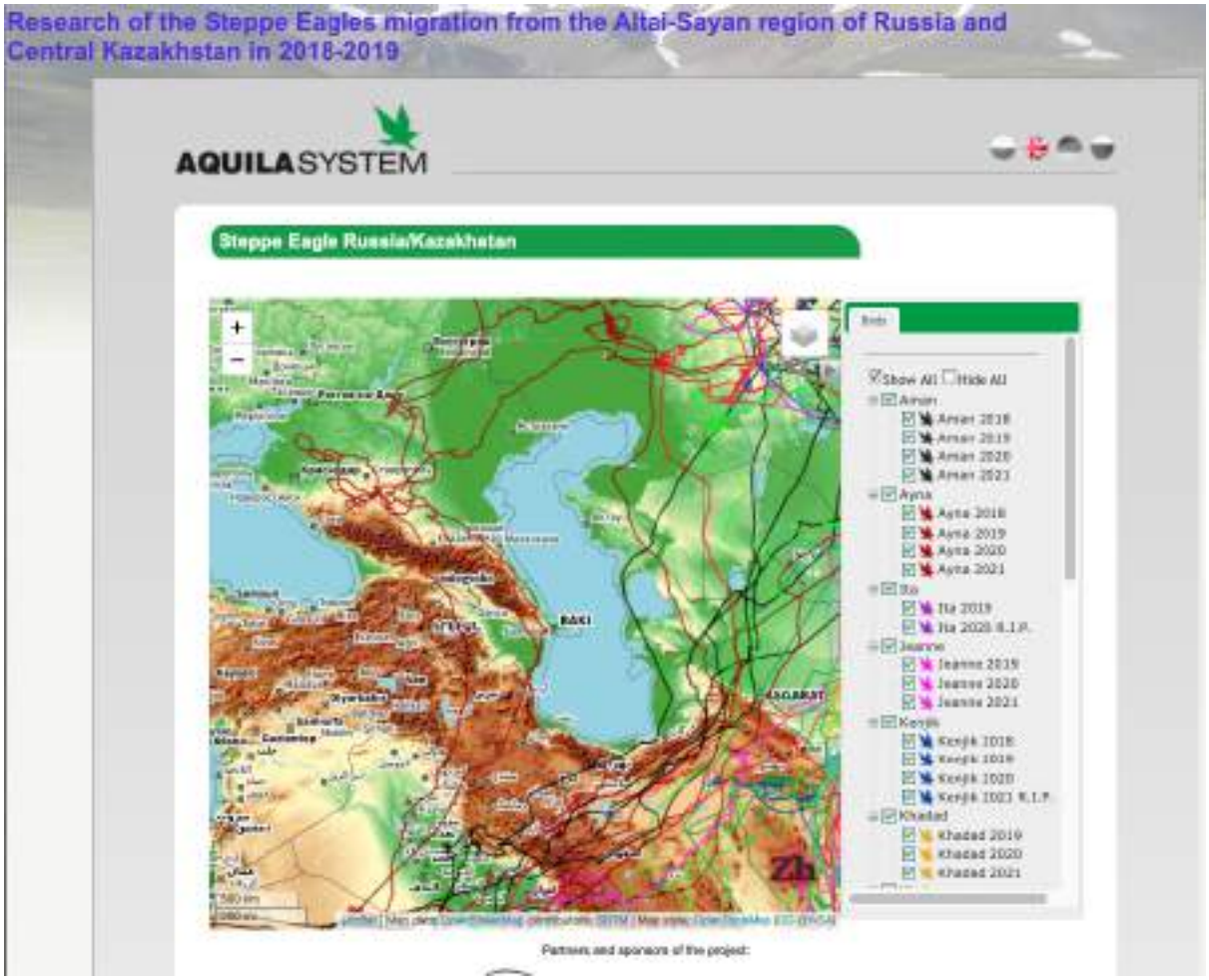
Figure 3-13 Steppe Eagle Migration Flight Paths[5]



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.

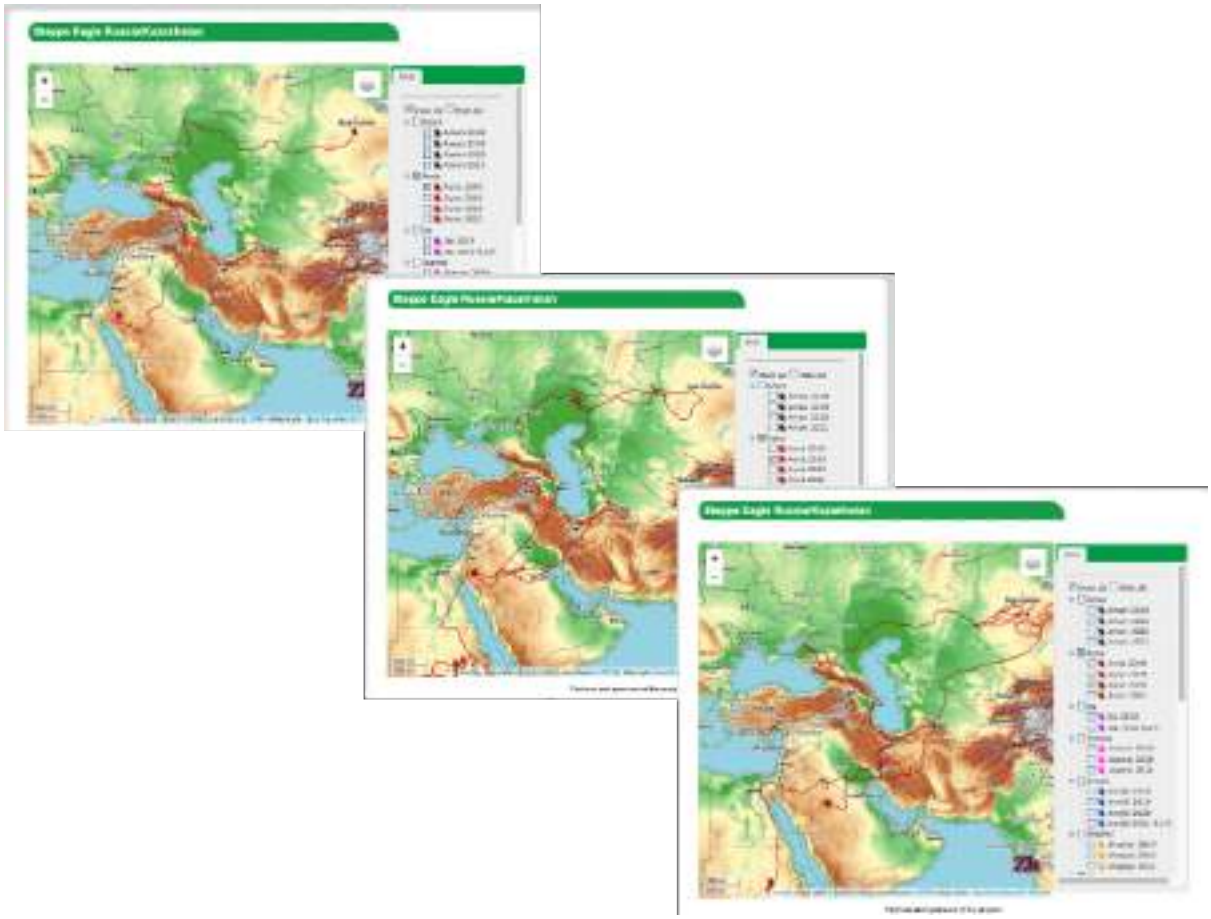
Figure 3-14 Steppe Eagle Migration Flight Paths[6]



The above figure showcases that the majority of tagged eagles utilized the eastern migratory pathway whilst a single individual (out of 14 tracked birds) utilized 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

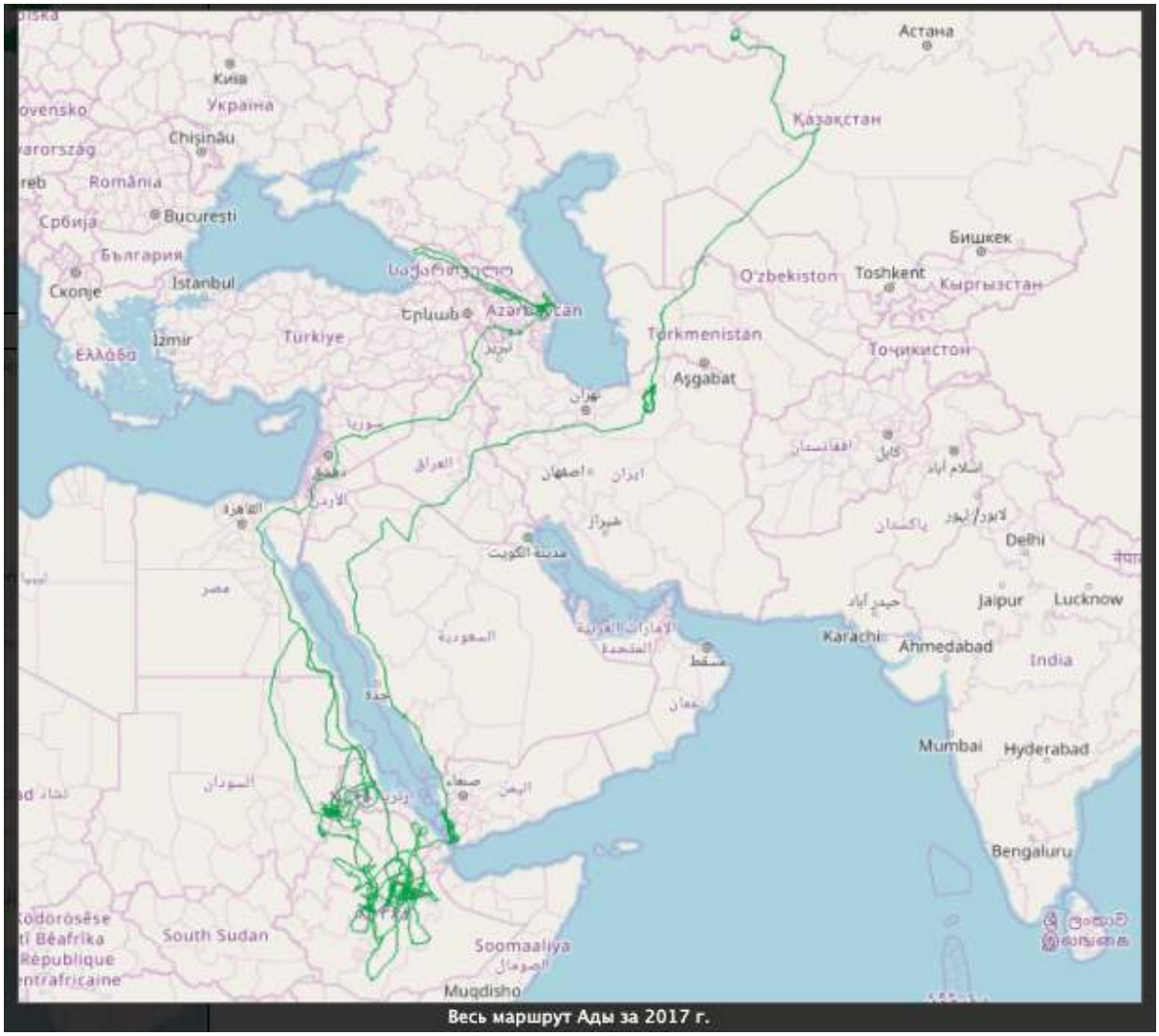
Figure 3-15 Steppe Eagle Migration Flight Paths[7]



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]



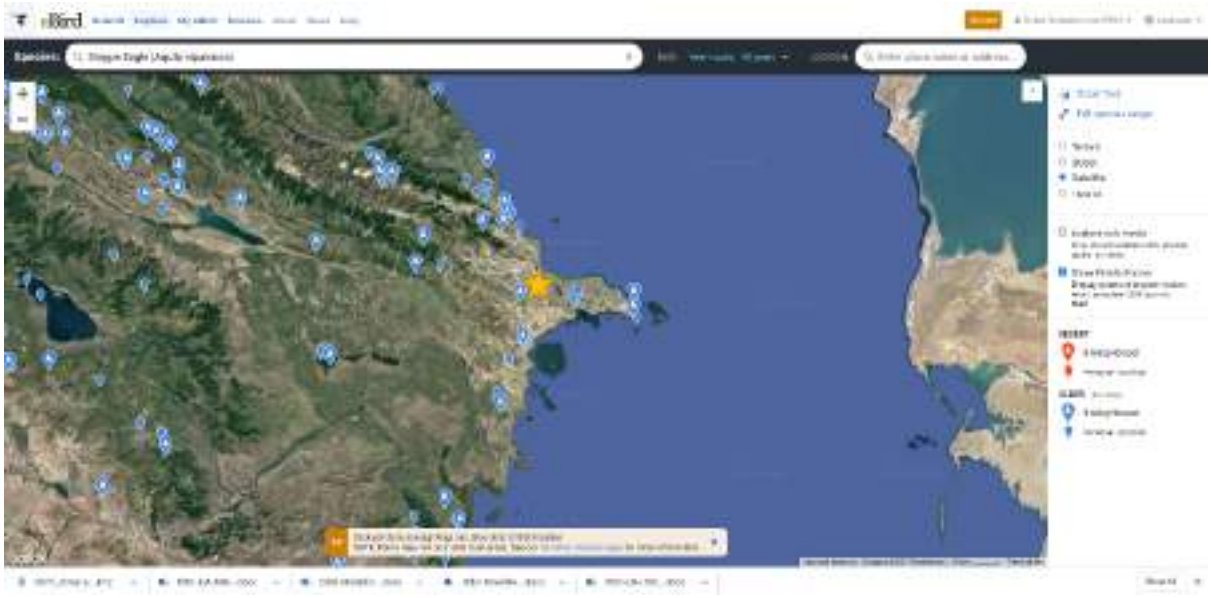
The above figure provides another example of an individual which utilized a clockwise strategy, (heading south on the east of the Caspian Sea, and heading north on the western coast of the Caspian Sea and passing the Absheron peninsula) indicating that although it appears to be less preferred than the 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

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)



Project Surveys

Bird surveys that have been undertaken include:

- Vantage Point Surveys as per Scottish Natural Heritage (now NatureScot) Guidelines, during the seasons of Spring 2020, Autumn 2020, Winter 2020-2021, Spring 2021, Summer 2021, and Spring 2022;
- OHTL Surveys were undertaken in Summer 2021 and Autumn 2021;
- Breeding Bird / Nest Surveys were undertaken in Summer 2020 and Spring 2022; and
- Transect Line Surveys were undertaken in Spring 2022.

The records of Steppe Eagle captured during the surveys are provided in the table below.

Table 3-4 Steppe Eagle Records

SPECIES	VP SURVEYING	OHTL SURVEYING	OTHER SURVEYING
Steppe Eagle	A total of 150 observations were recorded during Spring 2020/21 (split into two parts), Autumn 2020, Winter 2021, and Summer 2021, (the majority during April and May).	Summer 2021 – 3 observations Autumn 2021 – 29 observations	N/A

Species	VP Surveying	OHTL Surveying	Other Surveying
	Spring 2022 was surveyed across March, April and May; a total of 45 observations were recorded during 144 survey hours.		

Analysis

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.

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 150 observations were made over the course of four seasons, with as many as 80 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.

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.

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.

Project Surveys

Bird surveys that have been undertaken include:

- Vantage Point Surveys as per Scottish Natural Heritage (now NatureScot) Guidelines, during the seasons of Spring 2020, Autumn 2020, Winter 2020-2021, Spring 2021, Summer 2021, and Spring 2022;
- OHTL Surveys were undertaken in Summer 2021 and Autumn 2021;
- Breeding Bird / Nest Surveys were undertaken in Summer 2020 and Spring 2022; and
- Transect Line Surveys were undertaken in Spring 2022.

A total of 19 observations were recorded during VP surveys during the year covering Spring 2020-2021: 1 observation was recorded in March, 2 in April, 7 in May, and 9 in June. A total of 2 observations were made in Spring 2022 in the month of May.

During Breeding Bird surveys in 2021, 1 individual was observed, although no nests or breeding behavior was confirmed.

OHTL Surveys were undertaken. A total of 21 observations were made during Summer 2021 and 0 observations during Autumn 2021.

ANALYSIS

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.

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-Gobustan region. The current total estimate is around 10 breeding pairs within the EAAA, which would roughly translate to maximum 40-50 birds annually (including non-breeding juveniles), (as *per comm*. with member of Azerbaijan Ornithological Society), which falls under the critical threshold.

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.

ECOLOGY & CONSERVATION

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.

DISTRIBUTION

It is a 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

Project Surveys

Bird surveys that have been undertaken include:

- Vantage Point Surveys as per Scottish Natural Heritage (now NatureScot) Guidelines, during the seasons of Spring 2020, Autumn 2020, Winter 2020-2021, Spring 2021, Summer 2021, and Spring 2022;
- OHTL Surveys were undertaken in Summer 2021 and Autumn 2021;
- Breeding Bird / Nest Surveys were undertaken in Summer 2020 and Spring 2022; and
- Transect Line Surveys were undertaken in Spring 2022.

A total of 1 individual was recorded during VP surveys from Spring 2020-2021 during the month of October. OHTL Surveys were undertaken. A total of 5 observations were made during Summer 2021 and 0 observations during Autumn 2021.

ANALYSIS

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.

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 a single individual was sighted 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.

DISTRIBUTION

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

Project Surveys

Bird surveys that have been undertaken include:

- Vantage Point Surveys as per Scottish Natural Heritage (now NatureScot) Guidelines, during the seasons of Spring 2020, Autumn 2020, Winter 2020-2021, Spring 2021, Summer 2021, and Spring 2022.
- OHTL Surveys were undertaken in Summer 2021 and Autumn 2021
- Breeding Bird / Nest Surveys were undertaken in Summer 2020 and Spring 2022
- Transect Line Surveys were undertaken in Spring 2022

A total of 2 observations were recorded during VP surveys from Spring 2020-2021: 1 in January, 1 in April. A total of 1 observation was made in Spring 2022 in April.

OHTL Surveys were undertaken. A total of 13 observations were made during Autumn 2021.

ANALYSIS

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.

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 uplisting 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
- 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.

3.2.6 Red-footed Falcon

The Red-footed Falcon is listed as **Vulnerable** on the IUCN Red List, due to its global population experiencing a rapid population decline, owing to habitat loss and degradation.

DISTRIBUTION

It is listed as a passage migrant in Absheron-Gobustan and Azerbaijan, and may breed, but only sporadically, in western Azerbaijan.

Project Surveys

Bird surveys that have been undertaken include:

- Vantage Point Surveys as per Scottish Natural Heritage (now NatureScot) Guidelines, during the seasons of Spring 2020, Autumn 2020, Winter 2020-2021, Spring 2021, Summer 2021, and Spring 2022.
- OHTL Surveys were undertaken in Summer 2021 and Autumn 2021
- Breeding Bird / Nest Surveys were undertaken in Summer 2020 and Spring 2022

- Transect Line Surveys were undertaken in Spring 2022

It is listed as a passage migrant in Absheron-Gobustan and Azerbaijan, and may breed, but only sporadically, in western Azerbaijan.

A total of 3 observations were recorded during VP surveys from Spring 2020-2021 during the months of March and October. A total of 1 observation was made in Spring 2022 in the month of April. OHTL Surveys were undertaken. A total of 0 observations were made during Summer and Autumn 2021 OHTL Surveying.

ANALYSIS

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.

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 uplisting 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 Red-footed Falcon
- Red-footed Falcon are passing through the project airspace only
- Nearby IBAs, such as Alty Agach and Mount Gush-Gaya, have not identified Red-footed Falcon as a trigger species, therefore this region does not satisfy the KBA standard (and thus CH standard) for migrating Red-footed Falcon

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 iii is challenging. However, the relatively limited numbers of bats recorded from surveys indicate that Criterion iii (significant gathering of migratory/congregatory species) would be extremely unlikely to be triggered.

Regardless, all members of the order Chioptera 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 bats confirmed or considered likely occurring within project EAAA[9]):

- Greater Horseshoe Bat
- Geoffrey's Bat
- Whiskered Myotis
- Alcathoe Bat
- Brown Long-eared Bat
- Eastern Barbastelle
- Common Noctule
- Lesser Noctule
- Nathusius's Pipistrelle
- Kuhl's Pipistrelle
- Soprano Pipistrelle
- Savii's 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.*

- Particolored Bat
- Serotine Bat
- European Free-tailed 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 which are listed on the IUCN Red List of threatened species and for which recorded distribution includes the Absheron-Gobustan region.

- 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, **only one species** was recorded to occur within the Khizi WF Project Area during botanical surveying.

Theodor's Saint John's Wort *Hypericum theodori* was recorded on site during 2020 botanical surveys of the wind farm site and 2021 botanical surveys of the footprint of the balance of plant, 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).

This species 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. The total size of the EAAA (which includes both WF projects in the same EAAA patch is 981 km2.

Figure 5-1 EAAA of *Hypericum theodori* as per Habitat Requirements

The species has a distribution provided on IUCN Red List which appears to be outdated. The full EOO as provided on the IUCN Red List Site does not include the project site, and a cross-check of Kew Royal Botanic Gardens' Plants of the World Online database shows that the same species is actually listed as a Transcaucasus regional species, with records from Georgia, Armenia, Azerbaijan and the Transcaucasus portion of Russia.

Figure 5-2 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 this species, as:

- The IUCN Red List states the assessment was done in 2008, 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 km2.

The total coverage of the EAAA (981 km2) constitutes 0.19 % of the EOO (500,000 km2), which is under the thresholds needed to trigger criticality. This species as well as any other IUCN listed (which have not been identified on site to date) endangered 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).

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. None of the RDB EN species recorded were considered to be occurring in high enough concentration to trigger criticality under this Criterion.

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
Acantholimon schemahense A.Grossh.	frequent	VU D2	Species listed as VU in the Red Data Book

Species	Abundance	RDB Status	Conclusion
			cannot trigger criticality but will be considered as Priority Biodiversity Features.
Alcea kusjariensis Iljin.	occasional	EN B1ab(v)+B2ab(v)	Present in Azerbaijan, Armenia and Georgia. Total EOO > 200,000 km2. Total AOO unknown. See subsection below.
Atropa caucasica Kreyer.	Rare	VU B1b(i,iii)	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.
Cladochaeta candidissima M.B.	Rare	VU A2c+3c; B1ab(i,iii,iv)	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.
Iris acutiloba C.A.Verz.	rare	EN B2ab(iii) c(v)	Present in North Caucus, Transcaucasus, Iran, Turmenistan, and Turkey. Total EOO > 2 million km2. Total AOO unknown. See subsection below.
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.
Ophrys caucasica G.Woron.	Rare	VU A2c+3c	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.
Orchis caspia Trautv.	Rare	VU A2c+3cd	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
Punica granatum L.	Rare	VU B1ab (i,ii,iii,v)+2ab(i,ii,iii,v)	Species listed as VU in the Red Data Book cannot trigger criticality but will be considered as Priority Biodiversity Features.
Viola caucasica Kolenat.	rare	EN B2ab(ii,iii,iv)	EOO includes North Caucasus, Transcaucasus EOO > 200,000 km2; AOO unknown. See subsection below.
(FROM OHTL ALINGMENT ONLY)			
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.
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.

Alcea kusjariensis Iljin. was recorded as "Occasional" in the Botany Data Set, compiled by the botanist from site surveys. This species is Present in Azerbaijan, Armenia and Georgia. Total EOO > 200,000 km2. Total AOO unknown. 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.

Viola caucasica Kolenat was recorded as "Rare" in the Botany Data Set, compiled by the botanist from site surveys. This species EOO includes North Caucasus, Transcauacsus. EOO > 200,000 km2; AOO unknown. 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.

Consultations with a second national botanist specialist (different from the original surveying botanist) have led to the following information:

Both *Alcea kusjariensis* and *Viola caucasica* are not considered relevant to the project site or adjacent areas as they are Alpine Meadow species and the altitude of the project site and the type of habitat there is not suitable for these 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 both species will be treated as PBFs).

Iris acutiloba C.A.Verz. was recorded as "Rare" in the Botany Data Set, compiled by the botanist from site surveys. This species is present in North Caucus, Transcaucus, Iran, Turmenistan, and Turkey. Total EOO > 2 million km2. Total AOO unknown.

The national botanist specialist has provided the below maps indicating the EAAA around the project area and associated roads:

Figure 5-3 EAAA *Iris acutiloba*

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. The geographic range of this species in Azerbaijan is presented below:

Figure 5-4 National Distribution of *Iris acutiloba*

Whilst the Gobustan – Khizi region certainly supports this species, it is not considered a significant core national populaion, evidenced by the other known locations spread throughout the country. Therefore this species will similarly be treated as a PBF with NNL requirements in place.

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
Acantholimon schemachense A.Grossh.	Abundant	Regionally Endemic
Anthemis fruticulosa M.B.Fl.	Rare	Regionally Endemic
Artemisia caucasica Willd.	Frequent	Regionally Endemic
Astragalus caspicus	Frequent	Regionally Endemic
Astragalus denudatus Stev.	Frequent	Regionally Endemic
Centaurea reflexa Lam.	Occasional	Regionally Endemic
Cerastium multiflorum C.A.Mey.	Rare	Regionally Endemic
Cirsium strigosum M.B.Fl.	Rare	Regionally Endemic
Cladochaeta candidissima M.B.	Rare	Regionally Endemic
Cousinia orientalis	Rare	Regionally Endemic
Draba incompta Stev.	Rare	Regionally Endemic
Erodium schemachense A.Grossh.	Rare	Regionally Endemic

Species	Abundance	Status
Gypsophila capitata M.B.	Rare	Regionally Endemic
Hypericum karjagini Rzazade.	Rare	Regionally Endemic
Hypericum theodori Woron.	Rare	Regionally Endemic
Linaria schirvanica Fom.	Rare	Regionally Endemic
Merendera eichleri Boiss.	Rare	Regionally Endemic
Minuartia caucasica Ad.	Rare	Regionally Endemic
Nonea rosea M.B.	Occasional	Regionally Endemic
Onobrychis vaginalis C.A.Mey	Occasional	Regionally Endemic
Ornithogalum schmalhausenii Albov.	Rare	Regionally Endemic
Pulsatilla albana (Stev.)	Rare	Regionally Endemic
Ranunculus crassifolius A.Grossh.	Rare	Regionally Endemic
Serratula transcaucasica D.Sosn.	Rare	Regionally Endemic
Taraxacum praticolum Schischk.	Rare	Regionally Endemic
Thymus hadzhievii A.Grossh.	Abundant	Regionally Endemic
Astragalus schemachensis	Frequent	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.

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).

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.

One additional nationally threatened species was recorded during surveys, the Eastern Spadefoot *Pelobates syriacus*. This species is not threatened globally but considered EN as per the 2nd edition of the Azerbaijan REDB (2013). A single individual was recorded during herpetology surveying near a temporary water spring. The EAAA for this species may be considered as quite restricted due to its habitat requirements, and likely would not extend beyond a 2km buffer within contiguous suitable habitat. Though endangered on the national scale, the EAAA does not include ample suitable habitat and it is not considered likely to host a critical population of this species.

However, 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).

8 INVERTEBRATES

No globally threatened invertebrate species were recorded during the surveys (nor were identified during screening). However, a single nationally-threatened species was identified during the survey efforts; this species, *Saga ephippigera,* (bush-cricket) will be listed within the 3rd Edition of the Azerbaijan Red Data Book (*per communication with the expert surveyor*). The overall EAAA for this non-flying species could be considered as the project footprint inclusive of a 1km buffer. Although global and national populations are unknown, the species is known to occur within a number of other countries, including Georgia, Iran, Iraq, stretching into Central Asia as well. It is considered unlikely that criticality would be triggered within the EAAA. 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).

No nationally endemic invertebrate species were recorded during the surveys.

9 CONCLUSION

9.1 Summary of Findings

No species have triggered Critical Habitat for the project.

9.2 Final List of Critical Species & PBFs

The complete list of Priority Biodiversity Features for Khizi 3 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	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	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			
Marbled Polecat	X			
Greater Horseshoe Bat				X

Common Name	Globally Threatened	Nationally Threatened	Range-restricted	Migratory/ Congregatory
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			
Eastern Spadefoot *Pelobates syriacus*		X		
Saga ephippigera (bush-cricket)		X		
Caspian Knotweed (*Polygonum caspicum*)	X			
Dodder Astragalus (*Astragalus cuscutae*)	X			
Marazinian Astragalus (*Astragalus maraziensis*)	X			
Albanian Astragalus (*Astragalus albanicus*)	X			
Caspian Bilacunaria (*Bilacunaria caspia*)	X			

Common Name	Globally Threatened	Nationally Threatened	Range-restricted	Migratory/ Congregatory
Caspian Treacle Mustard (*Erysimum caspicum*)	X			
Coastal Bastard Toad-flax (*Thesium maritimum*)	X			
Wedge-leaved Meadow Saxifrage (*Seseli cuneifolium*)	X			
Acantholimon schemahense A.Grossh.		X	X	
Alcea kusjariensis Iljin.		X		
Anabasis salsa (C.A.M.) Bnth.		X		
Anthemis fruticulosa M.B.Fl.			X	
Atropa caucasica Kreyer.		X	X	
Astragalus caspicus			X	
Astragalus denudatus Stev.			X	
Astragalus schemachensis			X	
Centaurea reflexa Lam.			X	
Cerastium multiflorum C.A.Mey.			X	
Cirsium strigosum M.B.Fl.			X	
Cladochaeta candidissima M.B.		X	X	
Cousinia orientalis			X	
Draba incompta Stev.			X	
Erodium schemachense A.Grossh.			X	
Ferula persica Willd		X		
Gypsophila capitata M.B.			X	

Common Name	Globally Threatened	Nationally Threatened	Range-restricted	Migratory/ Congregatory
Hypericum karjagini Rzazade.			X	
Iris acutiloba C.A.Verz.		X		
Linaria schirvanica Fom.		X	X	
Merendera eichleri Boiss.			X	
Minuartia caucasica Ad.			X	
Nonea rosea M.B.			X	
Onobrychis vaginalis C.A.Mey			X	
Ophrys caucasica G.Woron.		X		
Orchis caspia Trautv.		X		
Ornithogalum schmalhausenii Albov.			X	
Pulsatilla albana (Stev.)			X	
Punica granatum L.		X		
Ranunculus crassifolius A.Grossh.			X	
Serratula transcaucasica D.Sosn.			X	
Taraxacum praticolum Schischk.			X	
Thymus hadzhievii A.Grossh.			X	
Thymus karjaginii			X	
Viola caucasica Kolenat.		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) REPORTS

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23 June, 2022 (updated 29 June)

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 Khizi 3 Wind Energy Project (K3WEP), per the contract between Xenops and Five Capitals Environmental and Management Consultancy (5C). The K3WEP is a proposed 162.5 MW wind energy facility to be located in the eastern end of the Caucasus Mountains, roughly 7 km SW of Sitalchay, 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 144 hours of Vantage Point (VP) survey data collected by Dr. Sultanov and his associates from March 27, 2020 through June 29, 2022 at a series of 4 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 modest reductions in predicted collision risk for vultures and Golden Eagles, a substantial increase in predicted collision risk for 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 Khizi 3 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 K3WEP site during the corresponding seasons. The current report presents a new CRM analysis of additional VP survey data that was collected at the K3WEP during the spring of 2022 (late 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 Khizi 3 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	2	5	2
Aquila nipalensis	Steppe Eagle	CR	EN	80	57	41
Haliaeetus leucoryphus	Pallas's Fish-Eagle		EN		1	
Ciconia nigra	Black Stork	CR		1		
Pandion haliaetus	Osprey	CR			1	

[1] https://www.iucnredlist.org/ accessed 22 June, 2022

[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.

[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 June, 2022

Scientific Name	English Common Name	Azbjn status[4]	IUCN status[5]	Spring Vantage Point Survey Observations		
				2020	2021	2022
Gypaetus barbatus	Bearded Vulture	EN	NT	6		1
Pernis apivorus	European Honey-Buzzard	VU		26	36	2
Aegypius monachus	Cinereous Vulture	EN	NT	336	313	257
Gyps fulvus	Eurasian Griffon	VU		1474	323	263
Gyps + Aegypius	Unidentified Vulture[6]			229	11	136
Circaetus gallicus	Short-toed Snake-Eagle	CR			3	1
Hieraaetus pennatus	Booted Eagle	EN		4	1	
Aquila heliaca	Imperial Eagle	EN	VU	1		1
Aquila chrysaetos	Golden Eagle	EN		26	20	5
Circus macrourus	Pallid Harrier	VU	NT		2	
Accipiter brevipes	Levant Sparrowhawk	VU		2		
Accipiter gentilis	Northern Goshawk	VU				2
Milvus migrans	Black Kite	VU		1	1	6
Buteo rufinus	Long-legged Buzzard	EN		38	98	178
Falco naumanni	Lesser Kestrel	VU		28	78	239
Falco vespertinus	Red-footed Falcon	VU	VU		1	1
Falco columbarius	Merlin	VU			1	4
Falco subbuteo	Eurasian Hobby	VU				2
Falco biarmicus	Lanner Falcon	DD			1	5
Falco peregrinus	Peregrine Falcon	EN			1	
Circus aeruginosus	Eurasian Marsh-Harrier			1	3	
Circus cyaneus	Hen Harrier			1	7	5
Circus pygargus	Montagu's Harrier			3	3	
Accipiter nisus	Eurasian Sparrowhawk				6	
Buteo lagopus	Rough-legged Hawk			4		
Buteo buteo	Common Buzzard			57	7	9
Falco tinnunculus	Eurasian Kestrel			75	59	22

[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.

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 Khizi 3 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
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	25	Provided by developer
latitude	40.7	Approximate midpoint of K3WEP 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.

[7] https://birdsoftheworld.org/bow/home, accessed 22-28 November, 2021

Table 3: Physical and observational characteristics of each bird species included within any of the Collision Risk Modeling analyses for the Khizi 3 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
Haliaeetus leucoryphus	Pallas's Fish-Eagle	0.78	1.97	Gliding	11.1	1
Ciconia nigra	Black Stork	0.98	1.5	Flapping	8.3	2
Pandion haliaetus	Osprey	0.58	1.65	Gliding	10.3	0.8
Gypaetus barbatus	Bearded Vulture	1.1	2.57	Gliding	9.4	1
Pernis apivorus	European Honey-Buzzard	0.56	1.34	Gliding	11	0.5
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 + 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
Circus macrourus	Pallid Harrier	0.44	1.11	Gliding	8.3	0.4
Accipiter brevipes	Levant Sparrowhawk	0.34	0.69	Flapping	12	0.3
Accipiter gentilis	Northern Goshawk	0.58	1.06	Flapping	12.5	0.3
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 vespertinus	Red-footed Falcon	0.3	0.71	Flapping	12.5	0.3
Falco columbarius	Merlin	0.28	0.63	Flapping	12.5	0.3
Falco subbuteo	Eurasian Hobby	0.32	0.76	Flapping	12.5	0.3
Falco biarmicus	Lanner Falcon	0.44	1.01	Flapping	13	0.4
Falco peregrinus	Peregrine Falcon	0.47	1.12	Flapping	13	0.4
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

[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)

[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.

Scientific Name	English Common Name	Length (m)	Wingspan (m)	Flight type[8]	Flight speed (m/sec)[9]	Detection distance (km) [10]
Accipiter nisus	Eurasian Sparrowhawk	0.34	0.67	Flapping	12	0.3
Buteo lagopus	Rough-legged Hawk	0.54	1.37	Gliding	11	0.5
Buteo buteo	Common Buzzard	0.46	1.23	Gliding	11	0.5
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.

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 Khizi 3 Wind Energy Project. For all species, the total duration of observations was equivalent to the total of 144 hours, or 8,640 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	2	100	2	3.142
Aquila nipalensis	Steppe Eagle	41	85.37	154.5	3.142
Gypaetus barbatus	Bearded Vulture	1	100	1	3.142
Pernis apivorus	European Honey-Buzzard	2	100	1.167	0.7854
Aegypius monachus	Cinereous Vulture	257	90.27	819.8	12.57
Gyps fulvus	Eurasian Griffon	263	95.06	598	12.57

[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.

Scientific Name	English Common Name	Number of observations[12]	% at rotor swept height[13]	Total bird minutes	Effective survey area (km^2)
Gyps + Aegypius	"Vulture sp"	656[14]	93.14	4361	12.57
Circaetus gallicus	Short-toed Snake-Eagle	1	100	1	2.011
Aquila heliaca	Imperial Eagle	1	100	1	3.142
Aquila chrysaetos	Golden Eagle	5	100	4.5	3.142
Accipiter gentilis	Northern Goshawk	2	100	1.333	0.2827
Milvus migrans	Black Kite	6	83.33	6.667	0.7854
Buteo rufinus	Long-legged Buzzard	178	80.34	160	0.7854
Falco naumanni	Lesser Kestrel	239	70.05	1417	0.2827
Falco vespertinus	Red-footed Falcon	1	100	5	0.2827
Falco columbarius	Merlin	4	0	2.25	0.2827
Falco Subbuteo	Eurasian Hobby	2	0	1	0.2827
Falco biarmicus	Lanner Falcon	5	80	11.33	0.5027
Circus cyaneus	Hen Harrier	5	20	3.667	0.5027
Buteo buteo	Common Buzzard	9	44.44	20.75	0.7854
Falco tinnunculus	Eurasian kestrel	22	77.27	119.6	0.2827

Collision Avoidance Parameter

Published, validated collision avoidance (CA) parameters are not available for most of the target species we modeled at the K3WEP, yet the CA parameter is well-known to be a very important parameter in 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 K3WEP, 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 Khizi 3 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
Haliaeetus leucoryphus	Pallas's Fish-Eagle	0.95	0.975	0.99775
Ciconia nigra	Black Stork	0.95	0.99	0.995
Pandion haliaetus	Osprey	0.981	0.9958	0.999
Gypaetus barbatus	Bearded Vulture	0.99	0.9958	0.999
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

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

Scientific Name	English Common Name	Lower bound value	Most realistic value	Upper bound value
Gyps or 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
Circus macrourus	Pallid Harrier	0.95	0.99	0.999
Accipiter brevipes	Levant Sparrowhawk	0.99	0.995	0.999
Accipiter gentilis	Northern Goshawk	0.99	0.995	0.999
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 vespertinus	Red-footed Falcon	0.873	0.969	0.999
Falco columbarius	Merlin	0.995	0.998	0.999
Falco subbuteo	Eurasian Hobby	0.995	0.998	0.999
Falco biarmicus	Lanner Falcon	0.995	0.998	0.999
Falco peregrinus	Peregrine Falcon	0.995	0.998	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 lagopus	Rough-legged Hawk	0.978	0.995	0.999
Buteo buteo	Common Buzzard	0.978	0.995	0.999
Falco tinnunculus	Eurasian Kestrel	0.873	0.969	0.999

Eagles (genera Aquila, Circaetus, Hieraaetus, Haliaeetus) and Osprey

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 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

[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.

terms of size, shape, behavior, and flight morphology. Although the Short-toed Snake-Eagle (*Circaetus gallicus*), Booted Eagle (*Hieraaetus pennatus*), and Osprey (*Pandion haliaetus*) 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 raptors, 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). For the Pallas's Fish-Eagle (*Haliaeetus leucoryphus*), we used a set of parameter values that are based on an ecologically-similar congeneric species, the White-tailed Eagle (*H. albicilla*), whose behavior around, and risk of collisions with wind turbines has been extensively studied at the Smøla Wind Farm in coastal Norway. For this species, we used the value of 0.95 CA recommended by SNH[16] for White-tailed Eagle as a lower bound, with values of 0.975 and 0.99775 for the most realistic, and upper bound CA values, respectively, based on empirically derived CA parameter values presented in May et. al. (2011) on the basis of satellite telemetry studies.

Egyptian and Bearded Vultures

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, Bearded Vulture, and *Aquila* eagles, we applied the same CA values for Egyptian and Bearded Vultures 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.

Fast Falcons

Four species of fast-flying falcon species (genus *Falco*) were observed during spring season VP survey efforts for the K3WEP, including Peregrine Falcon (*F. peregrinus*), Lanner Falcon (*F. biarmicus*), Merlin (*F. columbarius*) and Eurasian Hobby (*F. subbuteo*). These species are differentiated from the slower-flying falcons (kestrels and Red-footed Falcon) in possessing a set of shared 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

[16] https://www.nature.scot/doc/wind-farm-impacts-birds-use-avoidance-rates-naturescot-wind-farm-collision-risk-model accessed 20 June, 2021

correlate to similar collision avoidance tendencies in these species, though species-specific collision avoidance parameters have not been published for any of them. 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.

Hovering Falcons (Kestrels and Red-footed Falcon)

In contrast to the fast-flying falcons, kestrels (including both Eurasian and Lesser kestrels, *F. tinnunculus* and *F. naumanni*, respectively) and Red-footed Falcon (*F. vespertinus*) are characterized by a set of characteristics associated with slower flight, including lower wing loading, and a tendency to hunt for ground-based prey from perches, or using hovering flights (the fast falcons do not hover). 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 these three 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.

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 spring VP surveys at the K3WEP (*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*), Levant Sparrowhawk (*A. brevipes*), 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 three species of *Buteo* buzzard observed during the spring VP survey efforts, 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]).

Black Kite

To represent the CA parameter for the Black Kite (*Milvus migrans*), we used a series of published parameter estimates and recommendations that have been developed for the congeneric, and morphologically similar Red Kite (*Milvus milvus*). SNH (2010) recommends a CA value of 0.98 for Red Kite, and we used this as the lower bound CA value for Black Kite 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.

Black Stork

No published CA values were available for the Black Stork (*Ciconia nigra*), hence we based our hypothesized CA values for this 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 the Black Stork is a large-bodied bird, 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 other large-bodied water birds, such as swans, geese, and cormorants (Cook et. al. 2012).

Results and Conclusions

The results of the spring 2022 CRM analysis for the K3WEP 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 K3WEP. 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:

- Very little spring migratory passage of European Honey Buzzard was observed in spring 2022 compared with 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, as it is reflected both in the number of observations (Table 1) and the predicted collision risk (Table 6).

- Reduced activity and collision risk of Eurasian Griffon and Cinereous Vultures was recorded in 2022 compared with the previous two spring seasons (and especially spring 2020). Interpretation of this pattern is somewhat complex. The predicted spring collision risk for the individual species went down by 37% and 85% for Cinereous Vulture and Eurasian Griffon, respectively. However, the collision risk for the "Cinerous + Griffon" Vulture category, which is based on flight densities of both single species plus that of "unidentified vulture" went down by only 36% (Table 6), likely due to an increased proportion of unidentified vultures (pertaining to one or the other of these species) in the spring 2022 data set compared with previous springs. This net 36% collision risk reduction was produced by the opposing influences of greatly reduced numbers of vulture observations in spring 2022 compared with spring 2020 (Table 1), partially offset by an increase in the average duration of a single observation within the observation radius in 2022 compared to previous years, which likely reflects a marginal improvement of the field methodology, as flight durations of individual observations were estimated *post hoc*, rather than recorded directly in the CRM analysis of the 2020-2021 data set.

- Reduced activity and collision risk of Golden Eagles was recorded in 2022 compared with the previous two springs. The substantial reduction both in numbers of spring Golden Eagle observations (78% reduction in 2022 compared with the average of 2020 and 2021, Table 1) and Golden Eagle spring collision risk (92% reduction in 2022 compared with the composite of 2020+2021 Table 6) are suggestive of a natural, rather than artifactual reduction in Golden Eagle flight activity at the site in 2022, compared with previous years. In this sense, "natural," includes possible biological and/or stochastic influences on between-year variation in the occupancy of the site by this species.

- Significantly higher spring migratory passage of Long-legged Buzzard was observed in spring 2022 compared with 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, as it is reflected both in the number of observations (Table 1) and the predicted collision risk (Table 6).

- There was a very large (20-fold) increase in the predicted spring collision risk for Lesser Kestrel in spring 2022 compared with previous springs. This difference appears to have been generated by the influences of a modest increase in the numbers of spring observations of this species (Table 1) combined with a *10-fold increase* in the average duration of individual flights of this species recorded in 2022, compared with that estimated for the 2020-2021 analysis, reflective of the marginal improvement in accuracy of the methodology in 2022 compared with previous years. In the earlier surveys, the duration of Lesser Kestrel (and other tier 2 target species') flights within the observation radius were not recorded directly by the observers, but was estimated *a posteriori*, based on the hypothetical scenario in which each observation entailed a bird flying directly across the diameter of the observation radius at its species-specific flight speed. For Lesser Kestrel, this meant that 0.555 minutes were ascribed to each observation in the 2020-2021 data set. In the spring 2022 data set, in which the durations of

individual flights were recorded directly by the observers, the average duration of a Lesser Kestrel flight within the observation radius was 5.9 minutes. This is not surprising, given the tendency of this species to engage in hovering flights and the proximity of several of the VP survey points to active Lesser Kestrel nesting colonies. This was the biggest factor contributing to the prediction, based on the spring 2022 CRM, of 100 Lesser Kestrel collisions per spring under the "most realistic" collision avoidance scenario. However, we would suggest that this is an instance where the simplistic assumptions of the Band model create substantial uncertainty regarding how well the model represents reality. One factor contributing to possible error in the predicted collision risk is the high sensitivity of the Band model to small variations in observation radius (quadratic relationship). For Lesser Kestrel, we assumed a maximum reliable observation radius of 300m, based on the small size of this species relative to other raptors, and the difficulty of distinguishing this species from its congener, the Eurasian Kestrel. However, in the environment of the K3WEP, and particularly in the vicinity of a nesting colony of Lesser Kestrels, it is undoubtedly possible for observers to observe flying birds that can unequivocally be identified as Lesser Kestrels at distances substantially greater than 300m. The lead ornithologist was instructed prior to the 2022 spring surveys to ensure that he and his team of observers limited the bird observations recorded during the VP surveys to the species-specific observation radii. However, this is a difficult limitation for any bird observer to implement with 100% fidelity in the field, and hence poses a natural "challenge" to the accuracy of CRM results in any CRM analysis, and this weakness may be particularly severe in this case. In the case of Lesser Kestrel, inclusion of any observations of birds observed at distances greater than 300m would have the effect of inflating the predicted collision rates. In addition, this particular result exposes the well-known weakness of the Band CRM's sensitivity to small variations in the collision avoidance (CA) parameter. In reality, the tendency of Lesser Kestrels to avoid flying through wind turbine rotors in the vicinity of their nesting colonies is unknown. The CA parameters we used in this CRM to represent Lesser Kestrels were derived from values estimated for the American Kestrel (*Falco sparverius*), a species 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. Will Lesser Kestrels flying near turbines in the vicinity of their nesting colonies exhibit collision avoidance tendencies and behaviors comparable to those of American Kestrels hunting small prey on the ground below turbines at North American wind farms? This is unknown, but it is a key assumption inherent in the model, and introduces a significant element of uncertainty to the prediction. In sum, while we would not discount the possibility of significant impacts to Lesser Kestrels, as predicted by the CRM, we would suggest that in this case, due to the sensitivity of this particular result to several model inputs that contain a high degree of inherent uncertainty, this prediction is better viewed as a hypothesis, rather than a firm prediction.

Table 6: Estimated rates of collisions per **spring** season for bird species at the Khizi 3 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	0.0131	76	0.00549	182	0.00131	765	0.00812	123	0.00341	293	0.000812	1230
Steppe Eagle	0.722	1	0.160	6	0.0380	26	1.18	<1	0.261	3	0.0621	16
Pallas's Fish-Eagle	0.00289	346	0.00144	692	0.000130	7690	0	N/A	0	N/A	0	N/A
Black Stork	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Osprey	0.00211	47	0.000466	2140	0.000111	9010	0	N/A	0	N/A	0	N/A
Bearded Vulture	0.0224	44	0.00940	106	0.00224	446	0.00487	205	0.00205	488	0.000487	2050
European Honey-Buzzard	1.61	<1	0.367	2	0.0733	13	0.0674	14	0.0153	65	0.00306	326
Cinereous Vulture	3.38	<1	1.69	<1	0.845	1	2.13	<1	1.07	<1	0.534	1
Eurasian Griffon	9.39	<1	4.69	<1	2.35	<1	1.81	<1	0.907	1	0.453	2
Cinereous + Griffon[17]	14.4	<1	7.22	<1	3.61	<1	9.25	<1	4.62	<1	2.31	<1
Short-toed Snake-Eagle	0.0109	91	0.00240	416	0.000572	1740	0.0123	81	0.00271	369	0.000645	1550
Booted Eagle	0.0501	19	0.0111	90	0.00263	379	0	N/A	0	N/A	0	N/A

[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.

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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	0.00322	310	0.000711	1400	0.000169	5910	0.00565	176	0.00125	800	0.000297	3360
Golden Eagle	0.451	2	0.0996	10	0.0237	42	0.0346	28	0.00765	130	0.00182	549
Pallid Harrier	0.0785	12	0.0157	63	0.00157	636	0	N/A	0	N/A	0	N/A
Levant Sparrowhawk	0.0277	36	0.0138	72	0.00277	361	0	N/A	0	N/A	0	N/A
Northern Goshawk	0	N/A	0	N/A	0	N/A	0.129	7	0.0643	15	0.0129	77
Black Kite	0.0257	38	0.0103	97	0.00193	518	0.155	6	0.0621	16	0.0117	85
Long-legged Buzzard	1.71	<1	0.388	2	0.0777	12	4.23	<1	0.962	1	0.192	5
Lesser Kestrel	19.5	<1	4.77	<1	0.154	6	410	<1	100	<1	3.23	<1
Red-footed Falcon	0.188	5	0.0458	21	0.00148	676	1.78	<1	0.435	2	0.0140	71
Merlin	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Eurasian Hobby	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Lanner Falcon	0.00335	298	0.00134	745	0.000670	1492	0.0939	10	0.0376	26	0.0188	53
Peregrine Falcon	0.000727	1370	0.000291	3430	0.000145	6890	0	N/A	0	N/A	0	N/A
Eurasian Marsh-Harrier	0.181	5	0.0362	27	0.00362	276	0	N/A	0	N/A	0	N/A
Hen Harrier	0.312	3	0.0624	16	0.00624	160	0.109	9	0.0219	45	0.00219	456
Montagu's Harrier	0.547	1	0.109	9	0.0109	91	0	N/A	0	N/A	0	N/A
Eurasian Sparrowhawk	0.0368	27	0.0184	54	0.00368	271	0	N/A	0	N/A	0	N/A
Rough-legged Hawk	0.0861	11	0.0196	51	0.00391	255	0	N/A	0	N/A	0	N/A

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
Common Buzzard	1.02	<1	0.231	4	0.0462	21	0.303	3	0.0689	14	0.0138	72
Eurasian kestrel	21.5	<1	5.24	<1	0.169	5	32	<1	7.91	<1	0.255	3

Table 7: Estimated rates of collisions per **year** for bird species at the Khizi 3 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.

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
Egyptian Vulture	0.0320	31	0.0135	74	0.00320	312	0.0271	36	0.0114	87	0.00271	368
Steppe Eagle	0.845	1	0.187	5	0.0445	22	1.30	<1	0.288	3	0.0685	14
Pallas's Fish-Eagle	0.00289	346	0.00144	692	0.000130	7694	0	N/A	0	N/A	0	N/A
Saker Falcon	0.00787	127	0.00315	317	0.00157	636	0.00787	127	0.00315	317	0.00157	636
Black Stork	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Dalmatian Pelican	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Osprey	0.00211	474	0.000466	2145	0.000111	9012	0	N/A	0	N/A	0	N/A

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
Bearded Vulture	0.186	5	0.0781	12	0.0186	53	0.168	5	0.0706	14	0.0168	59
European Honey-Buzzard	1.74	<1	0.395	2	0.0791	12	0.193	5	0.0439	22	0.00877	113
Oriental Honey-Buzzard	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Cinereous Vulture	14.6	<1	7.31	<1	3.66	<1	13.4	<1	6.69	<1	3.35	<1
Eurasian Griffon	23.5	<1	11.7	<1	5.87	<1	15.9	<1	7.95	<1	3.97	<1
Cinereous + Griffon[18]	47.0	<1	23.5	<1	11.8	<1	41.8	<1	20.9	<1	10.5	<1
Short-toed Snake-Eagle	0.0370	27	0.00818	122	0.00195	512	0.0384	26	0.00849	117	0.00203	493
Booted Eagle	0.296	3	0.0655	15	0.0156	64	0.247	4	0.0544	18	0.0129	77
Imperial Eagle	0.00593	168	0.00131	763	0.000312	3200	0.0105	95	0.00228	437	0.000553	1800
Golden Eagle	0.548	1	0.121	8	0.0289	34	0.130	7	0.0288	34	0.00684	146
Pallid Harrier	0.368	2	0.0736	13	0.00736	135	0.29	3	0.0579	17	0.00579	172
Levant Sparrowhawk	0.0277	36	0.0138	72	0.00277	361	0	N/A	0	N/A	0	N/A
Black Kite	0.216	4	0.0863	11	0.0162	61	0.345	2	0.138	7	0.0259	38

[18] 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.

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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
White-tailed Eagle	0.104	9	0.0522	19	0.00470	212	0.104	9	0.0522	19	0.00470	212
Long-legged Buzzard	2.63	<1	0.599	1	0.120	8	5.16	<1	1.17	<1	0.234	4
Lesser Kestrel	110	<1	26.9	<1	0.868	1	501	<1	122	<1	3.95	<1
Red-footed Falcon	0.594	1	0.145	6	0.00467	213	2.19	<1	0.534	1	0.0172	58
Merlin	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A
Eurasian Hobby	0.0287	34	0.0115	86	0.00574	174	0.0287	34	0.0115	86	0.00574	174
Lanner Falcon	0.0575	17	0.0230	43	0.0115	86	0.148	6	0.0592	16	0.0296	33
Peregrine Falcon	0.00442	226	0.00177	564	0.000885	1120	0.00370	270	0.00148	675	0.000739	1350
Eurasian Marsh-Harrier	0.324	3	0.0648	15	0.00649	154	0.143	6	0.0287	34	0.00287	348
Hen Harrier	0.549	1	0.110	9	0.0110	90	0.347	2	0.0692	14	0.00692	144
Montagu's Harrier	0.742	1	0.148	6	0.0148	67	0.196	5	0.0391	25	0.00391	255
Eurasian Sparrowhawk	0.0908	11	0.0454	22	0.00908	110	0.054	18	0.0270	37	0.00540	185
Rough-legged Hawk	0.194	5	0.0442	22	0.00883	113	0.108	9	0.0246	40	0.00492	203
Common Buzzard	1.11	<1	0.253	3	0.0506	19	0.398	2	0.0904	11	0.0181	55
Eurasian Kestrel	35.3	<1	8.62	<1	0.278	3	46.2	<1	11.3	<1	0.364	2

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