

Cumulative Effects Assessment for the NIAT & RASGHA Wind Farm, Egypt

May 21, 2026

Where business and nature thrive



This report was prepared for RECREEE, the Regional Centre for Renewable Energy Efficiency

Copyright © 2026 The Biodiversity Consultancy Limited

All rights reserved.

*No part of this report may be reproduced in any form without
the written permission of The Biodiversity Consultancy Limited.*

*Citation: TBC (2026). Cumulative Effects Assessment for the NIAT & RASGHA Wind Farm, Egypt. The
Biodiversity Consultancy, Cambridge, United Kingdom.*

This document is copyright-protected by The Biodiversity Consultancy Ltd (TBC). The reproduction and distribution of this document for information is permitted without prior permission from TBC. However, neither this document nor any extract from it may be reproduced, stored, translated, or transferred in any form or by any means (electronic, mechanical, photocopied, recorded, or otherwise) for any other purpose without prior written permission from TBC.

| Document information | |
|----------------------|---|
| Document title | Cumulative Effects Assessment for the NIAT & RASGHA Wind Farm Project, Egypt. |
| Document subtitle | |
| Project No. | RCR04 |
| Date | 21 May 2026 |
| Version | Draft |
| Author | Lucy Murrell, Filipe Canário, Nadia Sheikh, Mihai Coroi |
| Client name | Regional Center for Renewable Energy and Energy Efficiency (RCREEE) |

| Document history | | | | | | |
|------------------|------------|------------|------------|------------|---|-------------|
| Revision no. | Author/s | Reviewer 1 | Reviewer 2 | Date | Comments | Final/draft |
| 1 | LM, FC, NS | MC | | 01/05/2026 | For client review | Draft |
| 2 | LM, FC, NS | FC | | 19/05/2026 | Addressing comments from the Lenders and LESA | Draft 2 |
| 3 | LM, FC, NS | FC | | 20/05/2026 | Addressing comments from the Lenders | Draft 3 |

Signature of Technical Director

Contents

| | |
|---|-----------|
| Acronym table..... | 6 |
| Executive summary..... | 7 |
| Introduction | 8 |
| Scope and objectives | 8 |
| Project description | 9 |
| Biodiversity context..... | 11 |
| Potential impacts and on-site management of biodiversity risk | 12 |
| Periodic review of the CEA | 12 |
| Study area..... | 12 |
| The VEC screening process | 13 |
| Cumulative assessment framework for birds..... | 14 |
| Overview of the framework for birds | 14 |
| Step 1 – Develop the bird species population list and identify the Units of Analysis..... | 17 |
| Methods..... | 17 |
| Results..... | 18 |
| Step 2 – Identify bird species’ sensitivity | 19 |
| Methods..... | 19 |
| Results..... | 21 |
| Step 3 – Conduct the ecological risk assessment and identify priority bird VECs..... | 22 |
| Methods..... | 22 |
| Results..... | 24 |
| Step 4 – The threshold setting process | 27 |
| Methods..... | 27 |
| Results..... | 28 |
| Adaptive management..... | 33 |
| Step 5 – Identify a mitigation and monitoring approach for priority bird VECs | 33 |
| The Cumulative Assessment framework for other vertebrates | 34 |
| Overview of the framework for other terrestrial species | 34 |
| Step 1 – Develop the non-bird species list and identify the Units of Analysis | 36 |
| Methods..... | 36 |
| Results..... | 36 |
| Step 2 – Identify species sensitivity..... | 36 |
| Methods..... | 36 |

| | |
|---|-----------|
| Results..... | 38 |
| Step 3 – Conduct the ecological risk assessment and identify priority non-bird vertebrate species VECs | 40 |
| Methods..... | 40 |
| Results..... | 41 |
| Step 5 – Identify a potential mitigation and monitoring approach for priority terrestrial VECs..... | 42 |
| The Cumulative Assessment for ecosystems | 42 |
| The mitigation and monitoring approach for priority VECs | 43 |
| Next steps | 51 |
| References..... | 52 |
| Appendix 1: Detailed results for steps 1-3 for bird VECs..... | 56 |
| Appendix 2: Non-bird VECs at Step 2..... | 57 |

Acronym table

| Acronym | Definition |
|---------|--|
| BAP | Biodiversity Action Plan |
| CEA | Cumulative Effects Assessment |
| CH | Critical Habitat |
| CHA | Critical Habitat Assessment |
| CR | Critically Endangered |
| EAAA | Ecologically Appropriate Area of Analysis |
| EBRD | European Bank of Reconstruction and Development |
| EIB | European Investment Bank |
| EN | Endangered |
| EOO | Extent of Occurrence |
| ESR6 | (EBRD) Environmental and Social Requirement 6 |
| ESIA | Environmental and Social Impact Assessment |
| EU | European Union |
| GBIF | Global Biodiversity Information Facility |
| GN | (IFC) Guidance Note |
| IBA | Important Bird and Biodiversity Area |
| IBAT | Integrated Biodiversity Assessment Tool |
| IFC | International Performance Corporation |
| IUCN | International Union for Conservation of Nature |
| KBA | Key Biodiversity Area |
| LC | Least Concern |
| NNL | No Net Loss |
| NT | Near Threatened |
| OHTL | Overhead Transmission Line |
| PBF | Priority Biodiversity Feature |
| PBR | Potential Biological Removal |
| POWO | Plants Of the World Online |
| PS6 | (IFC) Performance Standard 6 |
| RCREEE | Regional Centre for Renewable Energy and Energy Efficiency |
| SCADA | Supervisory Control and Data Acquisition |
| TBC | The Biodiversity Consultancy |
| VEC | Valued Environmental Component |
| VU | Vulnerable |

Executive summary

This report is a Cumulative Effects Assessment (CEA) of biodiversity for the NIAT & RASGHA Wind Farm (the Project) and other wind energy developments in the Gulf of Suez, Egypt. This assessment identified 11 migratory bird species and two bat species as priority Valued Environmental Components (VECs) for the Project (Table 1), which are most at risk from the combined impacts of existing and potential wind developments. Impact thresholds have been set for each priority bird VECs, which range between zero and five annual fatalities, above which an adaptive management response is triggered.

In addition, the Project has conducted a Critical Habitat Assessment (CHA, TBC 2026a) which identified two bird species as Critical Habitat (CH) values, 21 bird species and one reptile species as Priority Biodiversity Features (PBFs) (Table 1). The Project has a No Net Loss target for priority VECs and PBFs, and a Net Gain target for CH values.

This CEA proposes a set of mitigation and monitoring actions (The mitigation and monitoring approach for priority VECs) aimed at minimizing turbine blade and power line collision fatalities for the six bird and two bat priority VECs, as well as impacts on the reptile PBF. The approach follows Good International Industry Practice (GIIP) and focuses on: i) on-site mitigation and monitoring measures, and ii) collaborative efforts with other wind farm entities.

Table 1. Priority VECs (in bold) and PBFs for the NIAT & RASGHA Wind Farm Project

| Species | Scientific name | Type | IUCN status | PBF/CH | Overall risk | Threshold (fatalities/year) |
|-------------------------------|------------------------------|------|-------------|--------|--------------|-----------------------------|
| Black Kite | <i>Milvus migrans</i> | Bird | LC | PBF | Major | 3 |
| Black Stork | <i>Ciconia nigra</i> | Bird | LC | PBF | Moderate | 0 |
| Booted Eagle | <i>Aquila pennata</i> | Bird | LC | PBF | Moderate | 0 |
| Common Crane | <i>Grus grus</i> | Bird | LC | PBF | Moderate | 0 |
| Common Kestrel | <i>Falco tinnunculus</i> | Bird | LC | PBF | - | 0 |
| Eastern Imperial Eagle | <i>Aquila heliaca</i> | Bird | VU | PBF | Moderate | 0 |
| Egyptian Vulture | <i>Neophron percnopterus</i> | Bird | EN | PBF | - | 0 |
| Eurasian Sparrowhawk | <i>Accipiter nisus</i> | Bird | LC | PBF | - | 5 |
| European Honey Buzzard | <i>Pernis apivorus</i> | Bird | LC | PBF | Major | 5 |
| Great White Pelican | <i>Pelecanus onocrotalus</i> | Bird | LC | PBF | Major | 0 |
| Greater Spotted Eagle | <i>Clanga clanga</i> | Bird | VU | PBF | - | 0 |

| Species | Scientific name | Type | IUCN status | PBF/CH | Overall risk | Threshold (fatalities/year) |
|------------------------------|--------------------------------|---------|-------------|--------|--------------|-----------------------------|
| Lesser Spotted Eagle | <i>Clanga pomarine</i> | Bird | LC | PBF | - | 5 |
| Levant Sparrowhawk | <i>Accipiter brevipes</i> | Bird | LC | PBF | - | 5 |
| Long-legged Buzzard | <i>Buteo rufinus</i> | Bird | LC | PBF | - | 5 |
| Montagu's Harrier | <i>Circus pygargus</i> | Bird | LC | PBF | - | 5 |
| Osprey | <i>Pandion haliaetus</i> | Bird | LC | PBF | - | 5 |
| Pallid Harrier | <i>Circus macrourus</i> | Bird | NT | PBF | Moderate | 0 |
| Short-toed Snake Eagle | <i>Circaetus gallicus</i> | Bird | LC | PBF | - | 5 |
| Sooty Falcon | <i>Falco concolor</i> | Bird | LC | PBF | - | 0 |
| Steppe Buzzard | <i>Buteo buteo vulpinus</i> | Bird | LC | PBF | Moderate | 5 |
| Steppe Eagle | <i>Aquila nipalensis</i> | Bird | EN | CH | Major | 0 |
| Western Marsh Harrier | <i>Circus aeruginosus</i> | Bird | LC | PBF | - | 5 |
| White Stork | <i>Ciconia ciconia</i> | Bird | LC | CH | Moderate | 5 |
| Desert Pipistrelle | <i>Hypsugo ariel</i> | Mammal | DD | | Moderate | Not established |
| Rüppel's Pipistrelle | <i>Pipistrellus rueppellii</i> | Mammal | LC | | Moderate | Not established |
| Egyptian Spiny-tailed Lizard | <i>Uromastix aegyptia</i> | Reptile | VU | PBF | N/A | N/A |

Introduction

Scope and objectives

This report presents a Cumulative Effects Assessment (CEA) of biodiversity for the 500 MW NIAT & RASGHA Wind Farm (the Project), being developed by Alcazar Energy Partners (Alcazar Energy), and other wind energy operations in the Gulf of Suez, Egypt. It aims to identify priority Valued Environmental Components¹ (VECs) for the NIAT & RASGHA Wind Farm which are most at risk from the combined impacts of all the existing and potential wind developments identified within the study area (see Study area), and sets impact thresholds for adaptive management of mitigation measures. The report presents the following information for the Project:

- A list of potential biodiversity VECs;
- Identification of biodiversity VECs with 'sensitivity' to wind farm developments.
- A list of priority biodiversity VECs assessed to be at highest risk of cumulative effects from wind farm development in the study area.
- Impact thresholds for priority bird VECs; and
- Mitigation, monitoring and other management opportunities for the Project relevant to priority biodiversity VECs, including identifying opportunities where the Project can contribute to the management of cumulative effects.

This assessment broadly follows the approach developed in the equivalent CEA reports for the Tafilah Region Wind Power Projects in Jordan, the Lekela North Ras Ghareb wind farm (IFC 2017; TBC 2019) and another Alcazar Energy wind energy development project (TBC 2026), in Egypt's Red Sea Coastal region, along with the International Finance Corporation's (IFC) and The International Union for Conservation of Nature's (IUCN) guidance on cumulative impact assessment (IFC 2013; Bennun *et al.* 2024). The approach has been adapted to the local context, particularly to account for the variation in quality and quantity of baseline data which have been collected by different developers in the landscape.

Project description

The Project is located in the Red Sea Governorate, within the Ras Gharib District, administratively under the Ras Gharib City Council (Figure 1). The closest community settlement to the Project site is Ras Gharib city that is located around 8 km to the east.

The Project site has an allocated area of 73 km² and includes the following components:

- Wind turbines: the Project will be composed of 100 turbines, each with a rotor diameter of 145 m and tip height of 162.5 m.
- Medium Voltage (MV) Cables: The wind turbines will be connected through underground transmission medium voltage cables (33kV) to two onsite substations:
- Communications Network: The Project will have a Supervisory Control and Data Acquisition (SCADA) system for the remote operation of the facilities. A communication network will be

¹ This analysis focuses only on globally significant biodiversity values, species and ecosystems. The analysis does not include any evaluation of potential ecosystem service VECs. In addition, consultation with Egyptian stakeholders has not been feasible, and therefore VECs which might be considered as a priority by local experts, but not readily identifiable with global data sets, might be missed. A stakeholder review and input process is recommended to address this gap (see [Next steps](#)).

installed in the same trenches as the MV cables which will consist of fiber optic cables connecting the turbines together to the SCADA system at the substation;

- Internal Substations: This infrastructure collects and converts the output from the turbines to a higher voltage;
- Building Infrastructure: Onsite building infrastructure includes an administrative building (offices) used for normal daily operational related work, control room, workshop and a warehouse for storage of equipment and machinery.;
- Road network: An internal road network will be required within the Project site for installation of the turbines during the construction process and for ease of access to the turbines for maintenance purposes during operation;
- Other Temporary Components: Temporary components include temporary offices, laydown areas, batching plant, borrow pits, generators;
- Overhead Transmission Line (OHTL): 500 kV line that will connect the Project to two external substations and the national grid (OHTL specifications currently unknown).

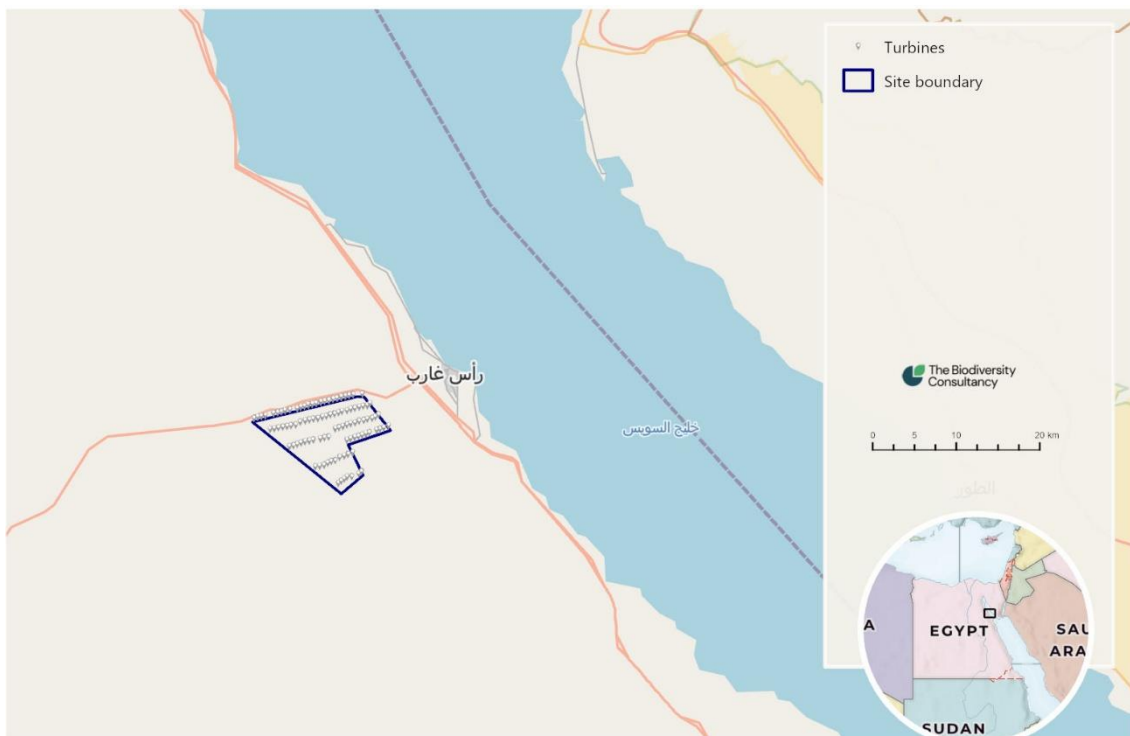


Figure 1. Project location

Biodiversity context

The Project is located in the Red Sea Coastal Desert Ecoregion (Dinerstein *et al.* 2017), that extends along the Red Sea coast of Egypt and Sudan, characterized by its arid climate. This region represents a transition zone between the hyper-arid Sahara Desert and the marine environment of the Red Sea, consisting of a desert area of sand and gravel plains, bisected by several shallow wadis.

The eastern parts of the Project site are more irregular compared to the remaining areas with some hills. The average ground surface elevation of the Project site ranges from around 100 m to 280 m above sea level. Land cover consists primarily of bare ground covered by clastic sediments of gravels and pebbles impeded in fine sand and slit. Vegetation is very scattered and low-growing, supporting a low diversity and abundance of terrestrial fauna (Zahran & Willis 2008; EcoConsult 2026; n.d.).

The Project overlaps with the Red Sea/Rift Valley flyway for migratory soaring birds which connects breeding grounds in Europe with wintering areas in Africa (BirdLife International 2015). This flyway is used by over 1.5 million individuals from 37 species of migratory soaring birds, as well as a suite of migratory passerines and other bird groups (Porter 2005; BirdLife International 2015; Jobson *et al.* 2021).

The number of migratory soaring birds crossing the Project area is very high during both the spring (northward) and autumn (southward) migration periods. Surveys conducted for the ESIA (EcoConServ & EcoConsult 2023; EcoConsult 2026) revealed that soaring bird numbers exceed 140,000 individuals in spring (148,677 in 2021 and 191,093 in 2022) and 3,000 in Autumn (3,404 in 2021, 4,406 in 2022, 6,494 in 2025). Most abundant species include White Stork (*Ciconia ciconia*), European Honey Buzzard (*Pernis apivorus*), Eurasian (Steppe) Buzzard (*Buteo buteo vulpinus*), Black Kite (*Milvus migrans*), Levant Sparrowhawk (*Accipiter brevipes*), Great White Pelican (*Pelecanus onocrotalus*) and Steppe Eagle (*Aquila nipalensis*).

The NIAT & RASGHA Wind Farm Project has completed a Critical Habitat Assessment (CHA) which determined that the Project is likely located in Critical Habitat (White Stork and Steppe Eagle) following IFC Performance Standard 6 (IFC PS6), the European Bank for Reconstruction and Development Environmental and Social Requirement 6 (EBRD ESR6) and the European Investment Bank Environmental and Social Standard 4 (EIB ESS4) (TBC, 2026a). One Priority Biodiversity Feature (PBF) (EBRD 2024, 2025a), the globally Vulnerable (VU) Egyptian Spiny-tailed Lizard (*Uromastix aegyptia*), was also identified. The CHA also found that the Project was in an area of primarily Natural Habitat as defined by IFC (IFC 2012, 2019).

EBRD ESR6 requires no net loss (NNL) and preferably a net gain (NG) of PBFs over the long term, to achieve measurable conservation outcomes. IFC PS6 requires NG of CH-qualifying features, and NNL of Natural Habitat and associated significant biodiversity, where feasible.

Potential impacts and on-site management of biodiversity risk

One of the main negative impacts caused by wind farm developments is bird mortality from collisions with turbines and associated power lines (Bennun *et al.* 2021). The Project area is crossed by over 190 thousand migratory soaring birds in spring, and at least 4,400 in autumn, of at least 28 species (EcoConsult 2026; n.d.).

The Project's Power Purchase Agreement (PPA) includes a 'Bird Migration Protocol'. This stipulates that the Project will participate in a region wide Active Turbine Management Program (ATMP) coordinated by RCREEE. The ATMP will take place during the spring and autumn migration periods and consists of a shutdown on demand program.

Periodic review of the CEA

This CEA will be reviewed every two years by the Project and updated in response to any relevant and significant new or changed information that has become available since the initial document or previous update, or in response to monitoring results that warrant adaptive management. Changes which may affect the findings of this CEA include the following information:

- Conclusions of the ongoing Strategic Environmental and Social Assessment and Cumulative Effects Assessment for wind energy projects in the Gulf of Suez, sponsored by the European Bank for Reconstruction and Development (EBRD).
- Results from ongoing monitoring at the site: e.g. substantial higher counts for a species than used in the priority VEC identification process, a lesser proportion of a species flying at collision risk altitudes; or
- About the regional or global threat status of a species: e.g. a species being upgraded from Vulnerable to Endangered, a species' population trend changing from 'declining' to 'stable'.
- Results of Post-construction Fatality Monitoring that trigger adaptive management when target thresholds defined in this CEA are exceeded. Refer to the [Adaptive management](#) section for details on this approach.

Any implications for the Project from changes to the findings of this CEA in response to an update of this document (e.g. either the species which are considered as priority VECs or the thresholds defined for a priority VEC) will only apply from the time that such an update is published and will not be applied retrospectively.

Study area

The region where the Project is going to be developed has been designated by the Egyptian New and Renewable Energy Authority (NREA) for wind energy development, and NREA has acquired this land from the Government of Egypt and identified five clusters of individual wind farm plots within the area. To appropriately capture all projects in the vicinity of the Project that could result in cumulative impacts on the priority biodiversity VECs, RCREEE provided information on the current (operational and in development) and planned projects in the region (Figure 2). The study area was a 10 km buffer around these projects' areas (Figure 2), as well as the Gebel El Zeit KBA/IBA.

As a rule of thumb on how to set geographical boundaries for a CEA, IFC (2020) suggests including the area that will be directly affected by the project or activity. A 10 km buffer was selected as conservative buffer to account for home ranges of some resident desert bird species (Kemp *et al.* 2024). It is also based on evidence from a neighbouring population of Dorcas Gazelle (*Gazella dorcas*) in Wadi El Gemal National Park, where individuals were observed to avoid the coastal road up to 10 km (Nagy *et al.* 2022), indicating the spatial extent at which direct disturbance effects may be felt. A 10 km buffer is also considered a conservative buffer to encompass disturbance or barrier effects caused by the turbines. The entire Gebel El Zeit KBA/IBA, which is located approximately 2 km from the site, was included in the study area so that the potential cumulative effects on species relevant to its integrity could be considered, following the IFC (2017) guidance.

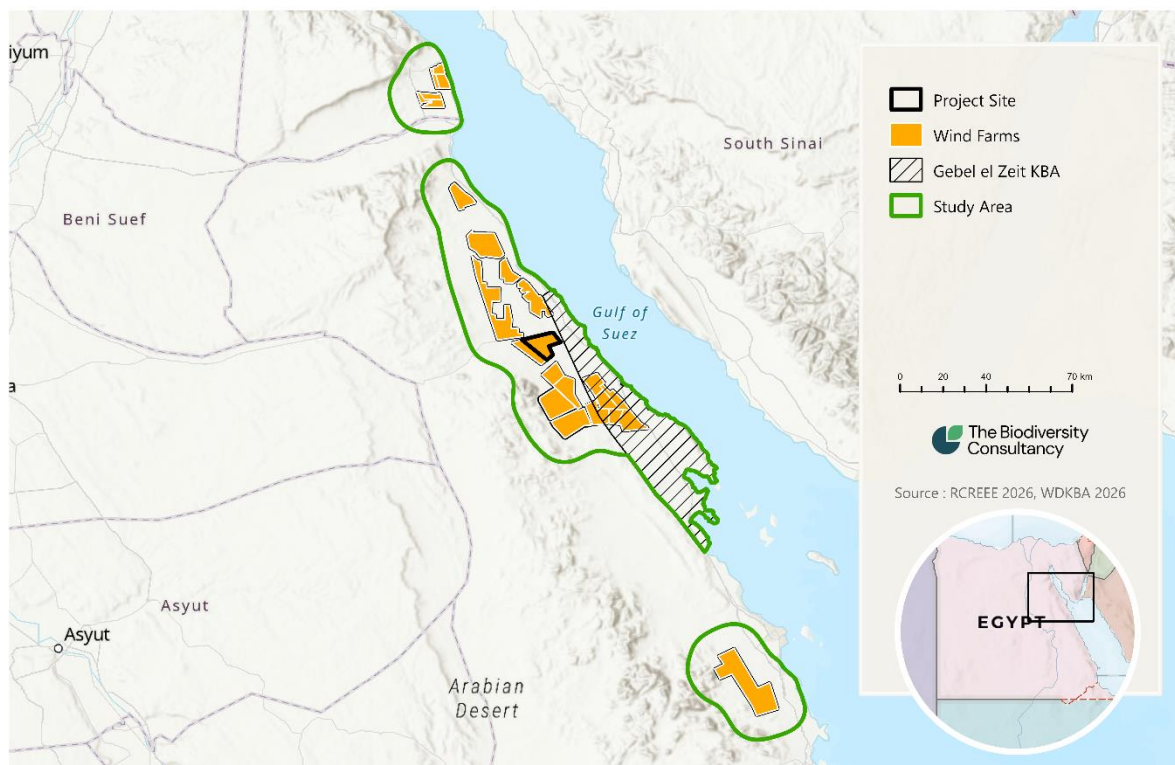


Figure 2. Location of the study area

The VEC screening process

VECs are attributes, both environmental and social, that are considered important in assessing the risks that a project, or suite of projects poses to the environment. VECs may include (IFC 2013):

- Physical features, habitats, wildlife populations (e.g., biodiversity);
- Ecosystem services.
- Natural processes (e.g., water and nutrient cycles, microclimate);
- Social conditions (e.g., health, economics); or
- Cultural aspects (e.g., traditional spiritual ceremonies).

Identification of VECs in this assessment is restricted to flora and fauna species and habitats. The analysis was carried out via a desk-based exercise using published and grey literature, and available spatial databases (accessed under licence from the [Integrated Biodiversity Assessment Tool](#) (IBAT))².

The process for identifying VECs and the framework for assessing cumulative effects was different for birds, other animals and habitats, and this is described in the following separate sections.

Cumulative assessment framework for birds

Overview of the framework for birds

The assessment framework for birds has two objectives: to identify bird species at highest risk from the potential impacts of developments in the study area; and to propose mitigation, monitoring and other management activities to address risks to those bird species. This framework follows a five-step process (Figure 3):

- **Step 1:** Develop a preliminary list of potential bird VECs comprising species potentially at risk from developments in the study area, because they are either known or predicted to occur in the study area (see [Step 1](#) – Develop the bird species population list and identify the Units of Analysis).
- **Step 2:** Determine the relative *sensitivity* of the species, being a combination of the:
 - *Vulnerability* of the species; and
 - *Relative Importance* of the species' population in relation to the appropriate Unit of Analysis (UoA), i.e. the flyway population or global distribution (see [Step 2](#) – Identify bird species' sensitivity).

Species which were determined to have negligible *sensitivity* were dropped from analysis before proceeding to Step 3. For species where the flyway population comprised <1% of the global population, and for which any impact would be negligible for the species at a global level, they were also dropped at this stage.

- **Step 3:** Determine the *overall risk* to the species from the cumulative effects of wind farm developments within the study area, being a combination of the:
 - *Sensitivity* of the species, as identified in Step 2; and
 - Cumulative *Likelihood of Effect* (LoE) rating for each species (see [Step 3](#) – Conduct the ecological risk assessment and identify priority bird VECs).

Those species with an *overall risk* of Major or Moderate are considered to be priority bird VECs for the project.

- **Step 4:** Determine an impact threshold for each priority bird VEC, being the point at which further fatality would be a risk to long-term viability of the population (see Step 4 – The threshold setting process); and,

² IBAT is a global biodiversity dataset setup by a partnership between BirdLife International, Conservation International, the International Union for Conservation of Nature (IUCN) and United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC). It enables the access to key biodiversity datasets, such as the IUCN Red List, IUCN/UNEP-WCMC Protected Planet, IUCN-BirdLife Key Biodiversity Areas, etc. [Integrated Biodiversity Assessment Tool \(IBAT\)](#).

- **Step 5:** Propose a range of mitigation, monitoring and management actions, to avoid fatalities of priority bird VECs, and to accurately estimate priority bird VEC fatalities to facilitate compliance with thresholds and inform adaptive management responses (see The mitigation and monitoring approach for priority VECs).

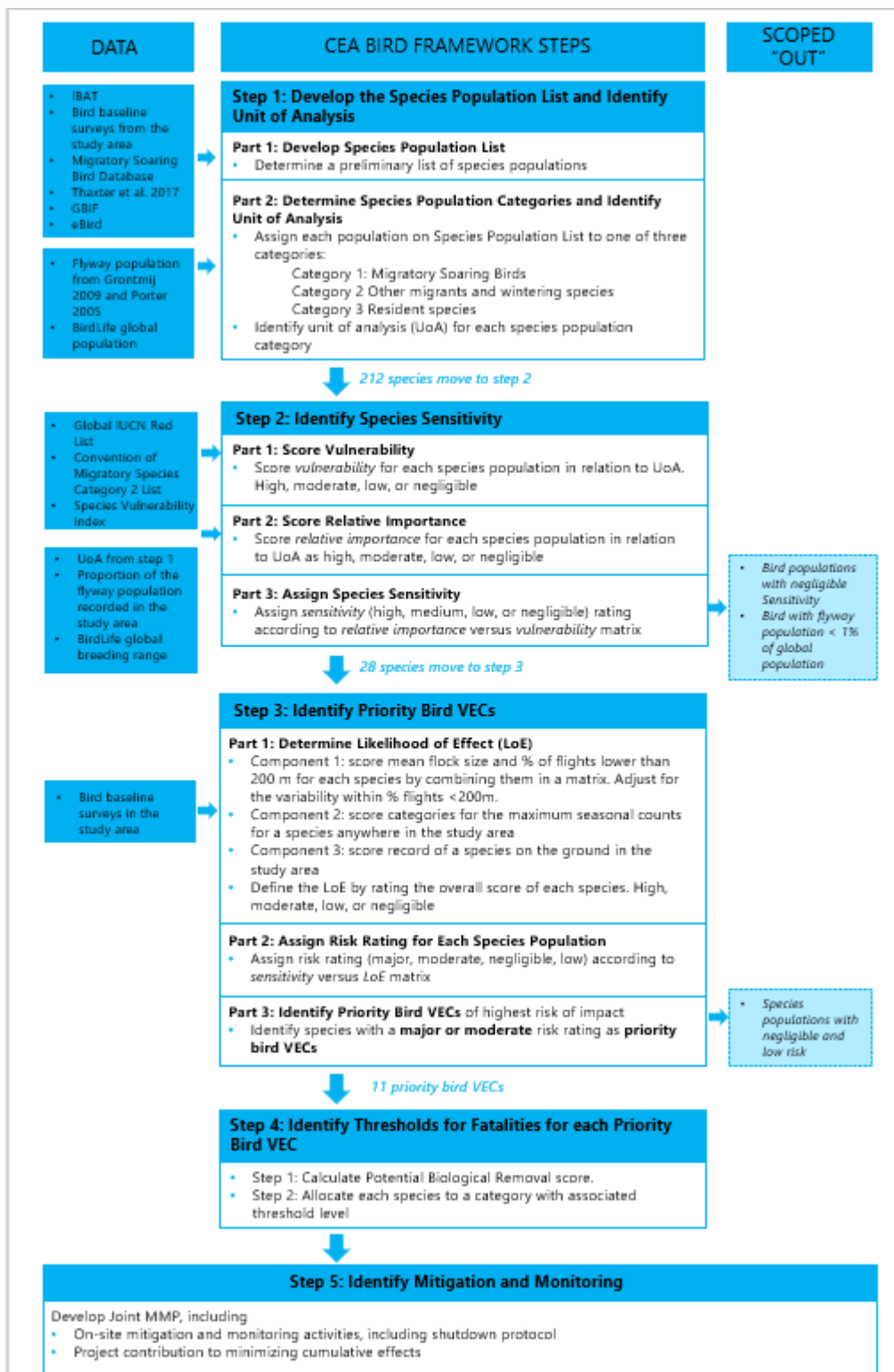


Figure 3. Process for cumulative effects analysis for priority bird VECs (adapted from IFC (2017))

Step 1 – Develop the bird species population list and identify the Units of Analysis

The purpose of Step 1 is to identify all bird species or populations that could potentially be at risk from the cumulative effects of wind energy developments in the study area and to determine a relevant UoA by which any effects on each species or population should be measured.

Methods

A species list of all bird species known or likely to be present in the study area was extracted from IBAT, supplemented with any additional species recorded in:

- Bird baseline data for the NIAT & RASGHA Wind Farm from autumn 2025 and partial spring 2026 surveys;
- Environmental and Social Impact Assessment (ESIA) Report for the NIAT Wind Farm (EcoConsult 2026)
- Cumulative Effects Analysis (EcoConServ & ECOConsult 2023)
- The BMS, Environmental & Social Impact Assessment (ESIA) and CHA for the Suez Wind Energy (SWE) wind farm Plot 2, which present bird baseline studies from spring and autumn 2022 and 2023 (EcoConServ *et al.* 2023, 2024a, 2024b, 2024c, 2024d);
- Migration of Soaring Birds at Gebel el Zeit (IBA) in relation to wind energy developments (Camina *et al.* 2024);
- RCREEE Strategic and Cumulative Environmental and Social Assessment Active Turbine Management Program (ATMP) for Wind Power Projects in the Gulf of Suez (Lahmeyer International & Ecoda 2018);
- The ESIA of Alfa Wind Project (EcoConServ 2016);
- Italgen Gabal El-Zeit 320 MW bird baseline studies in autumn 2008, spring 2009, autumn 2013, spring 2014 and autumn 2016 (Grontmij 2009; EcoConServ 2014, 2017);
- A survey in autumn 2006 in Gebel El Zeit Important Bird Area (Hilgerloh *et al.* 2011);
- Species qualifying the listing of Gebel El Zeit as an Important Bird and Biodiversity Area (BirdLife International 2024a);
- The Migratory Soaring Birds Tool (BirdLife International 2023), filtered by species mapped as occurring in the project area;
- The list of bird species included in the assessment of global vulnerability to wind power development compiled by Thaxter *et al.* (2017), filtered by species mapped in IBAT as occurring in the project area;
- The Global Biodiversity Information Facility ([GBIF](#)), filtered by records in the study area; and,
- [eBird](#), filtered by records in the study area.

These species were then allocated to one of three categories, and an appropriate UoA determined for each category:

- **Category 1:** Migratory Soaring Bird populations (as per BirdLife International 2018), with the UoA being the Rift Valley / Red Sea flyway population. Data on populations of these species were sourced from Grontmij (2009), supplemented with information from Porter (2005) and TBC (2023) as needed;

- **Category 2:** Other migrants and wintering species' populations, with the UoA being the global breeding range extent (taken from BirdLife International 2024b), as no national or regional estimates exist which would allow definition of a smaller UoA; or,
- **Category 3:** Resident species populations, with the UoA being the same as for Category 2 species.

Results

Step 1 produced a list of 212 bird species (Table 2, [Appendix 1](#): Detailed results for steps 1-3 for bird VECs).

Table 2. List of bird species known or likely to be present in the study area

| Order | | Unit of Analysis | | | Number of potential VECs |
|----------------------------------|----------------------------|------------------------------|---|-----------------------------------|--------------------------|
| Common Name | Order | Category 1 – MSB populations | Category 2 - Other migrants and wintering populations | Category 3 - Resident populations | |
| Diurnal birds of prey | <i>Accipitriformes</i> | 19 | 0 | 1 | 20 |
| Waterbirds | <i>Anseriformes</i> | 0 | 7 | 0 | 7 |
| Swifts | <i>Apodiformes</i> | 0 | 3 | 0 | 3 |
| Hornbills, hoopoes, wood hoopoes | <i>Bucerotiformes</i> | 0 | 1 | 0 | 1 |
| Nightjars | <i>Caprimulgiformes</i> | 0 | 1 | 0 | 1 |
| Shorebirds | <i>Charadriiformes</i> | 0 | 51 | 3 | 54 |
| Storks | <i>Ciconiiformes</i> | 2 | 0 | 0 | 2 |
| Pigeons and doves | <i>Columbiformes</i> | 0 | 2 | 3 | 5 |
| Kingfishers and related species | <i>Coraciiformes</i> | 0 | 5 | 0 | 5 |
| Cuckoos | <i>Cuculiformes</i> | 0 | 2 | 0 | 2 |
| Falcons and Caracaras | <i>Falconiformes</i> | 9 | 0 | 0 | 9 |
| Ground feeding birds | <i>Galliformes</i> | 0 | 1 | 1 | 2 |
| Cranes, crakes and rails | <i>Gruiformes</i> | 2 | 3 | 0 | 5 |
| Perching birds | <i>Passeriformes</i> | 0 | 70 | 11 | 81 |
| Ibises, herons and pelicans | <i>Pelecaniformes</i> | 1 | 9 | 0 | 10 |
| Flamingos | <i>Phoenicopteriformes</i> | 0 | 1 | 0 | 1 |
| Sandgrouse | <i>Pteroclidiformes</i> | 0 | 0 | 2 | 2 |
| Nocturnal birds of prey | <i>Strigiformes</i> | 0 | 1 | 0 | 1 |

| Order | | Unit of Analysis | | | Number of potential VECs |
|---------------------------------|-------------------|------------------------------|---|-----------------------------------|--------------------------|
| Common Name | Order | Category 1 – MSB populations | Category 2 - Other migrants and wintering populations | Category 3 - Resident populations | |
| Cormorants, gannets and boobies | <i>Suliformes</i> | 0 | 1 | 0 | 1 |
| Totals | | 33 | 158 | 21 | 212 |

Step 2 – Identify bird species’ sensitivity

The purpose of Step 2 is to determine the *sensitivity* of each species or population identified in Step 1 based on its *vulnerability* at a national, regional, or international scale, depending on the UoA, and the *relative importance* of the study area to the population.

Methods

Sensitivity as considered here relates to the species’ population known or likely to be present in the study area, and combines two components:

- **Vulnerability** was determined using; IUCN global threat status (IUCN 2024); IUCN North African threat status (Garrido *et al.* 2021); Category 2 of Annex 3 of the Convention of Migratory Species (CMS), reflecting species considered to have an unfavourable conservation status at a regional level within the Range States and territories, and also the Species Vulnerability Index (SVI) for species, mainly soaring birds, where this has been assessed (BirdLife International 2018). The guidance and associated ratings used to assess vulnerability are summarised in Table 3;

Relative importance for Migratory Soaring Birds (MSBs) is the proportion of the Rift Valley / Red Sea flyway population recorded in the study area, and for other migrants/wintering populations and for resident species the global Extent of Occurrence (EOO). The scoring and associated ratings used to assess relative importance for (1) MSBs and, (2) other migrants/wintering, and resident populations are summarized in

- Table 4 and Table 5 respectively. For the population recorded in the study area, this number was taken as the maximum count recorded in any season for any survey.

The *sensitivity* of the species is subsequently assigned based on a matrix (Table 6) that accounts for the combined *vulnerability* and *relative importance* ratings for each species. Species with a negligible *sensitivity* did not progress to Step 3. Additionally, species where the estimated flyway population was <1% of the total estimated global population were discounted, to reflect the very low importance of the Rift Valley / Red Sea flyway population at a global level³.

³ This resulted in the exclusion of Eurasian Sparrowhawk and Oriental Honey Buzzard.

Table 3. Vulnerability rating criteria

| Vulnerability | Migratory Soaring Birds (and other species where an SVI has been designated) | Other migrants and Resident species * |
|---|--|---|
| Negligible | LC on IUCN Global Red List, and SVI of 6 or below | LC on IUCN Global Red List, or LC on North African Red List (for resident species) |
| Low | VU or NT on IUCN Global Red List and SVI 6 or below; LC on IUCN Global Red List and SVI of 7 or 8; or CMS Category 2 Species and SVI of 6 or below | NT on IUCN Global Red List, or NT on North African Red List (for resident species) |
| Moderate | VU or NT on IUCN "Global" Red List and SVI of 7 or 8; LC on IUCN Global Red List and SVI of 9 or 10; or CMS Category 2 Species and SVI of 7 or 8 | VU on IUCN Global Red List, or VU on North African Red List (for resident species) |
| High | CR or EN on IUCN Global Red List; VU or NT on the IUCN Global Red List and SVI of 9 or 10; or CMS Category 2 Species and SVI 9 or 10 | CR or EN on IUCN Global Red List, or CR/EN on North African Red List (for resident species) |
| Note: * LC – Least Concern, NT – Near Threatened, VU – Vulnerable, EN – Endangered, CR – Critically Endangered | | |

Table 4. Relative importance rating for Migratory Soaring Birds

| Relative Importance | Maximum total count for a species within a single season from any one project in the study area as a percentage of flyway population |
|---------------------|--|
| Negligible | ≤ 1% |
| Low | >1% and ≤ 5% |
| Moderate | >5% and ≤10% |
| High | >10% |

Table 5. Relative importance rating for other migrants and resident species

| Relative Importance | Global Extent of Occurrence (km ²) |
|---------------------|--|
| Negligible | >10,000,000 |
| Low | >100,000 and <10,000,000 |
| Moderate | >50,000 and <100,000 |
| High | <50,000 |

Table 6. Sensitivity rating matrix

| Sensitivity | | Relative Importance | | | |
|---------------|------------|---------------------|------------|----------|--------|
| | | Negligible | Low | Moderate | High |
| Vulnerability | Negligible | Negligible | Negligible | Low | Low |
| | Low | Negligible | Low | Low | Medium |
| | Moderate | Low | Low | Medium | High |
| | High | Low | Medium | High | High |

Results

Step 2 produced a list of 30 bird species with greater than negligible *sensitivity* (Table 7)⁴, of which seven were assessed as High sensitivity and six as Medium.

Table 7. Rating at Step 2 for species with greater than negligible sensitivity

| Species | Scientific name | Rating | | |
|-------------------------|-----------------------------|---------------|---------------------|-------------|
| | | Vulnerability | Relative importance | Sensitivity |
| Bar-tailed Godwit | <i>Limosa lapponica</i> | Low | Low | Low |
| Black Kite | <i>Milvus migrans</i> | Low | High | Medium |
| Black Stork | <i>Ciconia nigra</i> | Low | High | High |
| Black-winged Pratincole | <i>Glareola nordmanni</i> | Low | Low | Low |
| Bonelli's Eagle | <i>Aquila fasciata</i> | Moderate | Negligible | Low |
| Booted Eagle | <i>Hieraaetus pennatus</i> | Moderate | High | High |
| Broad-billed Sandpiper | <i>Calidris falcinellus</i> | Moderate | Low | Low |
| Common Crane | <i>Grus grus</i> | Moderate | High | High |
| Curlew Sandpiper | <i>Calidris ferruginea</i> | Moderate | Low | Low |
| Cyprus Warbler | <i>Curruca melanothorax</i> | Negligible | High | Low |
| Cyprus Wheatear | <i>Oenanthe cypriaca</i> | Negligible | High | Low |

⁴ One species that was initially rated above a negligible sensitivity but was not carried through to Step 3 due to the low importance of the flyway for the species were the Oriental Honey-buzzard (*Pernis ptilorhynchus*).

| Species | Scientific name | Rating | | |
|------------------------|------------------------------|---------------|---------------------|-------------|
| | | Vulnerability | Relative importance | Sensitivity |
| Demoiselle Crane | <i>Anthropoides virgo</i> | Moderate | Negligible | Low |
| Eastern Imperial Eagle | <i>Aquila heliaca</i> | High | Moderate | High |
| Egyptian Vulture | <i>Neophron percnopterus</i> | High | Low | Medium |
| Eurasian Buzzard | <i>Buteo buteo</i> | Low | High | Medium |
| European Turtle-Dove | <i>Streptopelia turtur</i> | Moderate | Low | Low |
| Great White Pelican | <i>Pelecanus onocrotalus</i> | Moderate | High | High |
| Greater Spotted Eagle | <i>Clanga clanga</i> | High | Low | Medium |
| Grey Plover | <i>Pluvialis squatarola</i> | Moderate | Negligible | Low |
| Griffon Vulture | <i>Gyps fulvus</i> | Moderate | Negligible | Low |
| Lesser Spotted Eagle | <i>Clanga pomarina</i> | Moderate | Low | Low |
| Levant Sparrowhawk | <i>Accipiter brevipes</i> | Low | High | Medium |
| Long-legged Buzzard | <i>Buteo rufinus</i> | Low | Low | Low |
| Montagu's Harrier | <i>Circus pygargus</i> | Moderate | Negligible | Low |
| Pallid Harrier | <i>Circus macrourus</i> | Moderate | Moderate | Medium |
| Saker Falcon | <i>Falco cherrug</i> | High | Negligible | Low |
| Short-toed Snake-eagle | <i>Circaetus gallicus</i> | Low | Moderate | Low |
| Sooty Falcon | <i>Falco concolor</i> | Low | Low | Low |
| Steppe Eagle | <i>Aquila nipalensis</i> | High | High | High |
| White Stork | <i>Ciconia ciconia</i> | Moderate | High | High |

Step 3 – Conduct the ecological risk assessment and identify priority bird VECs

The purpose of Step 3 is to identify priority bird VECs from the 30 species populations scoped in at Step 2. This is done by combining each species' *sensitivity* score with an estimate of the *Likelihood of Effect* (LoE) which represents the site-specific risk, to identify those populations most at risk from adverse effects of the wind developments in the study area.

Methods

The LoE for each population was scored using three different collision risk components from the study area specific baseline dataset. The scores relate to; flight behaviour (component 1), abundance (component 2), and landing within the study area (component 3)⁵:

- **Component 1.** A matrix-derived score combining (i) the percent of individuals recorded flying below 180 m and (ii) the mean flock size (Table 8). This component is based on the reasoning that (i) those populations with a higher percentage of migrating individuals flying below tip height will be at greater risk of collision, and (ii) populations with larger mean flock sizes will potentially have a higher risk of multiple fatality collision events. The percentage of individuals recorded flying below 180 m was obtained from bird baseline data for the NIAT & RASGHA wind farm from autumn 2025 and spring 2026. Species with no data were scored as having 32% of records <180 m, corresponding to the mean across the known species. Mean flock size was also obtained from bird data for the NIAT & RASGHA wind farm from autumn 2025 and spring 2026. Species with no data on mean flock size were conservatively scored as having a maximum flock size equal to the maximum count recorded in a season.
- **Component 2.** A score based on the maximum total count for a species within a single season from any one project in the study area (Table 9) to reflect the reasoning that species with higher counts in the study area are more likely to be affected by wind developments; and,
- **Component 3.** A score to indicate whether a species had been recorded on the ground within the study area, irrespective of the numbers of individuals involved (species with records of landing scored 1, those without 0). Those species recorded on the ground must pass through the collision risk zone and hence are at greater risk of collision than those species for which landing on the ground has not been recorded.

These three components were summed to arrive at a final LoE score for each species (theoretical range 2-10), which was separated into quartiles to derive a LoE rating for that species (

Table 10). This LoE rating was then combined with the *sensitivity* rating from Step 2 to derive an *overall risk* rating (Table 11). Species which had an *overall risk* of major or moderate were considered priority bird VECs for the study area.

Table 8. Matrix for scoring mean flock size and % of flights less than 180 m for each species.

| Mean flock size | % of flights <200m | | | |
|-----------------|--------------------|-------|-------|--------|
| | 0-25 | 25-50 | 50-75 | 75-100 |
| <10 | 1 | 1 | 2 | 2 |
| 10-50 | 1 | 2 | 2 | 3 |
| 50-100 | 2 | 2 | 3 | 4 |
| >100 | 2 | 3 | 4 | 4 |

⁵ All data were sourced from the NIAT Wind Farm site.

Table 9. Score categories for the maximum seasonal counts for a species in the study area.

| Maximum season count | |
|----------------------|-------|
| Range | Score |
| 0 to 10 | 1 |
| 10 to 1000 | 2 |
| 1000 to 10000 | 3 |
| > 10000 | 4 |

Table 10. LoE rating based on overall score for each species evaluated at Step 3

| LoE | |
|------------------------------------|-----------------|
| Overall score (based on quartiles) | Level of Effect |
| ≤2 | Negligible |
| 3 | Low |
| 4 | Medium |
| ≥5 | High |

Table 11. Overall project risk matrix

| Overall risk | Likelihood of effect | | | |
|--------------|----------------------|----------|----------|----------|
| Sensitivity | Negligible | Low | Medium | High |
| Low | Negligible | Minor | Minor | Moderate |
| Medium | Minor | Minor | Moderate | Major |
| High | Minor | Moderate | Major | Major |

Results

Step 3 identified 11 species with an *overall risk* of major or moderate from the Project, and these species are considered priority bird VECs for this analysis (Table 12)⁶. Therefore, the total list of 212 potential VECs has been filtered to 11 species.

⁶ Note that this list is derived from existing reports and a desk-top analysis. No in-country expert consultation has been carried out for this rapid assessment. Local stakeholder review may identify additional species of particular concern, or provide additional data which could affect the findings.

Table 12. Scoping of species populations in steps 1 to 3 of the Cumulative Effects Analysis

| Group | Number of species | | |
|--|-------------------|------------|------------|
| | Step 1 | Step 2 | Step 3 |
| All birds | 212 | 28 | 11 |
| Category 1: Migratory Soaring Birds | 33 | 19 | 6 |
| Category 2: Other migrants and wintering species | 158 | 8 | 0 |
| Category 3: Resident species | 21 | 1 | 0 |
| <i>Filtered out</i> | - | <i>184</i> | <i>205</i> |

Table 13. Details of scores and ratings allocated to the eleven species identified as priority bird VECs

| Species | Scientific name | Category | Red List status | CMS Category 2 | SVI | Vulnerability | Highest count | Flyway population | % of UoA | Relative importance | Sensitivity | % flights <180m | Mean flock size | Highest count | Landing in Area | LoE | Overall risk |
|------------------------|------------------------------|----------|-----------------|----------------|-----|---------------|---------------|-------------------|----------|---------------------|-------------|-----------------|-----------------|---------------|-----------------|------|--------------|
| Black Kite | <i>Milvus migrans</i> | 1 | LC | No | 8 | Low | 39,090 | 132,700 | 10 | High | Medium | 38 | 26.6 | 13,523 | Yes | High | Major |
| Black Stork | <i>Ciconia ciconia</i> | 1 | LC | No | 10 | Moderate | 6,738 | 19,500 | 35 | High | High | 0 | 2.56 | 1,496 | No | Low | Moderate |
| Booted Eagle | <i>Hieraetus pennatus</i> | 1 | LC | No | 9 | Low | 362 | 3,169 | 11 | High | High | 21 | 1,27 | 80 | No | Low | Moderate |
| Common Crane | <i>Grus grus</i> | 1 | LC | No | 10 | Moderate | 17,518 | 35,000 | 50 | High | High | 1.5 | 22 | 66 | No | Low | Moderate |
| Easten Imperial Eagle | <i>Aquila heliaca</i> | 1 | VU | No | 9 | High | 147 | 2,125 | 6.9 | Moderate | High | 23 | 1 | 137 | No | Low | Moderate |
| European Honey Buzzard | <i>Pernis apivorus</i> | 1 | LC | No | 7 | Low | 157,055 | 1,000,000 | 16 | High | Medium | 51.4 | 44 | 2,844 | No | High | High |
| Eurasian Buzzard | <i>Buteo buteo</i> | 1 | LC | No | 7 | Low | 45,742 | 1,250,000 | 4 | High | Medium | 19 | 38 | 27,177 | Yes | High | Moderate |
| Great White Pelican | <i>Pelecanus onocrotalus</i> | 1 | LC | No | 10 | Moderate | 54,231 | 70,000 | 29 | High | High | 40 | 329 | 19,996 | Yes | High | Major |
| Pallid Harrier | <i>Circus macrourus</i> | 1 | NT | No | 8 | Moderate | 103 | 1,505 | 6.8 | Moderate | Low | 88 | 1.06 | 11 | Yes | High | Moderate |
| Steppe Eagle | <i>Aquila nipalensis</i> | 1 | EN | No | 9 | High | 28,068 | 37,500 | 75 | High | High | 15 | 12.5 | 10,805 | Yes | High | Major |
| White Stork | <i>Ciconia ciconia</i> | 1 | LC | No | 10 | Moderate | 505,843 | 450,000 | 112 | Low | Low | 40 | 400 | 115,479 | Yes | High | Major |

Step 4 – The threshold setting process

This step establishes a fatality threshold for each priority bird VEC from wind farm impacts, being the point at which further losses would be a risk to long-term viability of the population. Exceeding threshold values triggers a requirement for adaptive management, and this will lead to a review of wind farm operations and improvements to mitigation measures.

Species with a declining population trend, either globally or regionally, were automatically assigned a threshold of zero (see Table 14) as existing losses are already likely to have exceeded the level which would pose a risk to long-term viability of the population. For all other species (with stable, unknown or increasing population trends), thresholds were assessed relative to the population size determined by their UoA, which was the Red Sea / Rift Valley flyway population for all species.

Methods

Stage 1: For each priority VEC (with stable, unknown or increasing population trends), the Potential Biological Removal (PBR) value was calculated, representing the annual number of fatalities that could be sustained without compromising long-term population viability. This precautionary approach is appropriate where there is only limited information on a species' population biology and uses species-specific rates of adult survival rate and year of first breeding to calculate an annual rate of human-caused mortality that, in the long term, would likely lead to a nonviable population. The PBR is calculated as:

$$PBR = \frac{1}{2} R_{max} N_{min} f$$

Where:

R_{max} is the annual recruitment rate, which can be calculated from the maximum annual population growth rate via $R_{max} = Y_{max} - 1$. Y_{max} is calculated as:

$$Y_{max} = \frac{(sa - s + a + 1) + \sqrt{(s - sa - a - 1)^2 - 4sa^2}}{2a}$$

with s as the mean annual adult survival and a as the mean age at first breeding (Niel & Lebreton 2005). Information on s and a were sought for each priority VEC, however where this was not available, parameters from a closely-related surrogate species were used (Table 14).

N_{min} is a conservative estimate of population size, and is calculated as:

$$N_{min} = \hat{N} e^{(Z_p CV_{\hat{N}})}$$

with \hat{N} as the population estimate from the UoA, Z_p as the p^{th} standard normal variate (set at -0.842) and $CV_{\hat{N}}$ is the coefficient of variation for \hat{N} (set at 10%) (Wade 1998; Dillingham & Fletcher 2008); and,

f is the recovery factor, applied as per Dillingham and Fletcher (2008), with $f = 0.5$ for LC species, 0.3 for VU species and 0.1 for CR or EN species.

Stage 2: The PBR values provide an indication of the potential significance of additional impacts, and were not used to set the thresholds, but rather to assign the species into management categories. Species with a PBR <1,000 were assigned to Category 1, with a PBR 1,000-10,000 were assigned to Category 2 and those with a PBR >10,000 were assigned to Category 3 (Table 14). The rationale behind the categorisation is that for the species with the lowest PBRs any additional impact will have a population-level effect, while those with higher PBRs can cope with some additional mortality.

Potential stakeholder concerns, and the project aim of NG / NNL, have also been considered in setting the thresholds and result in conservative thresholds well below the PBR.

Thresholds

During operations, the Project will undertake fatality monitoring and other observations will be continuously through the migration period. Each fatality encountered will be documented in a 'priority bird fatality incident report', including identifying the species, and potential cause of death. These data will be reviewed periodically (before the start of each migratory season, to allow for adaptive management) to evaluate whether thresholds have been exceeded, and adaptive management is triggered.

The annual thresholds for each species have been set as follows:

- Zero fatalities
 - Category 1 species
 - All priority VECs with globally declining population trends
 - All CHA and PBF species with a global conservation status VU, EN or CR and declining population trends
 - Precautionarily, all species with zero threshold in neighbouring projects, as a result of their Cumulative Effects Assessment.
- Three fatalities
 - Category 2 species (unless listed above)
- Five fatalities
 - Category 3 species (unless listed above)
 - PBF species that did not qualify as priority VEC with a global conservation status of LC and NT

An additional threshold for 'extreme events' is defined as a single fatality event of >5 individuals, irrespective of the priority species involved. Exceedance of this threshold would trigger an adaptive management response.

Results

Four priority VECs with declining population trends (Steppe Eagle, Eastern Imperial Eagle, Booted Eagle and Pallid Harrier) were automatically assigned a fatality threshold of zero (see Table 14), along with six other species that qualified under other criteria. For these species, adaptive management actions are required if any fatalities are recorded. Two species were assigned to Category 2 and the remaining to Category 3.

Thresholds for CH-qualifying species

The two CH-qualifying species (TBC 2026) were also considered priority VECs for the Project. Thresholds for these species were developed following the same approach as described above for all the priority VECs. This led to the Steppe Eagle, with a declining population trend, being automatically assigned a fatality threshold of zero, and the White Stork being assigned a fatality threshold of five.

It must be noted that it is likely that these species are only considered as CH-qualifying because of the observation of regular concentrations of individuals at a waste dumping site located within the Project area. This dumping site will be relocated before commissioning. At that time the CH-qualifying status of these species should be re-assessed (it is considered likely that they will no longer qualify once the waste dumping site is removed) (TBC 2026).

Table 14. Input parameters, sources and results for the calculation of the fatality threshold for each priority bird VEC (species in bold qualify as CH, TBC 2026a).

| Species | Scientific name | Unit of analysis | Flyway population | Red List status | Recovery factor | Mean adult survival | Mean age at first breeding | Source for demographic parameters | PBR value | Threshold category | Fatality threshold |
|------------------------|---------------------------------|------------------------------|--------------------|-----------------|-----------------|---------------------|----------------------------|-----------------------------------|-----------|--------------------|--------------------|
| Black Kite | <i>Milvus migrans</i> | Red Sea / Rift Valley flyway | 132,700 | LC | 0.5 | 0.96 | 4 | - ⁷ | 2,626 | 2 | 3 |
| Eastern Imperial Eagle | <i>Aquila heliaca</i> | | Declining globally | | | | | | | | 0 |
| Eurasian Buzzard | <i>Buteo buteo</i> | | 1,250,000 | LC | 0.5 | 0.90 | 3 | Kenward et al. (2000) in the UK | 43,739 | 3 | 5 |
| Great White Pelican | <i>Pelecanus onocrotalus</i> | | 70,000 | LC | 0.5 | 0.78 | 3 | - ⁸ | 3,334 | 2 | 0 ⁹ |
| Pallid Harrier | <i>Circus macrourus</i> | | Declining globally | | | | | | | | 0 |
| Steppe Eagle | <i>Aquila nipalensis</i> | | Declining globally | | | | | | | | 0 |
| White Stork | <i>Ciconia ciconia</i> | | 450,000 | LC | 0.5 | 0.78 | 3 | Barbraud et al. (1999) in France | 21,430 | 3 | 5 |
| Booted Eagle | <i>Hieraetus pennatus</i> | | 3,169 | LC | 0.5 | 0.96 | 4 | - | 63 | 1 | 0 |

⁷ No demographic parameters exist for Black Kite, so information from Red Kite (Newton et al. 1989) was used as a surrogate

⁸ No demographic parameters exist for Great White Pelican, so information from American Brown Pelican (Walter et al. 2013) was used as a surrogate

| Species | Scientific name | Unit of analysis | Flyway population | Red List status | Recovery factor | Mean adult survival | Mean age at first breeding | Source for demographic parameters | PBR value | Threshold category | Fatality threshold |
|----------------------|---------------------------|------------------|-------------------|-----------------|-----------------|---------------------|----------------------------|-----------------------------------|-----------|--------------------|--------------------|
| Black Stork | <i>Ciconia nigra</i> | | 19,500 | LC | 0.5 | 0.838 | 3 | Tamás (2011) in Eastern Europe | 1,804 | 2 | 0 ⁹ |
| Comon Crane | <i>Grus grus</i> | | 35,000 | LC | 0.5 | 0.90 | 4 | - | 1,005 | 2 | 0 ⁹ |
| Honey Buzzard | <i>Pernis apivorus</i> | | 1,000,000 | LC | 0.5 | 0.86 | 3 | - | 40.066 | 3 | 5 |
| Levant Sparrowhawk | <i>Accipiter brevipes</i> | | 75,000 | LC | 0.5 | 0.90 | 3 | - | 9,597 | 2 | 3 |
| Common Kestrel | <i>Falco tinnunculus</i> | | 4,300,000 | LC | | | | | | 3 | 5 |
| Montagu's Harrier | <i>Circus pygargus</i> | | 300,000 | LC | | | | | | 3 | 5 |
| Eurasian Sparrowhawk | <i>Accipiter nisus</i> | | 2,000,000 | LC | | | | | | 3 | 5 |
| Lesser Spotted Eagle | <i>Clanga pomarina</i> | | 40,000 | LC | | | | | | 3 | 5 |
| Long-legged Buzzard | <i>Buteo rufinus</i> | | 100,000 | LC | | | | | | 3 | 5 |
| Osprey | <i>Pandion haliaetus</i> | | 100,000 | LC | | | | | | 3 | 5 |

⁹ Precautionarily attributed a zero-threshold since this threshold had been attributed before for a neighbouring project applying a similar methodology (ECOConsult *et al.* 2023)

| Species | Scientific name | Unit of analysis | Flyway population | Red List status | Recovery factor | Mean adult survival | Mean age at first breeding | Source for demographic parameters | PBR value | Threshold category | Fatality threshold |
|------------------------|------------------------------|------------------|-------------------|-----------------|--------------------|---------------------|----------------------------|-----------------------------------|-----------|--------------------|--------------------|
| Short-toed Snake Eagle | <i>Circaetus gallicus</i> | | 50,000 | LC | | | | | | 3 | 5 |
| Western Marsh Harrier | <i>Circus aeruginosus</i> | | 600,000 | LC | | | | | | 3 | 5 |
| Egyptian Vulture | <i>Neophron percnopterus</i> | | 12,400 | EN | Declining globally | | | | | | 0 ⁹ |
| Greater Spotted Eagle | <i>Clanga clanga</i> | | 3,900 | VU | Declining globally | | | | | | 0 ⁹ |
| Sooty Falcon | <i>Falco concolor</i> | | 2,800 | VU | Declining globally | | | | | | 0 ⁹ |

Adaptive management

Adaptive management is triggered when target thresholds are exceeded and should follow a set of clear sequential actions, specifically:

- Conduct a review to determine the primary reasons why a threshold was exceeded; and,
- Review the effectiveness of existing mitigation; and,
- Determine whether a revised mitigation strategy is required.

Possible options for revised mitigation may be extending the temporal period of shutdown on demand, increasing the number of observers, additional observer training, using technology to assist shutdown on demand (e.g., cameras, radar) etc. If improved mitigation proves insufficient, offsets or additional conservation actions may need to be considered to compensate for any losses above the thresholds.

An additional element of adaptive management is the periodic review of the CEA. This is necessary because increased information from the study area and from elsewhere along the flyway alter the level of risk to priority bird VECs or result in the identification of new priority species. Such information may include changes in species' Red List status, improved flyway population estimates, updated study area data (and therefore revised estimates of the proportion of flyway populations passing through the project area of influence), and improved understanding of the likelihood and magnitude of Project impacts.

It should be noted that the species' counts, flight heights and flock sizes used in Step 3 of this CEA are based on only one year of data collection at the wind farm (autumn 2025 and spring 2026 migration seasons), and that substantial interannual variation in bird passage numbers is well documented. Additionally, the bird survey data from spring 2026 available for inclusion in this CEA were incomplete at the time of this assessment, covering only the period from 20 February to 31 March. The unusually low numbers, or absence, of records for some migratory species typically expected during the spring season, such as Levant Sparrowhawk (*Accipiter brevipes*), further indicates that the available dataset does not represent the full spring migration period. The CEA will therefore be revised once data from the full spring survey period become available.

In addition, **a regional SESA and CIA is currently being undertaken for the entire Gulf of Suez region. The results of this assessment which are expected to be available before the end of 2026, may influence both the selection of bird VECs and a revision of mortality thresholds.** The new regional SESA is expected to provide guidance regarding mitigation for all projects operating in the region.

Step 5 – Identify a mitigation and monitoring approach for priority bird VECs

[The mitigation and monitoring](#) approach for priority VECs section presents the broad mitigation and monitoring actions that the Project will undertake or support to address their contribution to the cumulative effects from wind farm developments to priority bird VECs.

The Cumulative Assessment framework for other vertebrates

Overview of the framework for other terrestrial species

The assessment framework for vertebrate species (i.e. mammals and reptiles) has two objectives: to identify species at highest risk from the potential cumulative effects of developments in the study area, and to propose mitigation, monitoring and other management activities if species are identified to be at risk. This framework comprises a four-step process (Figure 4):

- **Step 1:** Develop a preliminary list of mammal and reptile species potentially at risk from developments in the study area, because they are known or predicted to occur in the study area (see [Step 1](#) – Develop the non-bird species list and identify the Units of Analysis);
- **Step 2:** Determine the relative *sensitivity* of each species, being a combination of the following:
 - *Vulnerability* of the species; and
 - *Relative Importance* of the species in relation to the appropriate UoA, i.e. the extent of occurrence (EOO) for each terrestrial species within Egyptian national boundaries (see [Step 2](#) – Identify species sensitivity).

Species which were determined to have negligible *sensitivity* were dropped from analysis before proceeding to Step 3.

- **Step 3:** Determine the *overall risk* to each species from the cumulative effects of wind farm developments within the study area, being a combination of the:
 - *Sensitivity* of the species, as identified in Step 2; and
 - Cumulative *likelihood of effect* (LoE) rating for each species (see [Step 3](#) – Conduct the ecological risk assessment and identify priority non-bird vertebrate species VECs).

Species with an *overall risk* of Major or Moderate were considered as priority VECs for the project.

- **Step 4:** Propose a range of mitigation, monitoring and management actions for priority mammal and reptile VECs to, if necessary, minimise collision risk for bats, habitat loss for other terrestrial vertebrates, and to inform any adaptive management responses (see [The mitigation and monitoring approach](#) for priority VECs section).

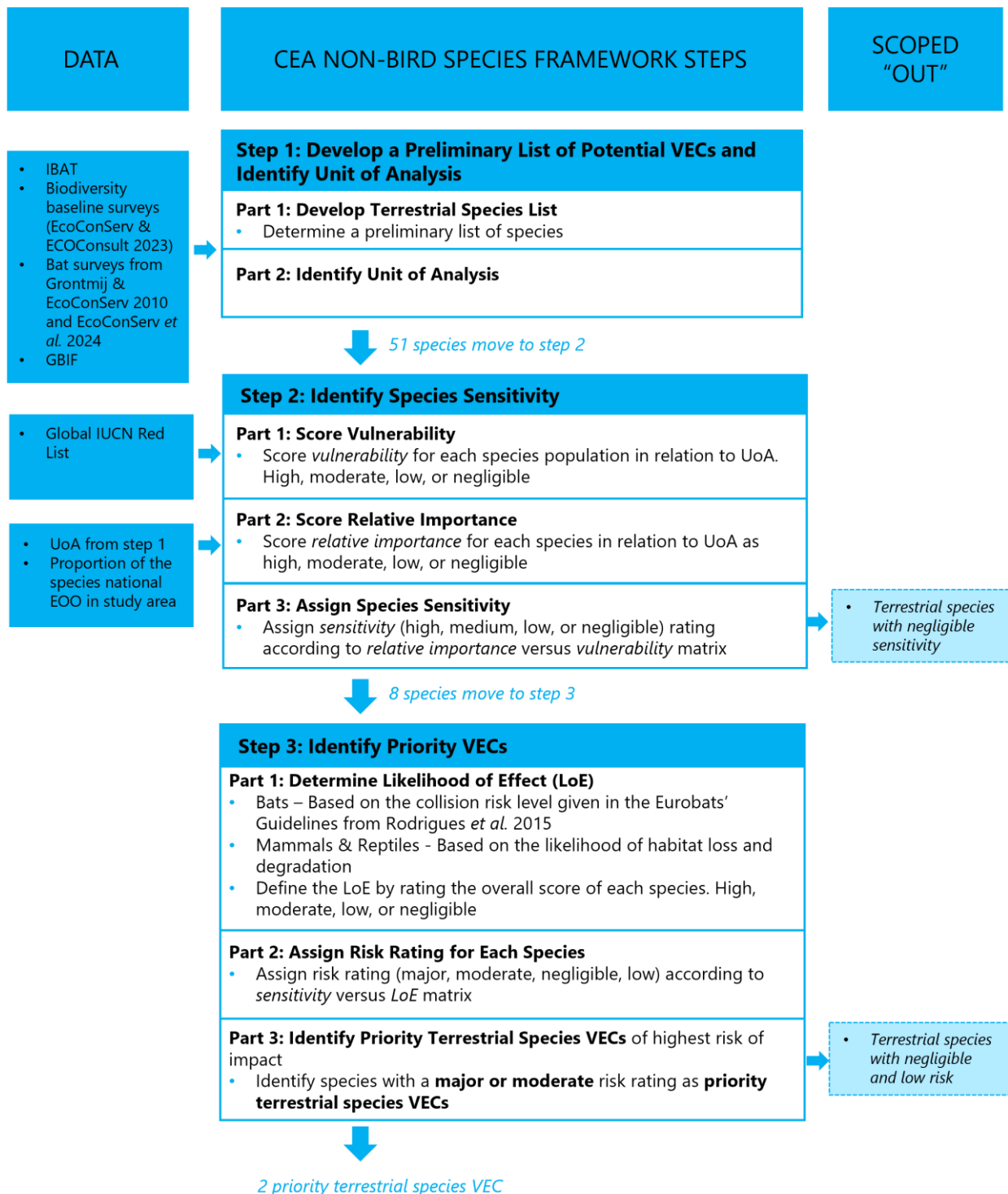


Figure 4. Process to identify priority non-bird species VECs

Step 1 – Develop the non-bird species list and identify the Units of Analysis

The purpose of Step 1 is to identify all non-bird vertebrate species that could potentially be at risk from the cumulative effects from actions related to wind energy developments in the study area and to determine a relevant UoA by which any effects on each species should be considered.

Methods

A list of mammal and reptile species predicted to be present in the study area were extracted from IBAT, and supplemented with any additional mammal/reptile species identified in Project surveys (SafeSoar 2025; Amr 2026; EcoConsult 2026; n.d.). For bats, the list was cross-checked with species listed in the field surveys for the nearby SWE site and the Italgen Gabal El-Zeit 320 MW EIA study in 2010 (Grontmij & EcoConServ 2010; EcoConServ *et al.* 2024e).

The UoA was identified based on a review of any available information on terrestrial species populations in Egypt and the wider Middle East region. The UoA identified for mammals and reptile species was the species' EOO within Egyptian national boundaries, based on IUCN global species distribution maps (IUCN 2024). Due to limited baseline data, no population estimates of any species known or likely to occur in the study area could be derived for the purpose of this analysis. Therefore, terrestrial species EOO in Egypt served as the best available information to be used for this study.

Results

A list of 25 mammal species and 27 reptile species were identified as occurring, or potentially occurring in the study area.

Step 2 – Identify species sensitivity

The purpose of Step 2 is to determine the *sensitivity* of each species identified in Step 1 based on its *vulnerability* of the species at the international and regional scale and the *relative importance* of the study area to the species.

Methods

The *sensitivity* of each species takes into account a combination of two components:

- **Vulnerability** of the species using IUCN threat categories (IUCN 2025) and, for mammals, the National (Egyptian) threat categories (Basuony *et al.* 2010). The rating system is summarised in Table 15.
- **Relative importance** of the study area in relation to the UoA was identified for each species. This was calculated using the equation below with the rating system summarised in Table 16.

$$\frac{\text{Species EOO in study area}}{\text{Species EOO in Egypt (UoA)}} \times 100 = \text{Relative Importance (\%)}$$

Two bat species were confirmed during baseline surveys (Amr 2026): Desert Pipistrelle (*Hypsugo ariel*) and Naked-rumped Tomb Bat (*Taphozous nudiventris*). The range of two other species, the Botta's Serotine (*Eptesicus bottae*) and Rüppel's Pipistrelle (*Pipistrellus rueppellii*), were not predicted to overlap with the study area from the IBAT consultation. However, bat surveys in the region (TBC unpub. data.) have indicated that these species can possibly be found within the study area. Since the IUCN range map is clearly underestimating these species range in Egypt, the equation above was not used and the study area was considered as having a low relative importance. If new data regarding the actual distribution of these species in Egypt becomes available, this classification may need to be updated.

The *sensitivity* of the species was subsequently assigned based on a matrix (Table 17) that accounts for the combined *vulnerability* and *relative importance* ratings for each species. Terrestrial species with a negligible sensitivity did not progress to Step 3.

Table 15. Vulnerability rating criteria for non-bird vertebrate species

| Vulnerability | IUCN Global Red List of Threatened Species* |
|--|--|
| Negligible | LC on IUCN Global Red List, or LC on the National Red List of mammals |
| Low | NT or DD on IUCN Global Red List, or NT on the National Red List of mammals |
| Moderate | VU on IUCN Global Red List, or VU on the National Red List of mammals |
| High | CR or EN on IUCN Global Red List, or CR/EN on the National Red List of mammals |
| * LC – Least Concern, NT – Near Threatened, VU – Vulnerable, EN – Endangered, CR – Critically Endangered | |

Table 16. Relative importance rating criteria for non-bird vertebrate species

| Relative Importance | Percentage of Species EOO present within Study Area |
|---------------------|---|
| Negligible | ≤ 1% |
| Low | >1% and ≤ 5% |
| Moderate | >5% and ≤10% |
| High | >10% |

Table 17. Sensitivity matrix for non-bird vertebrate species

| Sensitivity | | Relative Importance | | | |
|---------------|------------|---------------------|------------|----------|--------|
| | | Negligible | Low | Moderate | High |
| Vulnerability | Negligible | Negligible | Negligible | Low | Low |
| | Low | Negligible | Low | Low | Medium |
| | Moderate | Low | Low | Medium | High |
| | High | Low | Medium | High | High |

Results

Of the 51 species analysed in Step 2, one species have a *sensitivity* rating of medium, and seven species had a *sensitivity* rating of low (Table 18). All other mammal and reptile species had a negligible rating and are not considered in subsequent steps ([Appendix 2](#): Non-bird VECs at Step 2).

Table 18. Summary of rankings assigned at Step 2 for terrestrial species with a ranking above negligible. *range of these bat species in Egypt is considered to be underestimated, so the Relative importance was not calculated as a result of the % of the range in the study area, but considered to be low

| Species | Scientific name | Vulnerability | | | Relative importance | | | | Sensitivity |
|------------------------------|--------------------------------|---------------|-------------------|------------|-----------------------------------|-------------------------------|--------------------------|----------|-------------|
| | | IUCN Red List | National Red List | Score | Egyptian range (km ²) | Study area (km ²) | % of range in study area | Score | |
| Botta's Serotine | <i>Eptesicus bottae</i> | LC | VU | Moderate | 16,200 | 6801 | 42 | Low | Low |
| Desert Pipistrelle | <i>Hypsugo ariel</i> | DD | VU | Moderate | 14,100 | 6801 | 48 | Low | Low |
| Rüppel's Pipistrelle | <i>Pipistrellus rueppellii</i> | LC | VU | Moderate | 250,005 | 6801 | 2.7 | Low | Low |
| Greater Mouse-tailed Bat | <i>Rhinopoma microphyllum</i> | LC | VU | Moderate | 608,347 | 6801 | 1.1 | Low | Low |
| Naked-rumped Tomb Bat | <i>Taphozous nudiventris</i> | LC | VU | Moderate | 14,100 | 6801 | 48 | Low | Low |
| Rough Bent-toed Gecko | <i>Cyrtopodion scabrum</i> | LC | - | Negligible | 21,183 | 6801 | 32 | High | Low |
| Desert agama | <i>Trapelus mutabilis</i> | LC | - | Negligible | 109,133 | 6801 | 6.2 | Moderate | Low |
| Egyptian Spiny-tailed Lizard | <i>Uromastyx aegyptia</i> | VU | - | Moderate | 130,082 | 6801 | 5.2 | Moderate | Medium |

Step 3 – Conduct the ecological risk assessment and identify priority non-bird vertebrate species VECs

The purpose of Step 3 is to identify priority non-bird vertebrate species VECs from the eight species carried through from Step 2, i.e. the five bat species (Botta's Serotine, Desert Pipistrelle, Rüppel's Pipistrelle, Greater Mouse-tailed Bat, Naked-rumped Tomb Bat) and three reptile species (Rough Bent-toed Gecko, Desert agama and Egyptian Spiny-tailed Lizard). This was carried out by combining each species' *sensitivity* rating with an estimate of site-specific risk, i.e. the *Likelihood of effect* (LoE), to identify species that were most at risk from potential adverse effects of the wind developments in the study area.

Methods

LoE for bat species

The LoE for each bat species was identified using the level of collision risk in Eurobats' *Guidelines for consideration of bats in wind farm projects – Revision 2014* (Rodrigues *et al.* 2015) (Table 19) and further informed by global collision rates given in Thaxter *et al.* (2017), as there was no available information on the collision risk of bat species in the study area or at the country or regional level.

LoE for terrestrial species

The LoE for the three reptiles was based on the likelihood of habitat loss and degradation occurring from the cumulative effects of the potential wind farm developments in the study area (Table 20). The LoE rating was decided based on expert knowledge of the CEA team on the likely effects that are expected to occur from these developments.

Overall risk rating for non-birds

The LoE rating was then combined with the *sensitivity* rating from Step 2 to derive an *overall risk* rating (Table 21). Species which had an *overall risk* of major or moderate were considered priority VECs for the study area.

Table 19. LoE rating criteria for bat species

| LoE Rating | Level of Bat Collision Risk (based on Eurobats' Guideline) |
|------------|--|
| Negligible | Species and/or genus with low level of collision risk |
| Low | Species and/or genus with unknown level of collision risk |
| Medium | Species and/or genus with medium level of collision risk |
| High | Species and/or genus with high level of collision risk |

Table 20. LoE rating criteria for terrestrial species

| LoE Rating | Criteria |
|------------|--|
| Negligible | Negligible risk from habitat loss and degradation due to the cumulative effects of the developments. |
| Low | Low risk from habitat loss and degradation due to the cumulative effects of the developments. |
| Medium | Medium risk from habitat loss and degradation due to the cumulative effects of the developments. |
| High | High risk from habitat loss and degradation due to the cumulative effects of the developments. |

Table 21. Overall project risk matrix for non-bird vertebrate species

| Overall risk | | LoE | | | |
|--------------|--------|------------|----------|----------|----------|
| | | Negligible | Low | Medium | High |
| Sensitivity | Low | Negligible | Minor | Minor | Moderate |
| | Medium | Minor | Minor | Moderate | Major |
| | High | Minor | Moderate | Major | Major |

Results

Of the eight non-bird species carried through from Step 2 (Table 18), the Desert Pipistrelle and Rüppel's Pipistrelle are identified as having an *overall risk* rating of Moderate (Table 22). These two bat species are considered priority VECs for the study area. The presence of the Desert Pipistrelle has been confirmed in the Project area (Amr 2026), but Rüppel's Pipistrelle has not. Bats are generally scarce in the region and difficult to detect, so it is likely that the species is present even if it was not detected.

The remaining six species are identified as having an *overall risk* rating of Minor and are not considered priority VECs.

Table 22. Details of scores allocated to the non-bird vertebrate species assessed in Step 3. Those identified as priority VECs are in shown bold.

| Species | Scientific name | Sensitivity | Collision risk | LoE | Overall risk |
|------------------------------|--------------------------------|-------------|----------------|--------|--------------|
| Botta's Serotine | <i>Eptesicus bottae</i> | Low | Medium | Medium | Minor |
| Desert Pipistrelle | <i>Hypsugo ariel</i> | Low | High | High | Moderate |
| Rüppel's Pipistrelle | <i>Pipistrellus rueppellii</i> | Low | High | High | Moderate |
| Greater Mouse-tailed Bat | <i>Rhinopoma microphyllum</i> | Low | Unknown | Low | Minor |
| Naked-rumped Tomb Bat | <i>Taphozous nudiventris</i> | Low | Unknown | Low | Minor |
| Rough Bent-toed Gecko | <i>Cyrtopodion scabrum</i> | Low | NA | Low | Minor |
| Desert agama | <i>Trapelus mutabilis</i> | Low | NA | Low | Minor |
| Egyptian Spiny-tailed Lizard | <i>Uromastyx aegyptia</i> | Medium | NA | Low | Minor |

Step 5 – Identify a potential mitigation and monitoring approach for priority terrestrial VECs

The broad mitigation and monitoring actions that Project will undertake or support to address their contribution to the cumulative effects from wind farm developments to priority terrestrial species VECs, is presented in [The mitigation and monitoring approach](#) for priority VECs.

The Cumulative Assessment for ecosystems

A qualitative approach to identifying priority ecosystem VECs has been followed as data on land cover in the study area is limited and a quantitative approach was not feasible. Additionally, there has been no Red List Assessment of Ecosystems within Egypt. In this context, the approach was to review what features in the landscape are likely to be valued as important for supporting the biodiversity of the region.

The study area is not considered to contain particularly unique or highly threatened ecosystems (discussed further in the CHA, TBC 2026a). The Project area lies in the Red Sea Coastal Desert Ecoregion (Dinerstein *et al.* 2017). The vast majority of the Project area can be classified as “*Hamada Desert*” of the Sub-System “*Plain Land*” which is crossed by wadis of the Sub-System “*Low Land*”. No caves (potential bat roosting sites) have been identified in the Project area (EcoConsult 2026; n.d.).

Vegetation in the eastern desert region, in which the Project occurs, is largely restricted to salt marshes (sabkhas) and wadis (Ministry State of Environment Affairs 2014). Sabkhas do not occur within the Project area. Two main vegetated wadis and their tributaries cross the Project site (EcoConsult 2026; n.d.), however these are shallow, typical of the wider landscape, and any permanent vegetation in these wadis is sparse. The wadis in the Project area are therefore not considered of particular importance for supporting biodiversity in the region.

No priority ecosystem VECs have been identified for the Project.

The mitigation and monitoring approach for priority VECs

This section establishes the broad mitigation and monitoring actions that will be adopted by the Project, and actions that it will undertake or support to address its contribution to the cumulative effects to priority VECs from wind farm developments in the study area. These mitigation and monitoring actions (Table 23) focus on the six priority bird VECs, as identified in this document, and will also deliver benefits for other bird species passing through the wind farms. Recommendations are also listed for mitigating and monitoring impacts to the two bat VECs. In all cases, mitigation and monitoring actions will follow GIIP. The mitigation and monitoring approach will focus on two areas:

- **On-site mitigation and monitoring methods**, to minimise collision risk, validate the effectiveness of the proposed mitigation methods once they have been implemented, allow estimation of residual impacts and provide information to allow adaptive management of the monitoring and mitigation implemented; and,
- **Collaborative efforts with other wind farm entities**, to minimise the cumulative effects of all the proposed wind farm developments in the study area.

By adopting the proposed approach, the Project will be able to reduce its impact as far as practicable for the identified VECs, adhering to an approach that will facilitate alignment with PS6/ESR6/ESS4, and particularly be pursuing a goal of No Net Loss. By doing this, the Project sets a benchmark for other wind projects in the study area and provides an example of successful best-practice implementation for others to follow. A coordinated approach to mitigation, particularly migration monitoring and turbine shutdown would be beneficial to Alcazar Energy and all other wind projects in the study area. By adopting a coordinated shutdown protocol across the whole study area and sharing survey data at a regular frequency, individual project operational costs and risks to birds can be reduced through optimized and coordinated use of field observers across multiple projects.

The OHTL is considered an associated facility to the Project under IFC PS1 and EBRD ESR1, requiring cooperation with the relevant third-party operators to manage the biodiversity risks when feasible. The OHTL will be subject to an ESIA, which will determine appropriate mitigation actions to be implemented by EETC, which should include 'wildlife-friendly' pylons, to reduce the risk of electrocution, and the installation of Bird Flight Diverters (BFD) to avoid bird collisions. During operation, Post-construction Fatality Monitoring must be conducted along the OHTL following good international industry practice (IFC *et al.* 2023)

Table 23. Recommended Mitigation and Monitoring Actions for the Project

| Action | Measure | Description | Key objective | Responsible entity | Time frame | Target VEC |
|----------------------------|--|---|--|---------------------------|--|----------------|
| On-site mitigation actions | | | | | | |
| 1 | Development of appropriate protocols for mitigation and monitoring | <p>All actions require clear and detailed protocols that can be followed by survey teams and project management: this information should be included in the relevant Project documents. Protocols should align with industry good-practice guidelines.</p> <p>Specialists developing the protocols should be experienced in assessing biodiversity risk at wind farm developments, with a particular focus on birds. They should be sufficiently familiar with the Project objectives to align methods, and adapt them if conditions warrant (e.g. move VPs if bird movement patterns change, see Action 2).</p> | Ensure that all actions are undertaken in a consistent manner and collect appropriate data to make decisions. | NIAT and RASGHA Wind Farm | Approved protocols at least three months prior to commencement of operation | Birds and bats |
| 2 | Monitoring of priority bird VECs | <p>Monitoring the numbers, activities and flight paths of priority bird VECs within the wind farm is vital to inform mitigation actions. Birds must be monitored by trained and experienced field observers, and monitoring effort should cover the whole operational turbine area. The principal aim of monitoring is to initiate shut-down on demand protocols (see Action 3), to avoid collisions of priority birds with turbine blades. Additional aims are to record the numbers of priority bird VECs in the wind farm, determine flight paths and height, and to observe collisions or near misses (if or when these occur).</p> <p>Focus: monitoring should focus on priority bird VECs, with data recorded on other bird species as time allows. Unidentified species</p> | <p>(i) To ensure that shut-down on demand protocols can be initiated with sufficient time to minimize bird collisions</p> <p>(ii) to allow for informed adaptive management decisions to be made</p> | NIAT and RASGHA Wind Farm | In place prior to commencement of operation, with monitoring for the life of the project | Birds |

| Action | Measure | Description | Key objective | Responsible entity | Time frame | Target VEC |
|--------|---------------------|--|--|---------------------------|--|------------|
| | | <p>should precautionarily be considered priority bird VECs until proven otherwise.</p> <p>Method: monitoring should primarily use a series of pre-identified Vantage Points, the number and location of which will be dictated by local topography, turbine layout, viewshed analysis and activity patterns of priority bird VECs.</p> <p>Observers: should be experienced with identifying all priority bird VECs, and sufficiently knowledgeable about the goals of the project to recommend adjustments to methods if conditions warrant (e.g. move VPs if bird movement patterns change).</p> <p>Effort: as all priority bird VECs are migratory in the study area, monitoring must occur for the full spring and autumn migration periods, with start and end dates robustly justified (noting that the timing of migration varies considerably between species). Monitoring must also occur at all daytime hours when birds are known to be active. Reduced effort may be required outside of these periods and should be regularly reviewed as to its relevance.</p> <p>Records: observers must use standard data forms to record all observations, to allow for improvements to the methods and analysis of approach / responses in cases where collisions or near misses occur.</p> | | | | |
| 3 | Shut-down on demand | When field observers identify flight paths of priority bird VECs that are likely to result in collision, they must initiate a temporary shutdown of one or more turbines until the birds are no longer at risk, at which time the turbines can be restarted. This approach is a well-established | To minimize the number of collisions between priority bird VECs and wind turbines. | NIAT and RASGHA Wind Farm | Protocols and tested system in place prior to commencement | Birds |

| Action | Measure | Description | Key objective | Responsible entity | Time frame | Target VEC |
|--------|---------|--|---------------|--------------------|--|------------|
| | | <p>method for minimizing the risk to birds of colliding with rotating wind turbine blades. Shut-down on demand may also be triggered by other events not involving VECs, as defined in site-specific management plans.</p> <p>Protocols will be established under Action 1, and will include the conditions for initiating and recording:</p> <ul style="list-style-type: none"> ■ 'Near-miss incidents' (i.e. those situations where there was a failure to shut-down in a high-risk situation to a priority bird VECs; ■ Elevated risk situations (i.e. periods when environmental or other conditions result in specific or general risk to priority birds); ■ Shutdown and resumption of operation, required communications between field observers and wind farm operator; and, ■ Information to record in the event a shutdown occurs (both outcomes for the bird(s) involved and the operator's actions). <p>When one or more individuals of a priority bird VEC are observed, the field observer should consider shutdown of specific turbines based on their judgment considering the following parameters:</p> <ul style="list-style-type: none"> ■ Height at which bird is flying relative to the turbine risk height; ■ Likely flight path, flight pattern, and behavior of bird; and, ■ Distance from bird to turbine. <p>Automated shut-down on demand system options (e.g. radar, camera) should be explored, but (if used) should only supplement field-based</p> | | | of operation, with the system operational for the life of the project. | |

| Action | Measure | Description | Key objective | Responsible entity | Time frame | Target VEC |
|--------|---|---|--|---------------------------|--|----------------|
| | | observers for at least three years until such approaches have been demonstrated to work effectively in this situation. | | | | |
| 5 | Micro-siting and alignment of turbines | <p>Turbines should be micro-sited to provide the maximum gap between turbines, or turbine arrays, especially along the axes of likely migration routes. This approach is recommended with precaution as the ability of species to navigate through a wind farm is poorly understood.</p> <p>Turbine micro-siting will avoid areas containing vegetated wadis. Note that micro-siting has been conducted during development phase and assessed through Collision Risk Model in the ESIA.</p> | <p>(i) Allow priority bird VECs to pass through the wind farm</p> <p>(ii) to avoid impacts to terrestrial VECs and fauna habitats.</p> | NIAT and RASGHA Wind Farm | In the project design phase | Birds |
| 6 | Carcass surveys – turbines | This involves regular surveys of the area beneath turbines to detect carcasses from birds and bats that have collided with turbine blades. Protocols for these searches, including frequency, number of turbines searched and the search area under each turbine will be determined under Action 1 , and will be based on industry good-practice (IFC <i>et al.</i> 2023). | To determine the level of observed fatalities due to collisions with turbines at the wind farm site. | NIAT and RASGHA Wind Farm | On-going for at least the first three years of operation, then reassessed, but likely needed for the life of the project | Birds and bats |
| 8 | Carcass and searcher efficiency correction factor determination | Correction factors need to be applied to convert the observed carcasses under turbines and power lines to an estimate of actual mortality, as some carcasses will be removed prior to carcass surveys occurring (carcass removal bias), and searchers will not detect all carcasses present (searcher efficiency bias). These approaches are standard good-practice for wind farms, and if designed correctly, both trials can be | To provide species specific bird and bat fatality estimates 'corrected' for carcasses not found during fatality search surveys. | NIAT and RASGHA Wind Farm | During both spring and autumn migration periods for two years, then reassessment. | Birds and bats |

| Action | Measure | Description | Key objective | Responsible entity | Time frame | Target VEC |
|--------|---|--|------------------------------------|---------------------------|---|----------------|
| | | <p>conducted concurrently. Carcasses used should be as similar as possible to the type of expected fatalities to mimic real conditions.</p> <p>Experiments should be planned and led by someone familiar with the approaches, but the searchers used in the searcher efficiency trials should be those who will undertake the carcass surveys (Action 6 and Action 7). The number and distribution of carcasses used will depend on the habitat types and topography within the wind farm site.</p> <p>Analysis of resulting data should be through an established method: the Generalised Fatality Estimator developed by the USGS is recommended.</p> | | | Can begin prior to commencement of operation. | |
| 9 | Review to improve monitoring and mitigation effectiveness | <p>Periodic reviews of Actions 1, 2, 4-8, 10-11 will be undertaken to improve the effectiveness of monitoring and mitigation actions. This will include:</p> <p>Immediate review of process in the event of a recorded mortality for a priority bird or bat VEC, to recommend what, if any, additional actions may be implemented to further reduce collision risk.</p> <p>Quarterly review of carcass survey results and effectiveness of shut-down on demand protocols.</p> <p>Bi-annual review of monitoring data, following the end of each bird migration season.</p> <p>Annual review of carcass correction factor determination and all bird monitoring and responses for the Project. If thresholds are triggered,</p> | Adaptive management to reduce risk | NIAT and RASGHA Wind Farm | On-going from start of operations | Birds and bats |

| Action | Measure | Description | Key objective | Responsible entity | Time frame | Target VEC |
|---|--|--|--|---------------------------|---|----------------|
| | | this annual review must recommend additional mitigation measures that must be adopted during future monitoring. | | | | |
| 11 | Avoid and minimize impacts to Egyptian Spiny-tailed Lizard | <p>The lizard is not a priority VEC but is a PBF (<i>sensu</i> EBRD ESR6, as identified in TBC 2026) and impacts need to be reduced as far as is practicable by:</p> <p>Mapping and avoiding burrows during construction as much as possible; and, translocation as a last resort.</p> <p>Driver training and awareness to ensure vehicles stay on demarcated roads and drivers avoid road fatalities.</p> | Impact avoidance and minimization | NIAT and RASGHA Wind Farm | Pre-construction, construction and operations | N/A |
| Alcazar Energy contribution to minimizing cumulative effects | | | | | | |
| 12 | Data sharing | <p>The Project will make annual summaries of its monitoring and mitigation efforts publicly available to support baseline knowledge, increase transparency and understanding of the work being undertaken. Detailed monitoring results, including fatality data, will be reported in line with regulatory and lender requirements, and shared with relevant stakeholders if required.</p> <p>The Project should also share raw data in public databases such as the GBIF (EBRD 2025b).</p> | <p>Maximize the knowledge base in the region.</p> <p>Provide examples of best-practice for other operators to follow</p> | NIAT and RASGHA Wind Farm | Periodically for the life of the project | Birds and bats |
| 13 | Training of observers | The Project will contribute to training of a pool of skilled bird observers who are able to carry out baseline and monitoring surveys throughout the study area | Ensure comparable observer standards are maintained across all project sites. | All / other | On-going, with establishment prior to | Birds |

| Action | Measure | Description | Key objective | Responsible entity | Time frame | Target VEC |
|----------------------|--|---|---|---------------------------------|---|----------------|
| | | | | | commencement of operation | |
| 14 | Coordination of observer networks | The Project will require the site observers to coordinate within their networks where these can be of greatest benefit. | Maximise the benefits from an extended observer network | NIAT and RASGHA Wind Farm | On-going, with establishment prior to commencement of operation | Birds |
| 15 | Discussion forum | Support an annual biodiversity workshop / conference for wind farms in the Project area, to facilitate knowledge exchange, share experiences and plan cumulative actions. | Improve regional knowledge of priority bird VECs and improve wind farm operations | All / NIAT and RASGHA Wind Farm | Annually | All |
| Other actions | | | | | | |
| A | Prepare and implement a Biodiversity Action Plan (BAP) | Overarching Project plan to guide the mitigation of biodiversity impacts. The BAP should summarise anticipated impacts, demonstrate how the Project will apply the mitigation hierarchy, and forecast how the Project will achieve at least no net loss for the VECs and other priority biodiversity. This would include a review of collision risk models to determine what, if any, residual impacts remain after the application of mitigation actions. If collision risk models indicate that such impacts do may remain, this will also need to include a plan for compensating or offsetting residual impacts on priority biodiversity. | Support the implementation of mitigation measures and deliver>NNL ¹⁰ to priority bird VECs throughout the Project lifetime | NIAT and RASGHA Wind Farm | Must be implemented prior to operations commencing | Birds and bats |

¹⁰ Following the Tafila Region Wind Power Projects CEA (IFC 2017), priority VECs in the CEA would be considered the focus of>NNL in the project area.

Next steps

To maximise the effectiveness of this CEA, the following actions should be undertaken:

1. Provide the current draft of this document to stakeholders for review, as part of the ESIA disclosure. Relevant stakeholders include but are not limited to: government agencies (e.g. NREA), RCREEE, other wind farm developers, lenders and relevant NGOs (e.g. Nature Conservation Egypt, BirdLife International, etc.). Comments, corrections and requests for additional information should be sought from stakeholders. Where appropriate, this assessment will be revised based on their feedback;
2. Share the findings of the CEA with any other parties doing, or likely to do, similar work in Egypt; and,
3. Provide the final CEA to relevant stakeholders in the Gulf of Suez, such as EEAA, NCE and NREA.

References

- Amr, Z. (2026) Bat assessment for Alcazar-NIAT 500 MW Wind Farm in the Gulf of Suez, Arab Republic of Egypt.
- Barbraud, C., Barbraud, J.-C. & Barbraud, M. (1999) Population dynamics of the White Stork *Ciconia ciconia* in western France. *Ibis* 141: 469–479.
- Basuony, M.I., Gilbert, F. & Zalat, S. (2010) Mammals of Egypt. Atlas, red data listing and conservation.
- Bennun, L., Fletcher, C., Cook, A., Wilson, D., Jobson, B., Asante-Owusu, R., Dakmejian, A. & Liu, Q. (2024) *Guidance on biodiversity cumulative impact assessment for wind and solar developments and associated infrastructure*. IUCN, International Union for Conservation of Nature.
- Bennun, L., van Bochove, J., Ng, C., Fletcher, C., Wilson, D., Phair, N. & Carbone, G. (2021) *Mitigating biodiversity impacts associated with solar and wind energy development*. IUCN International Union for Conservation of Nature and The Biodiversity Consultancy, Gland, Switzerland and Cambridge, UK.
- BirdLife International (2015) BirdLife is working to mainstream soaring bird conservation along the Rift Valley/Red Sea flyway. <https://datazone.birdlife.org/birdlife-is-working-to-mainstream-soaring-bird-conservation-along-the-rift-valley/red-sea-flyway>
- BirdLife International (2018) The Migratory Soaring Birds project. <http://migratorysoaringbirds.undp.birdlife.org/>
- BirdLife International (2023) Migratory Soaring Birds Tool V3. <https://maps.birdlife.org/MSBtool/>
- BirdLife International (2024a) Important Bird Area factsheet: Gebel El Zeit. <https://datazone.birdlife.org/site/factsheet/gebel-el-zeit-iba-egypt>
- BirdLife International (2024b) IUCN Red List for birds. Downloaded from <https://datazone.birdlife.org/species/search> on 12/11/2024.
- Camina, A., Ceballos, P. & Vicente, N. (2024) Migration of Soaring Birds at Gebel el Zeit (IBA) in relation to wind energy developments (Report for EcoConsult on behalf of RCREEE). ACRENASL, Madrid, Spain.
- Dillingham, P. & Fletcher, D. (2008) Estimating the ability of birds to sustain additional human-caused mortalities using a simple decision rule and allometric relationships. *Biological Conservation* 141: 1783–1792.
- Dinerstein, E., Olson, D., Joshi, A., Vynne, C., Burgess, N.D., Wikramanayake, E., Hahn, N., Palminteri, S., Hedao, P., Noss, R., Hansen, M., Locke, H., Ellis, E.C., Jones, B., Barber, C.V., Hayes, R., Kormos, C., Martin, V., Crist, E., Sechrest, W., Price, L., Baillie, J.E.M., Weeden, D., Suckling, K., Davis, C., Sizer, N., Moore, R., Thau, D., Birch, T., Potapov, P., Turubanova, S., Tyukavina, A., de Souza, N., Pintea, L., Brito, J.C., Llewellyn, O.A., Miller, A.G., Patzelt, A., Ghazanfar, S.A., Timberlake, J., Klöser, H., Shennan-Farpon, Y., Kindt, R., Lillesø, J.-P.B., van Breugel, P., Graudal, L., Voge, M., Al-Shammari, K.F. & Saleem, M. (2017) An ecoregion-based approach to protecting half the terrestrial realm. *BioScience* 67: 534–545.
- EBRD (2024) Environmental and Social Policy 2024 - Environmental and Social Requirement 6.
- EBRD (2025a) EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Guidance Note. March 2023. European Bank for Reconstruction and Development, London, UK.
- EBRD (2025b) Environmental and Social Requirement 6: Biodiversity conservation and sustainable management of living natural resources. Guidance note. European Bank for Reconstruction and Development, London, UK.

- EcoConServ (2014) Environmental and Social Impact Assessment Italgen 140-200MW Wind Farm at Gabal El Zayt (Phase 2) (Report for Italgen). EcoConServ, Cairo, Egypt.
- EcoConServ (2016) Alfa Wind Project: Environmental and Social Impact Assessment 2nd draft report (Report for Alfanar Energy). EcoConServ, Cairo, Egypt.
- EcoConServ (2017) Ornithological Study for ITALGEN Wind Farm Project, Gebel El Ziet Autumn, 2016 (Report for Italgen). EcoConServ, Cairo, Egypt.
- EcoConServ & EcoConsult (2023) Site-Specific Environmental and Social Impact Assessment (ESIA) - Siemens Gamesa Renewable Energy NIAT Wind Power Plant 500 MW at Gulf of Suez (Report for RCREEE, the Regional Centre for Renewable Energy and Energy Efficiency). RCREEE, Cairo, Egypt and Amman, Jordan.
- EcoConServ & ECOConsult (2023) Cumulative Effects Analysis: NIAT Wind Power Plant 500 MW at Gulf of Suez. RCREEE, Cairo, Egypt.
- EcoConServ, EcoConsult & Safe Soar (2024a) Environmental & Social Impact Assessment (ESIA): Suez Wind Energy BOO Wind Power Plant 1.1 GW - SWE South (Plot 2). RECREEE, Cairo, Egypt.
- EcoConServ, EcoConsult & Safe Soar (2024b) Critical Habitat Assessment (CHA): Suez Wind Energy BOO Wind Power Plant 1.1 GW - SWE South (Plot 2). RECREEE, Cairo, Egypt.
- EcoConServ, EcoConsult & Safe Soar (2024c) Autumn bird migration study 2023. SUEZ Wind Energy BOO Wind Power Plant 1.1. GW – SWE PLOTS 1 & 2.
- EcoConServ, EcoConsult & Safe Soar (2024d) Spring bird migration study 2023. SUEZ Wind Energy BOO Wind Power Plant 1.1. GW – SWE PLOTS 1 & 2.
- EcoConServ, EcoConsult, Safe Soar & Natural Power (2023) Bird Migration Study for Suez Wind Energy BOO Wind Power Plant 1.1 GW during Spring and Autumn seasons 2022. RECREEE, Cairo, Egypt.
- EcoConServ, Safe Soar & EcoConsult (2024e) Site-Specific Environmental and Social Impact Assessment (ESIA) Suez Wind Energy BOO Wind Power Plant 1.1 GW – SWE North (PLOT 2) *draft* Bat Addendum Report (Report for RCREEE, the Regional Centre for Renewable Energy and Energy Efficiency). EcoConServ, Safe Soar and EcoConsult, Cairo, Egypt and Amman, Jordan.
- EcoConsult (2026) Site-Specific Environmental and Social Impact Assessment (ESIA) - Siemens Gamesa Renewable Energy NIAT Wind Power Plant 500 MW at Gulf of Suez (Report for RCREEE, the Regional Centre for Renewable Energy and Energy Efficiency). RCREEE, Cairo, Egypt and Amman, Jordan.
- ECOConsult, EcoConServ & RCREEE (2023) Masdar Infinity Power Holding 200 MW Wind Power Project in Gulf of Suez.
- Garrido, J., Numa, C., Barrios, V., Qninba, A., Riad, A., Haitham, O., Hasnaoui, H., Buirzayqah, S., Onrubia, A., Fellous-Djardini, A., Saheb, M., Rousellon, K., Cherkaoui, S., Essetti, I., Noaman, M., Radi, M., Cuzin, F., Irizi, A., Monchaux, G., Hamdi, N., Monti, F., Bergier, P., Ouni, R., Etayeb, K., Chokri, M., Azafzaf, H., Gyenge, P., Si Bachar, A. & Bakass, B. (2021) The conservation status and distribution of the breeding birds of prey of North Africa. International Union for Conservation of Nature, Gland, Switzerland.
- Grontmij (2009) Bird Migration Study El Zayt, Egypt (Report for Italgen). Aarhus University, Aarhus, Denmark.
- Grontmij & EcoConServ (2010) EIA study for a 120-400MW wind farm El Zayt, Egypt (Report for Italgen). Grontmij | Carl Bro and EcoConServ, Aarhus, Denmark and Cairo, Egypt.

- Hilgerloh, G., Michalik, A. & Raddatz, B. (2011) Autumn migration of soaring birds through the Gebel El Zeit Important Bird Area (IBA), Egypt, threatened by wind farm projects. *Bird Conservation International* 21: 365–375.
- IFC (2012) Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation (IFC), Washington DC, USA.
<https://www.ifc.org/content/dam/ifc/doc/2010/20190627-ifc-ps-guidance-note-6-en.pdf>
- IFC (2013) Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets. International Finance Corporation, Washington D.C., USA.
https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_handbook_cumulativeimpactassessment
- IFC (2017) Tafilal Region Wind Power Projects Cumulative Effects Assessment. International Finance Corporation, Washington D.C.
- IFC (2019) Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation (IFC), Washington DC, USA.
- IFC, EBRD & KfW (2023) Post-construction bird and bat fatality monitoring for onshore wind energy facilities in emerging market countries. International Finance Corporation, European Bank for Reconstruction and Development and Kreditanstalt für Wiederaufbau.
- IUCN (2024) The IUCN Red List of Threatened Species. Version 2024-2. *IUCN Red List of Threatened Species*. <https://www.iucnredlist.org/en>
- IUCN (2025) The IUCN Red List of Threatened Species. Version 2025-2. <https://www.iucnredlist.org>.
- Jobson, B., Allinson, T., Sheldon, R., Vansteelant, W., Oppel, S. & Jones, V.R. (2021) Monitoring of migratory soaring birds in the East African-Eurasian flyway: a review and recommendations for future steps. *Sandgrouse* 43: 1–23.
- Kemp, R., Colyn, R., Freeman, M.T. & McKechnie, A.E. (2024) Population status of the range-restricted Red Lark *Calendulauda burra* in a conservation area stronghold. *Ostrich* 95: 140–151.
- Kenward, R., Walls, S., Hodder, K., Pakkala, M., Freeman, S. & Simpson, V. (2000) The prevalence of non-breeders in raptor populations: evidence from rings, radio-tags and transect surveys. *Oikos* 91: 271–279.
- Lahmeyer International & Ecoda (2018) Strategic and Cumulative Environmental and Social Assessment Active Turbine Management Program (ATMP) for Wind Power Projects in the Gulf of Suez. Final report (D-8) on the Strategic Environmental and Social Assessment for an Area of 284km² at the Gulf of Suez (Report for RCREEE, the Regional Centre for Renewable Energy and Energy Efficiency). JV Lahmeyer International GmbH & ecoda Environmental Consultants GbR, Bad Vilbel, Germany.
- Ministry State of Environment Affairs (2014) Egypt's Fifth National Report to the Convention on Biological Diversity. Ministry State of Environment Affairs, Cairo, Egypt.
- Nagy, A., Mohallal, E.M.E., El-Kafrawy, S. & Saber, S.A. (2022) Which is a stronger predictor of the abundance of Dorcas Gazelle, *Gazella dorcas* in the Eastern desert of Egypt: human or natural factors? *Zoology in the Middle East* 68: 189–197.
- Newton, I., Davis, P. & Davis, J. (1989) Age of first breeding, dispersal and survival of Red Kites *Milvus milvus* in Wales. *Ibis* 131: 16–21.
- Niel, C. & Lebreton, J.-D. (2005) Using demographic invariants to detect overharvested bird populations from incomplete data. *Conservation Biology* 19: 826–835.

- Porter, R. (2005) Soaring Bird Migration in the Middle East and North-East Africa: the bottleneck sites. pp. 127–167 in: *Mainstreaming Conservation of Migratory Soaring Birds into Key Productive Sectors Along the Rift Valley/ Red Sea Flyway*. UNDP.
- Rodrigues, L., Bach, L., Dubourg-Savage, M.-J., Karapandža, B., Rnjak, D., Kervyn, T., Dekker, J., Kepel, A., Bach, P., Collins, J., Harbusch, C., Park, K., Micevski, B. & Minderman, J. (2015) *Guidelines for consideration of bats in wind farm projects Revision 2014*.
- SafeSoar (2025) Spiny-tailed Lizard Survey of ALCAZAR-NIAT 500MW site in Gulf of Suez Region, Egypt. RCREEE, Cairo, Egypt.
- TBC (2019) Lekela North Ras Gharib 250 MW: Analysis of cumulative effects to biodiversity (Unpublished report prepared on behalf of Lekela Power Ltd). The Biodiversity Consultancy Ltd, Cambridge.
- TBC (2023) Biodiversity Action Plan and Offset Feasibility Study for Project Blade. The Biodiversity Consultancy Ltd, Cambridge, UK.
- TBC (2025) Revised final Critical Habitat Assessment for the Scatec wind farm, Egypt (Report for RCREEE, the Regional Centre for Renewable Energy and Energy Efficiency). The Biodiversity Consultancy Ltd, Cambridge, UK.
- TBC (2026) Cumulative Effects Assessment for the Gebel El Zeit 580 MW Wind Farm, Egypt. The Biodiversity Consultancy, Cambridge, United Kingdom.
- Thaxter, C.B., Buchanan, G.M., Carr, J., Butchart, S.H.M., Newbold, T., Green, R.E., Tobias, J.A., Foden, W.B., O'Brien, S. & Pearce-Higgins, J.W. (2017) Bird and bat species' global vulnerability to collision mortality at wind farms revealed through a trait-based assessment. *Proceedings of the Royal Society B: Biological Sciences* 284: 20170829.
- Wade, P. (1998) Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds. *Marine Mammal Science* 14: 1–37.
- Walter, S., Carloss, M., Hess, T., Athrey, G. & Leberg, P. (2013) Movement patterns and population structure of the brown pelican. *The Condor* 115: 788–799.
- Zahran, M.A. & Willis, A.J. (2008) *The Vegetation of Egypt*. Springer Dordrecht.
- (N.d.).
- (N.d.).

Appendix 1: Detailed results for steps 1-3 for bird VECs

Appendix 1 provided in the embedded excel workbook.

Appendix 2: Non-bird VECs at Step 2

| Scientific name | Common name | IUCN status | National status (mammals) | Vulnerability | Egypt EOO | Study area | % in area | Relative importance | Sensitivity |
|------------------------------------|-----------------------------------|-------------|---------------------------|---------------|-----------|------------|-----------|---------------------|-------------|
| <i>Acanthodactylus boskianus</i> | Bosc's Fringe-toed Lizard | LC | | Negligible | 819762 | 6801 | 0.83 | Negligible | Negligible |
| <i>Acanthodactylus scutellatus</i> | | LC | | Negligible | 890173 | 6801 | 0.76 | Negligible | Negligible |
| <i>Acomys cahirinus</i> | Cairo Spiny Mouse | LC | LC | Negligible | 939457 | 6801 | 0.72 | Negligible | Negligible |
| <i>Asellia tridens</i> | Geoffroy's Trident Leaf-nosed Bat | LC | LC | Negligible | 985919 | 6801 | 0.69 | Negligible | Negligible |
| <i>Canis lupaster</i> | African Wolf | LC | LC | Negligible | 968108 | 6801 | 0.7 | Negligible | Negligible |
| <i>Cerastes cerastes</i> | Desert Horned Viper | LC | | Negligible | 971726 | 6801 | 0.7 | Negligible | Negligible |
| <i>Cerastes vipera</i> | Sahara Sand Viper | LC | | Negligible | 729340 | 6801 | 0.93 | Negligible | Negligible |
| <i>Chalcides ocellatus</i> | Ocellated Skink | LC | | Negligible | 903705 | 6801 | 0.75 | Negligible | Negligible |
| <i>Cyrtopodion scabrum</i> | Rough Bent-toed Gecko | LC | | Negligible | 21183 | 6801 | 32.1 | High | Low |
| <i>Echis coloratus</i> | | LC | | Negligible | 210452 | 6801 | 3.23 | Low | Negligible |

| Scientific name | Common name | IUCN status | National status (mammals) | Vulnerability | Egypt EOO | Study area | % in area | Relative importance | Sensitivity |
|------------------------------|--------------------------|-------------|---------------------------|---------------|-----------|------------|-----------|---------------------|-------------|
| <i>Eptesicus bottae</i> | Botta's Serotine | LC | VU | Moderate | 16200 | 6801 | 41.99 | Low ¹¹ | Low |
| <i>Felis lybica</i> | Afro-Asiatic Wildcat | LC | LC | Negligible | 199002 | 6801 | 3.42 | Low | Negligible |
| <i>Gerbillus gerbillus</i> | Lesser Egyptian Gerbil | LC | LC | Negligible | 967188 | 6801 | 0.7 | Negligible | Negligible |
| <i>Gerbillus henleyi</i> | Pygmy Gerbil | LC | LC | Negligible | 253933 | 6801 | 2.68 | Low | Negligible |
| <i>Gerbillus pyramidum</i> | Greater Egyptian Gerbil | LC | LC | Negligible | 713126 | 6801 | 0.95 | Negligible | Negligible |
| <i>Hemidactylus turcicus</i> | Turkish Gecko | LC | | Negligible | 172093 | 6801 | 3.95 | Low | Negligible |
| <i>Herpestes ichneumon</i> | Egyptian Mongoose | LC | LC | Negligible | 450969 | 6801 | 1.51 | Low | Negligible |
| <i>Hyaena hyaena</i> | Striped Hyaena | NT | LC | Low | 985642 | 6801 | 0.69 | Negligible | Negligible |
| <i>Hypsugo ariel</i> | Desert Pipistrelle | DD | VU | Moderate | 14100 | 6801 | 48.23 | Low ¹ | Low |
| <i>Jaculus jaculus</i> | Lesser Egyptian Jerboa | LC | LC | Negligible | 959716 | 6801 | 0.71 | Negligible | Negligible |
| <i>Lepus capensis</i> | Cape Hare | LC | LC | Negligible | 422748 | 6801 | 1.61 | Low | Negligible |
| <i>Lytrochynchus diadema</i> | Crowned Leaf-nosed Snake | LC | | Negligible | 964285 | 6801 | 0.71 | Negligible | Negligible |

¹¹ range of these bat species in Egypt is considered to be underestimated, so the Relative importance was not calculated as a result of the % of the range in the study area, but considered to be low

| Scientific name | Common name | IUCN status | National status (mammals) | Vulnerability | Egypt EOO | Study area | % in area | Relative importance | Sensitivity |
|-----------------------------------|----------------------------|-------------|---------------------------|---------------|-----------|------------|-----------|---------------------|-------------|
| <i>Malpolon moilensis</i> | Moila Snake | LC | | Negligible | 961014 | 6801 | 0.71 | Negligible | Negligible |
| <i>Meriones crassus</i> | Sundevall's Jird | LC | LC | Negligible | 831908 | 6801 | 0.82 | Negligible | Negligible |
| <i>Mesalina guttulata</i> | Small-spotted Desert Racer | LC | | Negligible | 779956 | 6801 | 0.87 | Negligible | Negligible |
| <i>Mesalina olivieri</i> | | LC | | Negligible | 210787 | 6801 | 3.23 | Low | Negligible |
| <i>Mesalina rubropunctata</i> | Red-spotted Desert Racer | LC | | Negligible | 908184 | 6801 | 0.75 | Negligible | Negligible |
| <i>Pipistrellus rueppellii</i> | Rüppel's Pipistrelle | LC | VU | Moderate | 250005 | 6801 | 2.72 | Low | Low |
| <i>Pipistrellus kuhlii</i> | Kuhl's Pipistrelle | LC | LC | Negligible | 250005 | 6801 | 2.72 | Low | Negligible |
| <i>Platyceps saharicus</i> | | LC | | Negligible | 247073 | 6801 | 2.75 | Low | Negligible |
| <i>Procavia capensis</i> | Rock Hyrax | LC | LC | Negligible | 272889 | 6801 | 2.49 | Negligible | Negligible |
| <i>Psammophis aegyptius</i> | Saharan Sand Snake | LC | | Negligible | 879938 | 6801 | 0.77 | Negligible | Negligible |
| <i>Psammophis schokari</i> | Forskål's Sand Snake | LC | | Negligible | 961077 | 6801 | 0.71 | Negligible | Negligible |
| <i>Pseudotrapelus chlodnickii</i> | | LC | | Negligible | 631767 | 6801 | 1.08 | Low | Negligible |
| <i>Ptyodactylus guttatus</i> | Fan-footed Gecko | LC | | Negligible | 628639 | 6801 | 1.08 | Low | Negligible |
| <i>Ptyodactylus hasselquistii</i> | | LC | | Negligible | 168006 | 6801 | 4.05 | Low | Negligible |

| Scientific name | Common name | IUCN status | National status (mammals) | Vulnerability | Egypt EOO | Study area | % in area | Relative importance | Sensitivity |
|-------------------------------------|---------------------------------|-------------|---------------------------|---------------|-----------|------------|-----------|---------------------|-------------|
| <i>Rattus rattus</i> | House Rat | LC | - | Negligible | 474636 | 6801 | 1.43 | Low | Negligible |
| <i>Rhinopoma cystops</i> | Egyptian Mouse-tailed Bat | LC | LC | Negligible | 486754 | 6801 | 1.4 | Low | Negligible |
| <i>Rhinopoma hardwickii</i> | Lesser Mouse-tailed Bat | LC | - | Negligible | 978842 | 6801 | 0.69 | Negligible | Negligible |
| <i>Rhinopoma microphyllum</i> | Greater Mouse-tailed Bat | LC | VU | Moderate | 608347 | 6801 | 1.12 | Low | Low |
| <i>Sekeetamys calurus</i> | Bushy-tailed Jird | LC | LC | Negligible | 152394 | 6801 | 4.46 | Low | Negligible |
| <i>Spalerosophis diadema</i> | Diadem Snake | LC | | Negligible | 985635 | 6801 | 0.69 | Negligible | Negligible |
| <i>Stenodactylus petrii</i> | Anderson's Short-fingered Gecko | LC | | Negligible | 928317 | 6801 | 0.73 | Negligible | Negligible |
| <i>Stenodactylus sthenodactylus</i> | Elegant Gecko | LC | | Negligible | 953468 | 6801 | 0.71 | Negligible | Negligible |
| <i>Taphozous nudiventris</i> | Naked-rumped Tomb Bat | LC | VU | Moderate | 14100 | 6801 | 48.2 | Low | Low |
| <i>Trapelus mutabilis</i> | | LC | | Negligible | 109133 | 6801 | 6.23 | Moderate | Low |
| <i>Tropiocolotes steudneri</i> | Algerian Sand Gecko | LC | | Negligible | 795530 | 6801 | 0.85 | Negligible | Negligible |
| <i>Uromastyx aegyptia</i> | Egyptian Spiny-tailed Lizard | VU | | Moderate | 130082 | 6801 | 5.23 | Moderate | Medium |
| <i>Varanus griseus</i> | Desert Monitor | LC | | Negligible | 735910 | 6801 | 0.92 | Negligible | Negligible |

| Scientific name | Common name | IUCN status | National status (mammals) | Vulnerability | Egypt EOO | Study area | % in area | Relative importance | Sensitivity |
|--------------------------|---------------|-------------|---------------------------|---------------|-----------|------------|-----------|---------------------|-------------|
| <i>Vulpes rueppellii</i> | Rüppell's Fox | LC | LC | Negligible | 915546 | 6801 | 0.74 | Negligible | Negligible |
| <i>Vulpes vulpes</i> | Red Fox | LC | LC | Negligible | 598326 | 6801 | 1.14 | Low | Negligible |

Make nature your business

The Biodiversity Consultancy Ltd
Office: +44 (0) 1223 366238
Newnham Mill, Mill Pond, Cambridge, CB3 9EY, UK

www.thebiodiversityconsultancy.com

