Interim Biodiversity Action Plan for SUEZ Wind Energy BOO Wind Power Plant 1.1. GW – SWE South (PLOT 2)

THE BIODIVERSITY CONSULTANCY

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Table of contents

Executive Summary **5**

1 Introduction **6**

1.1 Background 6

1.2 Purpose and objectives of a BAP 6

1.3 Spatial and temporal scope of the BAP 7

1.4 Stakeholder consultation 7

2 Project description **7**

3 Project policies & commitments **8**

3.1 Corporate policy 8

3.2 Lender requirements 9

4 Biodiversity context **9**

4.1 Priority biodiversity values 11

5 Potential impacts on biodiversity **12**

5.1 Construction impacts 13

5.2 Operational impacts 13

6 Mitigation Strategy **13**

6.1 Mitigation hierarchy 13

6.2 Mitigation actions 14

7 Residual impact assessment **18**

7.1 Birds 18

7.2 Egyptian Spiny-tailed Lizard 21

8 Offset strategy **21**

8.1 Offset approach 21

8.2 Offset principles 21
8.3 Offset governance 22
8.4 Offset requirements and targets 22
8.5 Offset actions 23
8.6 Additional actions to support conservation 23
9 Project status for priority species 24
10 Next steps 25
10.1 Biodiversity Monitoring and Evaluation Plan Framework 25
11 BAP implementation 26
11.1 Roles and responsibilities 26
11.2 Budget considerations 27
12 References 28
13 Appendix 1: Offset feasibility study 31
Introduction 31
Screening of offset options 33
Details of potential offset options 35
Retrofitting power lines in Egypt 35
Retrofitting power lines in Kazakhstan 36
Retrofitting power lines in Jordan 39
Programme against illegal hunting/capture in the Middle East 41
Additional offset options 45

Executive Summary

Not included in this interim BAP – this section will be added for the revised final version.

1 Introduction

1.1 Background

This document is the Interim Biodiversity Action Plan (BAP) for SUEZ Wind Energy (SWE, the Client) for the SUEZ Wind Energy BOO Wind Power Plant 1.1. GW – SWE South (PLOT 2) Wind Farm project (the Project), to be developed in the Gabel el Zeit area of the Red Sea Governorate, approximately 305 km south-east of Cairo, Egypt. The Project is planned to be a 550 MW (Megawatt) wind energy facility with 69 turbines.

The Project is required to comply with the International Finance Corporation's (IFC) Performance Standards, including IFC PS6 (PS6) (IFC 2012, 2019) and European Bank for Reconstruction and Development (EBRD) Performance Requirement 6 (PR6) Biodiversity conservation and sustainable management of living natural resources (EBRD 2019, 2023) to meet the Project lenders' requirements.

1.2 Purpose and objectives of a BAP

The purpose of this BAP is to describe a series of actions by which the Project will demonstrate Net Gain (NG) for Critical Habitat-qualifying features and No Net Loss (NNL) for Natural Habitat (NH) and for Priority Biodiversity Features (PBFs) as identified in the Project's Critical Habitat Assessment (CHA) (EcoConServ *et al.* 2024a) and NNL will also be demonstrated for priority Valued Environmental Components (VECs), as identified in the Projects' Cumulative Effects Analysis (EcoConServ *et al.* 2024b). The BAP also sets out the approach for how the mitigation hierarchy will be followed, and the roles and responsibilities for internal staff and external partners.

The objectives of this BAP are to:

- Identify the priority biodiversity values for which the Project area has a NNL or NG target;
- Summarise the mitigation measures for these priority biodiversity values which be implementation during the Project's construction and operation phases;
- Estimate residual impacts to priority biodiversity values;
- Set out a framework for biodiversity offsets, and assess their feasibility[1]; and,
- Set out the principles of a monitoring and evaluation framework to enable the Project to demonstrate achievement of the NNL/NG targets.

This BAP has been prepared in-line with IFC PS6 and IFC Guidance Note 6 (IFC 2012, 2019), EBRD PR6 and EBRD Guidance Note 6 (EBRD 2019, 2023). The BAP actions are devised in-line with the mitigation hierarchy: i.e., avoid, minimise, restore and offset, and offsetting measures

[1] Discussions with potential offset implementation partners are at an early stage, and therefore the BAP and Offset Feasibility Study will likely require future iteration as offset options are confirmed.

are identified and developed in line with IFC PS6 requirements and guidance published by the Business and Biodiversity Offsets Programme (BBOP 2012).

It is important to note that this BAP is a 'living' document, i.e. intended to be reviewed and updated on a regular basis. Regular review and update will take place as Project implementation progresses, and as more information becomes available on the status and ecology of priority biodiversity values, the impacts on these values and the effectiveness of mitigation actions. This adaptive management approach will be informed by the Project's Biodiversity Monitoring and Evaluation Plan (BMEP).

1.3 Spatial and temporal scope of the BAP

The spatial (geographical) scope covered by this BAP is the:

- Project Area of Influence;
- Ecologically Appropriate Areas of Analysis (EAAA) as defined in the Critical Habitat Assessment (CHA) for this Project (EcoConServ *et al.* 2024a); and,
- Other areas beyond the EAAAs which are considered for offset implementation which include other countries located within the same migration flyway (see Section 8 and Appendix 1).

This BAP includes actions which will cover the proposed lifespan of the Project, with actions ending at different times depending on the impacts from the Project to specific priority biodiversity features and the feature's NG/NNL target.

1.4 Stakeholder consultation

IFC's PS6 strongly recommends projects to develop partnerships with recognised and credible conservation organisations, academic institutes, biodiversity experts and the relevant government agencies, to seek their advice during the development and implementation of a BAP. This is especially important for projects located in NH and Critical Habitat (CH), or in legally protected and internationally recognised areas (IFC 2019). Engagement with government, community and any local Non-Governmental Organisation (NGO) representatives early and through the Project will help ensure that potential offsets receive broad support and avoid unplanned costs or delays in progress towards NNL or NG. It will also ensure that the Project can learn and incorporate useful elements from other conservation programmes elsewhere in the region.

A list of stakeholders consulted during the development of the BAP are included in the Offset Feasibility Study (OFS) (Appendix 1).

2 Project description

The Project site is located within the Ras Gharib City (or District) and therefore administratively is under the Ras Gharib City Council. The Ras Gharib District is further divided into Ras Gharib

town as well as 2 rural (village) local units (Zaafarana and Wadi Dara). The closest community settlements to the Project site would be Wadi Dara (0.9km from the Project site), Ras Shukier (9 km) and Ras Gharib (37.7 km) (Figure 1). The Project consists of:

- 69 8.0 MW wind turbines;
- Underground medium voltage cables connecting the wind turbines to substations;
- Two Substations (to convert the output from the turbines to a higher voltage);
- Building Infrastructure for the daily operation of the Project;
- Road network; and
- 220 kV 47 km long Overhead Transmission Line (OHTL).

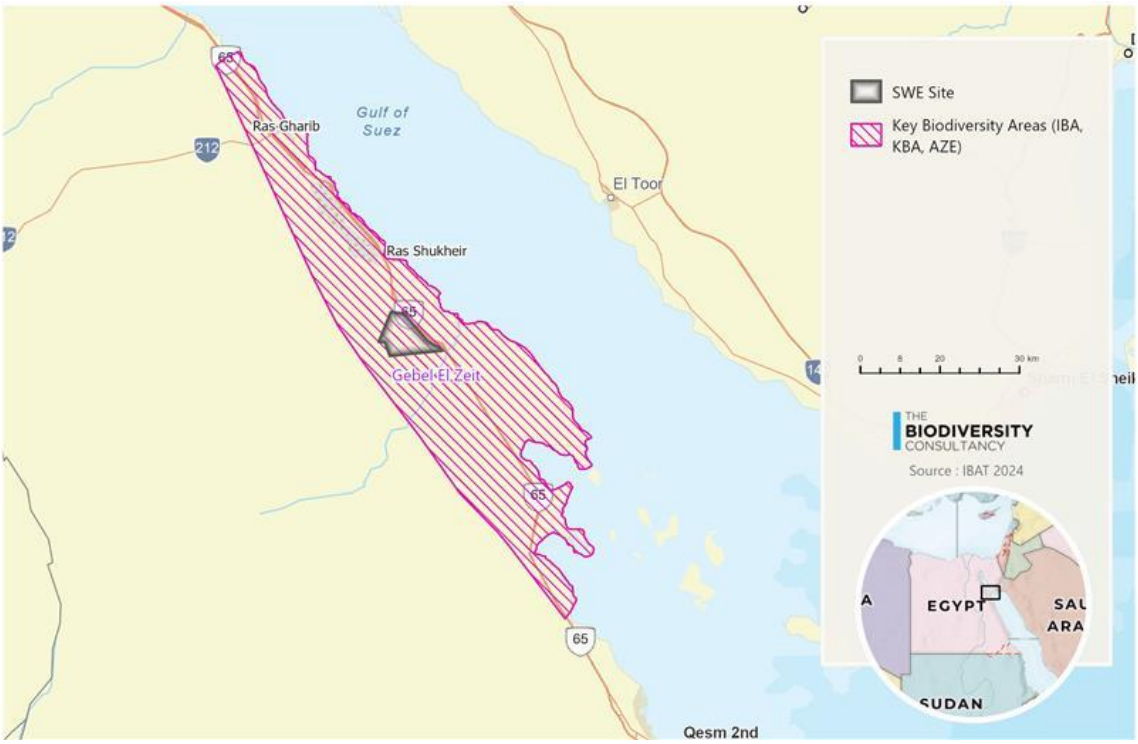

Figure 1. The Project Site, nearby population centres and the Gebel el Zeit Key Biodiversity Area

3 Project policies & commitments

3.1 Corporate policy

The Developer is committed to the protection of the environment and to the health and safety of its employees, contractors and the local community through all stages of the project life cycle. To achieve this goal, the Developer is committed to the following E&S Policy:

- Comply with all applicable national and local E&S laws and regulations as well as permitting requirements;
- Meeting internationally accepted industry best practice E&S requirements, including those of the relevant International Financing Institutions (IFIs): EBRD Performance

Requirements, IFC Performance Standards, and World Bank Group (WBG) General EHS Guidelines;
- Achieve a target of Zero significant environmental accidents;
- Assessing and minimizing potential impacts to the community, worker and the environment;
- Establishing and maintaining an Environmental and Social Management System (ESMS) which identifies objectives and targets, risks and hazards, responsibilities, and includes systems of monitoring and reporting as well as incident and accident reporting and investigation;
- Realizing continual improvement in E&S performance by developing indicators, through monitoring and auditing performance, and by implementing corrective actions where needed;
- Reporting externally on E&S performance and encouraging dialogue with employees, local communities and other stakeholders to promote awareness;
- Setting and achieving targets that promote the efficient use of natural resources;
- Minimizing and managing all waste streams and where waste is generated ensure that it will be handled and disposed of safely and responsibly; and,
- Ensuring Policy is disclosed at all Project facilities and ensure that Developer's employees and contractors, are made aware of this Policy and are adequately trained to manage the E&S risks and impacts of their actions.

3.2 Lender requirements

The Project is committed to align with IFC PS6 (IFC 2012, 2019) and EBRD PR6 (EBRD 2019, 2023), and other good international industry practice (GIIP) guidance such as the World Bank Group's Environmental Health and Safety Industry General and Sectoral Guidelines on Wind Energy (World Bank Group 2015). Specific PS6 and PR6 requirements applicable to this BAP are highlighted in the relevant sections of this document. As part of these requirements, NG is required for those biodiversity values for which the Project is in an area of CH. Gains can either be generated via biodiversity offsets (that achieve measurable, additional outcomes) where the Project has impacts to CH values or via supporting additional conservation activities that are focused on CH values for which the Project has no impact. A minimum of NNL is required for PBFs and, where feasible, for NH.

4 Biodiversity context

The Project is in the Red Sea Coastal Desert Ecoregion (Dinerstein *et al.* 2017) and occurs in an area of sand and gravel plains bisected by several shallow wadis. Land cover consists primarily of bare ground with very scattered low-growing vegetation, supporting a low diversity and abundance of terrestrial flora and fauna (EcoConServ *et al.* 2024a). Most vegetation occurs in the wadis, where the small shrub *Ochradinus baccatus* is frequent (Grontmij & EcoConServ 2010). The Project is sited on a gently sloping sand plain at ~70–130 m above sea level and lies approximately 8 km inland from the Gulf of Suez coast to the east and 15 km from the edge of the escarpment (northern Red Sea Mountains) to the west. Within and around the Project area are several wadis, which drain the escarpment. The local area contains a number of existing wind

farms and small oil fields, along with several small agricultural operations (e.g. poultry farms, date palm plantations, some crops) immediately south of the Project area (Grontmij & EcoConServ 2010).

The Project occurs within the Red Sea/Rift Valley flyway (Figure 2) 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 species, as well as a suite of migratory passerines and other bird groups (BirdLife International 2015). The Project is also entirely within the Gebel El Zeit Key Biodiversity Area[2] (KBA) and Important Bird Area[3] (IBA). This KBA is a very important migration corridor for soaring migrants, particularly birds of prey and storks, and forms an important stop-off point in the Red Sea/Rift Valley flyway. This IBA is the narrowest point in the southern part of the Gulf of Suez and migratory birds using this flyway are funnelled through the area during both spring and autumn journeys. The KBA is identified as a 'bottleneck' site on the Red Sea/Rift Valley flyway by BirdLife International[4].

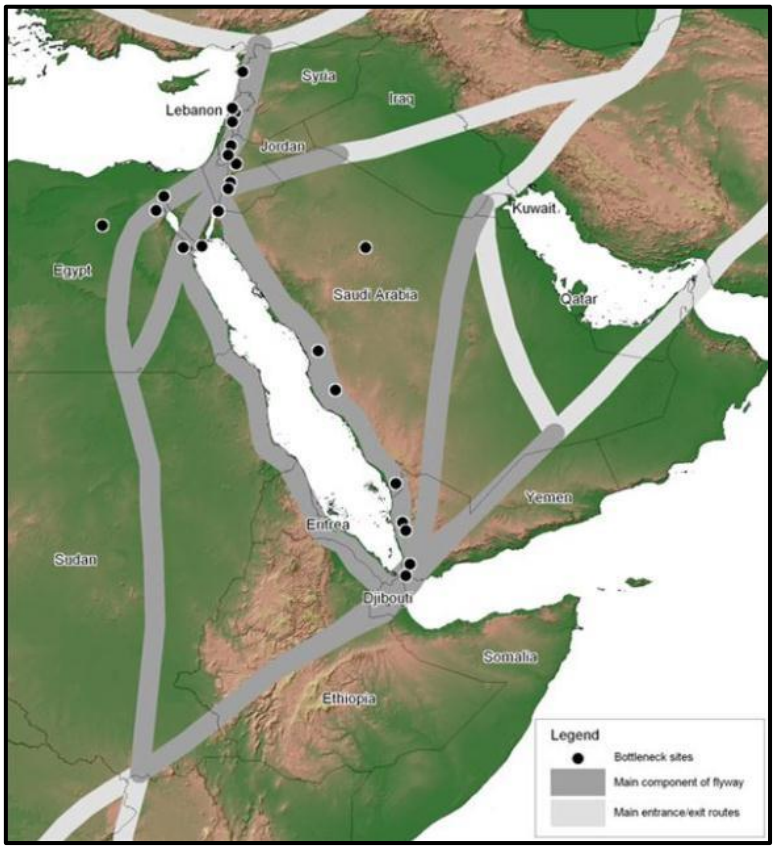

Figure 2: Map of the main elements of the Rift Valley/Red Sea flyway showing key bottleneck sites (Source: BirdLife International)

[2] https://www.keybiodiversityareas.org/site/factsheet/6217

[3] https://datazone.birdlife.org/site/factsheet/gebel-el-zeit-iba-egypt

[4] https://datazone.birdlife.org/birdlife-is-working-to-mainstream-soaring-bird-conservation-along-the-rift-valley/red-sea-flyway

4.1 Priority biodiversity values

4.1.1 Overview

This BAP focuses on biodiversity features which require special management measures rather than all biodiversity. The priority biodiversity features for this BAP are those within at least one of the categories below (elaborated in subsequent sections), and which are likely to be affected by the Project:

- Critical Habitat-qualifying species under IFC PS6 and EBRD PR6;
- Species classified as Priority Biodiversity Features under EBRD PR6; or,
- Species considered as Priority Valued Environmental Components.

4.1.2 Critical Habitat values

Areas of "high biodiversity value" are termed Critical Habitat by both the IFC and EBRD. Such a designation is based on the presence and/or quantity of significant types of biodiversity (e.g., threatened species, highly threatened ecosystems) and is independent of the condition of the habitat. The Critical Habitat Assessment for the Project (EcoConServ *et al.* 2024c) identified that the Project is in an area of Critical Habitat for ten species (Table 1), all of which are migratory soaring birds.

For these species the Project is required to demonstrate (IFC 2012, paragraph 17):

- No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;
- The Project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;
- The Project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.

This BAP describes the Project's mitigation strategy to achieve net gain for these species in Section 6.

Table 1. Biodiversity priority species for the Project.

Taxa	Scientific name	English name	IUCN Category[a]	Critical Habitat species[b]	Priority Biodiversity feature[b]	Priority VEC[c]
Birds	*Accipiter brevipes*	Levant Sparrowhawk	LC	Yes	No	Yes
	Aquila nipalensis	Steppe Eagle	EN	Yes	No	Yes
	Aquila heliaca	Eastern Imperial Eagle	VU	Yes	No	Yes
	Buteo buteo vulpinus	Eurasian (Steppe) Buzzard	LC	Yes	No	Yes

Taxa	Scientific name	English name	IUCN Category[a]	Critical Habitat species[b]	Priority Biodiversity feature[b]	Priority VEC[c]
	Ciconia ciconia	White Stork	LC	Yes	No	Yes
	Ciconia nigra	Black Stork	LC	Yes	No	Yes
	Circus macrourus	Pallid Harrier	NT	No	No	Yes
	Clanga clanga	Greater Spotted Eagle	VU	No	Yes	Yes
	Grus grus	Common Crane	LC	Yes	No	Yes
	Hieraaetus pennatus	Booted Eagle	LC	No	No	Yes
	Milvus migrans	Black Kite	LC	No	No	Yes
	Neophron percnopterus	Egyptian Vulture	EN	Yes	No	Yes
	Pelecanus onocrotalus	Great White Pelican	LC	Yes	No	Yes
	Pernis apivorus	European Honey-buzzard	LC	Yes	No	Yes
Reptiles	*Uromastyx aegyptia*	Egyptian Spiny-tailed Lizard	VU	No	Yes	No

[a] LC = Least Concern, EN = Endangered, VU = Vulnerable and NT = Near Threatened.
[b] As defined in the Critical Habitat Assessment (EcoConServ et al. 2024b).
[b] As defined in the Cumulative Effects Assessment (EcoConServ et al. 2024a).

4.1.3 Priority Biodiversity Features

In addition to CH values, EBRD also considers a suite of PBFs which are of lower concern, but still important for a project to consider (EBRD 2019, 2023). The Project CHA (EcoConServ *et al.* 2024c) classified two species, the Egyptian Spiny-tailed Lizard (*Uromastyx aegyptia*) and Greater Spotted Eagle (*Clanga clanga*) as PBFs (Table 1). According to EBRD PR6, the Project must achieve an NNL for PBFs. The Project's mitigation strategy to achieve NNL for these features will be described in following sections of this report. Where significant residual impacts on PBFs remain, additional remediation and offset measures are likely to be required to achieve NNL.

4.1.4 Priority VECs

Valued Environmental Components (VECs) is a concept used in the practice of cumulative impact assessment to indicate an environmental or social attribute that is considered important in assessing risk. Priority VECs are those at highest risk of cumulative effects from the Project in the study area, and identification of Priority VECs allows mitigation, monitoring and management measures to be focused on those species of highest risk. Identification of Priority VECs for the Project has been undertaken in a Cumulative Effects Analysis (CEA) (EcoConServ *et al.* 2024b), which identified 14 priority VECs and set accompanying acceptable/significant impact thresholds for each species. Priority VECs for the Project include all the bird species described in the last two sections as CH-qualifying and as PBFs plus Booted Eagle (*Hieraaetus pennatus*), Pallid Harrier (*Circus macrourus*) and Black Kite (*Milvus migrans*) (Table 1). The Project's goal for these additional VECs is NNL if impacts exceed the significant impact threshold.

5 Potential impacts on biodiversity

This section provides an overview of potential biodiversity impacts related to the wind farm and transmission line for the Project's construction and operation phases. The impacts mentioned

have been compiled and interpreted from the Project ESIA (EcoConServ *et al.* 2024a) and impacts and mitigation actions in relevant sector guidelines (Bennun *et al.* 2021; OCDE 2024).

Mitigation measures for the predicted impacts are presented in Section 6 and a quantitative residual impact assessment, assuming the successful implementation of the mitigation measures, is presented in Section 7 of this BAP.

5.1 Construction impacts

For both the wind farm site and along the transmission line, impacts are associated with the installation of turbines, transmission line pylons and associated infrastructure (e.g., access roads, hard stands, buildings). These activities will primarily affect the Egyptian Spiny-tailed Lizard through habitat loss and degradation and direct loss of individuals. Also, species could be impacted due to:

- Disturbance due to noise, light and human presence (machinery, vehicles, blasting);
- collision with vehicles; and,
- hunting pressure by project staff.

5.2 Operational impacts

The main impact of the operational wind farm is the collision of susceptible bird with turbines. Turbines may also act as a barrier to the normal movements of some bird species.

Electrocutions of birds may also occur at transmission pylons, while collisions of birds may occur with wires of the transmission line. The transmission line may also act as a barrier to the normal movements of some bird species.

Impacts to the Egyptian Spiny-tailed Lizard during operation are related to:

- Disturbance due to noise, light, and human presence (machinery, vehicles, blasting);
- collision with vehicles; and,
- hunting pressure by project staff.

6 Mitigation Strategy

6.1 Mitigation hierarchy

The mitigation measures adopted by the Project follow the mitigation hierarchy of avoid, minimise, restore, and compensate/offset (Figure 3). Avoidance entails 'designing out' an impact or risk (e.g., through relocating a project component, avoiding a harmful activity, employing alternative technology), preventing their expected impacts on biodiversity. Minimisation reduces the severity of impacts on biodiversity by controlling or limiting the source impact. Such actions reduce the likelihood or magnitude of biodiversity impacts, but not completely prevent them.

Restoration seeks to recreate the original (pre-project) habitat type or to actively enhance the rate of recovery of degraded habitats on the Project site, with a focus on areas affected temporarily during construction. Where significant residual impacts remain, compensation/offset actions to achieve an overall NNL for NH (where feasible), PBFs and Priority VECs, and NG for CH-qualifying features will need to be developed.

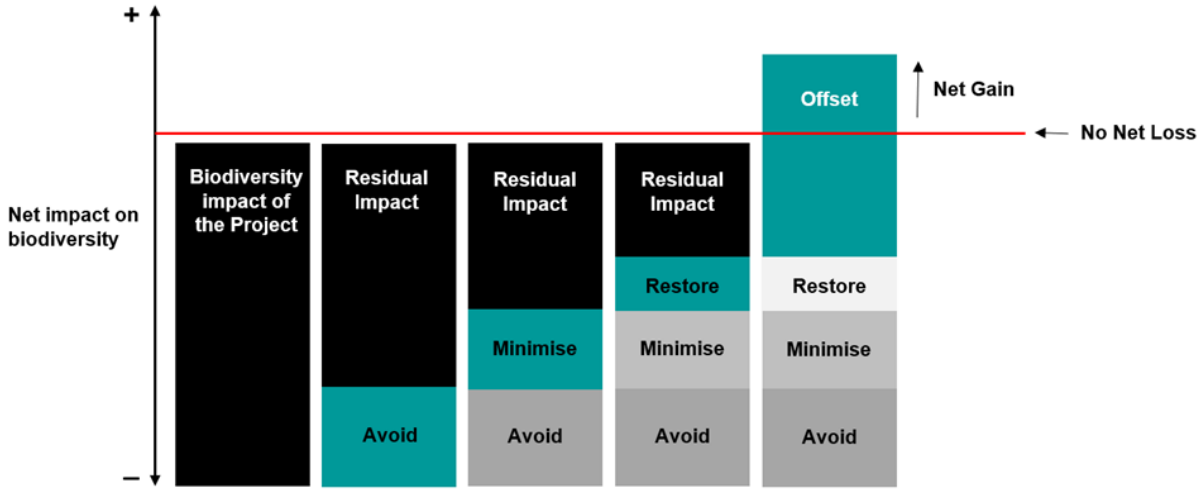

Figure 3. The Mitigation Hierarchy and delivery of net positive impact on biodiversity.

6.2 Mitigation actions

The overall approach to mitigation is detailed within the Project ESIA (EcoConServ *et al.* 2024) and BMP (EcoConServ & EcoConsult 2024a) and should be referred to for detailed information. The following sections summarise the relevant mitigation actions for priority biodiversity values, birds and the Egyptian Spiny-tailed Lizard.

6.2.1 Priority Birds

Avoidance of impacts is not possible without moving the wind farm which is in unfeasible given the existing and planned neighbouring farms.

Soaring bird collision mortality has been identified as the main biodiversity risk associated with the Project. **Minimisation** of these impacts on migratory soaring birds will occur from the start of operation through the adoption of Shut-Down on Demand (SDOD) following the protocols established in the Active Turbine Management Program (ATMP) for Wind Power Projects in the Gulf of Suez (e.g., GreenPlus 2021, GreenPlus 2022, NREA & SafeSoar 2023). The general principles to comply with established protocols are described below.

SDOD bird monitoring will occur place during 90 days during spring (20 February – 20 May) and 78 days during autumn (12 August – 28 October)[5], covering the full migration periods for

[5] The project has agreed to extend the survey period, and these values will be updated once the new survey period has been confirmed.

soaring birds in the region. The monitoring will last for 12 hours each day, between *c.* one hour after sunrise and *c.* one hour before sunset.

A set of Vantage Points (VPs) for monitoring flight activity and to facilitate effective SDOD will be defined, ensuring all the turbines and a buffer area will be covered by constant observation. Each VP will cover no more than four turbines. The buffer will ensure that enough time is available for turbines to be shut down when birds approach. Observers at vantage points will use walkie-talkies (and mobile phones, as a backup) to communicate between each other and the SCADA coordinator (when a shutdown is necessary). Observers will work in pairs and in shifts to ensure a vigilance throughout the daily survey period. During the SDOD monitoring, observers will detect and count all migratory soaring birds in the Project area and map their movements. They also will evaluate collision risk and determine whether one or more wind turbines should be temporarily shut-down, based on pre-determined shut-down criteria, that include:

- *Condition 1 – Threatened species*
  Whenever a targeted soaring bird(s) of a threatened species (according to up-to-date IUCN Red List) is detected in the wind farm area or heading towards it at risky flight altitudes (≤200 m).
- *Condition 2 – Flocks with 10 or more targeted soaring birds*
  Whenever flocks with 10 or more soaring birds are detected in the wind farm area, or heading towards it, at risky flight altitudes (≤200 m).
- *Condition 3 – Imminent risk of collision*
  Even when the previous conditions are not met, one or more turbines should be shut down whenever there is an imminent high risk of collision of migratory soaring bird(s) with turbine(s).
- *Condition 4 – Extreme weather*
  Turbines should be shut down during extreme weather events (e.g., sand/dust storms) or other precarious events that threaten the safety of the monitoring team or the targeted soaring birds, whenever conditions 1 or 2 have been verified in the two hours that preceded the event.
- *Condition 5 – Roosting inside or near windfarm area*
  Whenever bird(s) of a threatened species (Condition 1) or flocks with 10 or more soaring birds (Condition 2) is detected roosting or attempting to roost inside or near the windfarm area (≤2000 m), risky turbines should be shut down until the bird(s) depart the risk zone, or until the risk is assessed as low by the Field Coordinator.

Existing and future data on bird monitoring, bird behavioural variables, site specific characteristics and weather data and other relevant data will be used to:

- define/delimit the key flight activity periods at the Project area;
  identify high-risk areas and times, and definition of groups of turbines by zones for the SDOD Program and achieve effective coverage throughout the Project.

All mortality events and near misses will be reviewed (turbines not shutting down before birds fly through or not shutting down at all) will be investigated to provide indications for

improvement under adaptive management. For each carcass that is found an investigation will be conducted by the ATMP team in order to investigate what likely reasons leading to the failure in the SDOD system (e.g., communication failure, bird was not detected, adverse weather/sandstorm, bird disturbed while roosting, SCADA failure). Results of this investigation, along with any resulting changes in protocols, should be included in the ATMP monitoring report.

This information could then be used to establish a predictive fixed shutdown of some or all turbines located in the identified sensitive areas during the sensitive periods and could lead to increased mitigation effectiveness. The use of a Radar Systems (RSs) approach to assist visual observations using VPs is also under consideration, being dependent of the approval from the responsible military authorities. Their use will only be considered if approval for their optimal location is approved.

The final detailed delineation of the ATMP will be coordinated by the Developer and RCREEE, and will be described in future update versions of this BAP.

Also, in order to increase visibility of the turbines, and thus increase natural avoidance behaviour, a single blade will be painted black from the tip to halfway up the blade. This BAP assumes that painting will occur on all blades, however the ESIA is not clear on this point (EcoConServ *et al.* 2024c).

The Project will also implement a Carcass Management Plan (CMP, REFERENCE PENDING) to keep the project area and its surroundings free of carcasses, and reduce the attractiveness of nearby chicken farms to priority species. This CMP will be implemented for the life of the project, alone, or in cooperation with other developers, which could be potentially affected.

Minimisation of impacts in the Overhead Transmission Line (OHTL) will be through the installation of Bird Flight Diverters (BFDs) on all Project transmission lines and ensuring that transmission lines, especially pylons, are designed to be wildlife-friendly. BFDs will be installed every 10 m along the entire length of the OHTL and on the shield wire[6]. All BFDs installed will be dynamic (*e.g.* move in the wind) to increase visibility. The BFDs installed within the IBA and within 4 km of the dam in Plot 2 will include models that glow or light up at night (e.g. FireFly diverters) to increase visibility for birds staging in the area and arriving late or leaving early.

Onsite **restoration** of habitats is not possible for these species as none are likely to regularly use any terrestrial habitat present.

The requirement for **offsets** for priority birds is discussed in Chapter 8.

[6] Note that this spacing is taken from the ESIA and does not align with good international practice, which recommends a maximum spacing of 5 m between BFDs (Martín Martín et al. 2022).

6.2.1.1 *Proposed improvements in mitigation*

The mitigation of Project's impacts on birds can be further enhanced if other improvements opportunities, resulting from the acquired knowledge from other projects in the area (TBC 2023; Camiña Cardenal *et al.* 2024) are added to the ATMP described in the ESIA and presented in the previous section (Table 2). Exploration of the effects of implementing these additional mitigation actions on the residual impacts of priority birds is discussed in Chapter 7.

Table 2. Recommended improvements to mitigation actions and their expected impact in reducing collisions of migratory soaring birds.

Improvement action	Stage	Potential for reducing collision fatalities
Install one or more additional radio repeaters in strategic location(s) within the Project area to improve the communication between the field coordinators and the SCADA coordinator.	Equipment	Moderate
Use of two radars in both monitoring seasons (spring and autumn) located in locations selected by experienced radar ornithologists. Radar operators should also receive comprehensive training in all aspects of RASOD, including bird migration.	Equipment	High

6.2.2 Egyptian Spiny-tailed Lizard

Project impacts to the Egyptian Spiny-tailed Lizard are primarily the destruction of habitat, plus the potential loss of, or disturbance to, individuals from construction activities (noise, light, vibration) and human presence (machinery, vehicles, blasting), collision with vehicles and increased hunting pressure by project staff.

Pre-construction surveys for sensitive species of herpetofauna have taken place, allowing to map the locations of known/active burrows used by Egyptian Spiny-tailed Lizard throughout the Project Area. Detailed design for the final layout will consider the results of these pre-construction surveys and Project infrastructure will be sited to avoid the identified burrows to the greatest extent possible. Where this is not possible, or where fresh burrows are identified at the commencement of clearance works, these burrows will be excavated by hand and the animals captured and translocated.

Prior to work in an area containing Spiny-tailed Lizard burrows any remaining burrows within 50 m of proposed works will be re-checked by an ecologist using an endoscope and if empty dug out and destroyed. If any animal is found back in the working areas the burrow will be dug out carefully by hand and the animal captured and placed in a secure box before taking to a cool location ready for translocation to the receptor site. Once the lizard is removed from the burrow the hole will be collapsed and made unsuitable for future use.

Capture and movement of Spiny-tailed Lizards will only be completed as a last resort. All works will be completed at least 50 m from active burrows. Locations where burrows are present between 50 and 100 m of construction will be monitored throughout the construction period

and if significant negative impacts (i.e., abandonment of burrows or increased mortality) are observed the remaining burrows in closest proximity will be excavated and the animals translocated to holding areas in accordance with the below protocols for the duration of the construction window in that location.

If areas suitable for translocation exist within the Project Area these will be prioritized as this minimizes the impacts of transporting animals away from the Project site. If no such sites exist, suitable sites within 10 km of the Project area will be identified for future release of individuals. Any suitable translocation receptor site must:

- Contain appropriate vegetation for the species, considering both food and cover;
- Have suitable soil types to allow animals to dig and create new burrows; and,
- Not already be close to carrying capacity for this species.

Studies have shown (O'Donovan & O'Riordan 2018) that soft releasing Spiny-tailed Lizards leads to a better survival rate than simply releasing the animals into a new site so any animal which is translocated will be soft-released into an individual mesh enclosure within an area of suitable habitat. The pen will measure at least 2 m x 2 m and be covered to provide shade and prevent attack from above. A "starter hole" will be dug using a 20 cm auger to a depth of approximately 30 cm to provide some initial shelter. Supplementary feeding will also be undertaken and after a seven days the enclosure will be removed to allow lizards to move and forage naturally. The following measures will also be implemented to minimize onsite disturbance on the species:

- Promote awareness among staff and contractors of the ban on hunting and train them in the environmentally appropriate procedures to follow on site during construction and operation;
- If the use of explosives is necessary during construction, pre-cutting techniques and micro-retarders should be used, attenuating the intensity of the vibrations produced;
- Establish low-speed traffic rules and adequate signposting on the project's roads/accesses to reduce the likelihood of road kills.

7 Residual impact assessment

7.1 Birds

7.1.1 Methods

The predicted residual impacts used in this BAP are based on fatality estimates provided by the Client for the wind farm prior to mitigation and for the OHTL (EcoConsult & Turnstone Ecology 2024) (grey columns in Table 3). Use of these values in the BAP does not suggest or imply endorsement of those values as correct – TBC has not reviewed the raw data and analysis approach used to derive those values.

These pre-mitigation fatality predictions for collisions with turbine blades were then adjusted by the effectiveness of the proposed mitigation outlined in Section 6, which is assumed to reduce

fatalities by 98.5%. As fatalities predicted from CRM may not strongly correlate with actual fatalities, these values were then compared with actual fatalities from Post-Construction Fatality Monitoring at the adjacent Blade wind farm (TBC 2023), adjusted for the different mitigation effectiveness at the two sites[7].

The higher value from the adjusted CRM predictions from Blade and the post-mitigation fatality estimate from the Project was then considered the annual pre-mitigation collision fatality prediction for the Project.

No modifications were made to the fatality values predicted on the OHTL, as it is assumed that the monitored OHTLs have mitigation following GIIP.

Total annual fatalities per species is then the sum of the fatalities from collision and the OHTL for that species.

7.1.2 Results

Annual estimated fatalities for the Project totalled 34 soaring birds (Table 3) mostly associated with collision with the OHTL. Predicted fatalities are: 17 White Stork (*Ciconia ciconia)*, 10 European Honey-buzzard (*Pernis apivorus)*, four Eurasian (Steppe) Buzzard (*Buteo buteo vulpinus)* and one fatality each of Steppe Eagle (*Aquila heliaca*), Black Kite (*Milvus migrans*), Great White Pelican (*Pelecanus onocrotalus*) and Levant Sparrowhawk (*Accipiter brevipes*).

Apart from the minimisation measures the Project has committed to implement (see Section 6.2.1), some improvements to reduce collision risk could be obtained with the implementation of the actions described in Table 2. If these were implemented by the Project, mitigation effectiveness is assumed to increase to 99%. Applying this improved mitigation to the collision fatality estimates would only affect estimates for White Stork and European Honey-buzzard, reducing fatality estimates for these species by three (to 14) and one (to nine) respectively.

These are predicted impacts, and PCFM is required to determine the actual fatalities of priority species. PCFM is essential to update the Project's residual impacts and to allow for adaptive management and mitigation during operation.

[7] This BAP assumes that Blade was implementing 'standard' ATMP protocols with an 98% mitigation effectiveness. Blade values were adjusted to a 98.5% effectiveness by dividing the Blade raw value by 0.02 (i.e. 1-0.95) and multiplying the result by 0.015 (i.e. 1-0.985).

Table 3. Estimated annual fatalities from collisions with wind turbines and OHTL at the Project area for priority birds.

English name	Fatality threshold[a]	Pre-mitigation predicted annual collision fatalities	Predicted residual impacts from collisions[b]	Blade adjusted annual collisions[c]	Final predicted residual impacts from collisions	Predicted residual impact from the OHTL	Predicted Project Residual Impact[b]
Levant Sparrowhawk	0	*0*	0	0	0	1	1
Eastern Imperial Eagle	0	*0*	0	0.00	0	0	0
Steppe Eagle	0	*0*	0	0	0	0	1
Eurasian (Steppe) Buzzard	0	*3*	0	1.5	2	3	4
White Stork	0	*19*	0	7	7	10	17
Black Stork	0	*0*	0	0	0	0	0
Pallid Harrier	-	-	0	0	0	0	0
Greater Spotted Eagle	0	*0*	0	0	0	0	0
Common Crane	0	*0*	0	0	0	0	0
Booted Eagle	0	-	0	0	0	0	0
Black Kite	10	-	0	1	1	2	1
Egyptian Vulture	0	*0*	0	0	0	0	0
Great White Pelican	0	*0*	0	1	1	0	1
European Honey-buzzard	0	*8*	0	3	3	7	10

[a] As defined in the Cumulative Effects Assessment (EcoConServ et al. 2024a).
[b] Assuming that the ATMP reduces fatalities by 98.5%
[c] Based on PCFM data from TBC 2023, and adjusted for mitigation effectiveness as per footnote 5. .
[d] Assuming that the ATMP reduces fatalities by 99%

7.2 Egyptian Spiny-tailed Lizard

The devised mitigation actions targeting the Egyptian Spiny-tailed Lizard are considered adequate to ensure that there are no predicted significant residual impacts for the species associated to the Project area and accordingly no offsetting will be required.

8 Offset strategy

8.1 Offset approach

Biodiversity offsets and/or other forms of compensation are required to ensure overall NG of CH and NNL for NH, PBFs and priority VECs, in line with IFC PS6 and EBRD PR6.

Offsets should be used as the last resource in the mitigation hierarchy, if significant residual impacts remain after the previous steps of the mitigation hierarchy (avoidance, minimisation, restoration) have been implemented (e.g. CSBI & TBC 2015). Offsets can include off-site habitat restoration and actions that increase a species' survival or productivity (restoration offsets), and/or measures to stop the ongoing degradation and loss of biodiversity in existing designated sites or sites proposed for designation (averted loss offsets).

8.2 Offset principles

The development of potential offset actions should follow good practice (e.g. ICMM & IUCN 2013; Ledec & Johnson 2016) and key offset principles for achieving NNL/NG include:

- **Ecological equivalence:** Biodiversity gains from offsets will be planned as "like-for-like or better";
- **Landscape context:** Offsets will be designed accounting for connectivity across the landscape, avoiding fragmentation, and maintaining flows of ecosystem services;
- **Additional:** Conservation gains will be clearly attributable to the Project's actions and will demonstrably be above and beyond results that would have occurred if the offset had not taken place;
- **Transparency:** The design, implementation and monitored outcomes of biodiversity offsets will be transparent and communicated in the public domain;
- **Precautionary approach:** Estimates of gains and losses will be conservative and include a margin of precaution proportional to the risks involved in offset delivery;
- **Long-term outcomes**: Offsets will use an adaptive management approach, incorporating monitoring and evaluation, to secure outcomes that last at least as long as the Project impacts. Securing long-term financing is essential to ensuring permanence of the offset; and,
- **Stakeholder participation**: Offsets will be based upon appropriate, extensive and transparent stakeholder consultation.

8.3 Offset governance

Biodiversity offsets are more likely to be feasible in contexts with clear institutional arrangements, good governance and management responsibility, including a high level of stakeholder involvement throughout. This provides a good basis for long-lasting implementation conservation actions. Important design principles for establishing this type of management system approach are to:

- Use existing governance structures wherever feasible;
- Ensure any new structures that are created are appropriate to the scale and stakeholders involved;
- Develop downward as well as upward accountability (implementation and financial) for all management structures; and,
- Ensure there is sufficient capacity and technical assistance within the governance and management structures to function efficiently.

8.4 Offset requirements and targets

No significant residual impacts are predicted for the single non-bird priority species (the Egyptian Spiny-tailed Lizard), and therefore the development of offsets is only necessary to attain the NG and NNL goals for priority bird species: these goals are presented in Table 4.

Table 4. Annual offset goals for biodiversity priority species for the Project (CH species shown in bold, for which NG is required).

Scientific name	English name	Critical Habitat species	Predicted project residual impact	Annual Offset target[8]
Accipiter brevipes	**Levant Sparrowhawk**	**Yes**	**1**	**≥2**
Aquila nipalensis	**Steppe Eagle**	**Yes**	**0**	**≥1**
Aquila heliaca	**Eastern Imperial Eagle**	**Yes**	**1**	**≥2**
Buteo buteo vulpinus	**Eurasian (Steppe) Buzzard**	**Yes**	**4**	**≥5**
Ciconia ciconia	**White Stork**	**Yes**	**17**	**≥18**
Ciconia nigra	**Black Stork**	**Yes**	**0**	**≥1**
Circus macrourus	Pallid Harrier	No	0	≥0
Clanga clanga	Greater Spotted Eagle	No	0	≥0
Grus grus	**Common Crane**	**Yes**	**0**	**≥1**
Hieraaetus pennatus	Booted Eagle	No	0	≥0
Milvus migrans	Black Kite	No	1	≥1
Neophron percnopterus	**Egyptian Vulture**	**Yes**	**0**	**≥1**
Pelecanus onocrotalus	**Great White Pelican**	**Yes**	**1**	**≥2**
Pernis apivorus	**European Honey-buzzard**	**Yes**	**10**	**≥11**

[8] No multipliers were used to take into account uncertainty in delivery and delays between impact and gains.

8.5 Offset actions

Eight potential offset actions were considered for their potential to deliver the annual gains required by the Project for one or more target species: four of these options were analysed in depth while detailed information for the remaining four was not available for preparation of the initial BAP and not pursued further. Summary information for these eight options are provided in Appendix 1. Of the offset projects considered during the feasibility phase, three will be supported by the Project and are summarised below. Full proposals, with any confidential information removed, are attached as Appendices to this BAP.

8.5.1 Retrofitting of power lines in Egypt[9]

This project will be coordinated by RCREEE and run over ~30 months. Fatality searches have previously occurred along ~190 km of OHTL along the east and west sides of the Red Sea coast in the spring and autumn migration periods of 2021 and 2022, and a 6 km section of OHTL in the Zaafaranah/ Ras Gharib region identified as a fatality hot-spot[10]. Twenty-one White Stork carcasses were recorded in this section, equating to an estimated 13.9 individuals per year once fatalities had been adjusted for relevant biases. Along this 6 km section, RCREEE will organise for 'Rotmarka' type Bird Flight Diverters (BFDs) to be installed at a spacing of 15-20 m[11] and assuming BFDs are 50% effective (following Bernardino et al. 2019), installation would prevent 6.95 White Stork fatalities per year.

8.5.2 Retrofitting of power lines in Kazakhstan

This option is under discussion with the Biodiversity Research and Conservation Centre. Once a sufficiently detailed proposal is available, relevant information will be included here.

8.5.3 Retrofitting of power lines in Jordan

This option is under discussion with the Royal Society for the Conservation of Nature, Jordan. Once a sufficiently detailed proposal is available, relevant information will be included here.

8.6 Additional actions to support conservation

The present version of the BAP does not propose specific additional actions to support conservation. However, in compliance with paragraph 20 of IFC's PS6 for projects within an Internationally Recognized Area (such as an IBA), the project "will implement additional programs, as appropriate, to promote and enhance the conservation aims and effective

[9] TBC has not reviewed this proposal and inclusion here does not suggest or imply that TBC agrees with the approach or conclusions of that proposal.

[10] Approximate start and end locations of the OHTL: Lat 28.541839° Long 32.872709° and Lat. 28.509651°, Long. 32.922398°.

[11] Note that a spacing of 15-20 m does not follow good international practice, which recommends a maximum spacing of 5 m between BFDs (Martín Martín et al. 2022).

management of the area", and therefore such programs will be investigated in the final version of the BAP.

Should the Project wish to support conservation actions for priority biodiversity with no predicted impacts or non-priority biodiversity for the Project (e.g. Sooty Falcon; see **Error! R eference source not found.**), this would respectively either represent an additional action until a fatality is recorded - at which time it would automatically become an offset -, or an additional conservation action.

9 Project status for priority species

With the current mitigation and assuming the predicted impacts and gains from the currently supported offsets materialise, the Project will meet its commitments for the Egyptian Spiny-tailed Lizard and three of the priority bird species (Table 5).

Table 5. Offset targets, current predicted gains, and target status for each of the Project's biodiversity priority species (species for which the target is predicted to be met are shown in bold).

Scientific name	English name	Annual Offset target[12]	Current predicted gains	Status
Accipiter brevipes	Levant Sparrowhawk	≥2	0	Target not met
Aquila nipalensis	Steppe Eagle	≥1	0	Target not met
Aquila heliaca	Eastern Imperial Eagle	≥2	0	Target not met
Buteo buteo vulpinus	Eurasian (Steppe) Buzzard	≥5	0	Target not met
Ciconia ciconia	White Stork	≥18	~7	Target not met
Ciconia nigra	Black Stork	≥1	0	Target not met
Circus macrourus	**Pallid Harrier**	**≥0**	**0**	**Target met**
Clanga clanga	**Greater Spotted Eagle**	**≥0**	**0**	**Target met**
Grus grus	Common Crane	≥1	0	Target not met
Hieraaetus pennatus	**Booted Eagle**	**≥0**	**0**	**Target met**
Milvus migrans	Black Kite	≥1	0	Target not met
Neophron percnopterus	Egyptian Vulture	≥1	0	Target not met
Pelecanus onocrotalus	Great White Pelican	≥2	0	Target not met
Pernis apivorus	European Honey-buzzard	≥11	0	Target not met
Uromastyx aegyptia	**Egyptian Spiny-tailed Lizard**	**(0)**	**(0)**	**Target met**

[12] No multipliers were used to take into account uncertainty in delivery and delays between impact and gains.

10 Next steps

Currently, the Project is not meeting their commitments for 10 priority biodiversity features, although the Project is in discussion with potential offset delivery partners in Kazakhstan and Jordan. Once full proposals have been received from these organisations, this BAP will need to be updated, including a re-evaluation of the status of the Project relative to its target for each species. If these three offsets do not collectively meet the Project's requirements, additional offset actions would need to be identified.

As the Project is within an Internationally-Recognised Area (the Gebel el Zeit KBA), it must also engage with relevant parties to meet the requirements of PS6 paragraph 20.

10.1 Biodiversity Monitoring and Evaluation Plan Framework

The development of a Biodiversity Monitoring and Evaluation Plan (BMEP) is required to demonstrate compliance with paragraphs 7 and 17 of PS6, and should be developed as soon as possible with updates as new information of work actions become available (e.g. a BMEP could current cover Egyptian Spiny-tailed Lizard impacts, and be expanded to birds once offsets are sequentially contracted and then again once the Project becomes operational). While the BMEP may be referenced in an updated BAP at a later timeframe, some general guidance relevant for determining the Project's net position (i.e. losses and gains) are highlighted below. The BMEP must include an adaptive management approach, so that monitoring can inform changes to mitigation actions if impacts are shown to be significantly higher or lower than predicted in the ESIA and this BAP.

As indicated in the Project ESIA (EcoConServ *et al.* 2024c) and BMP (EcoConServ & EcoConsult 2024a), this BAP assumes that standardized PCFM, in line with current best practice guidance (IFC *et al.* 2023), will be implemented in the wind farm and associated OHTLs for the life of the Project to monitor actual levels of mortality. PCFM must be completed at all the turbines and OHTL and the program of PCFM must include carcass searching, searcher efficiency trials and carcass persistence trials. This information will be used to estimate annual fatalities using GenEst. The PCFM results are essential to evaluate the effectiveness of mitigation measures targeting the minimisation of bird collisions with turbines, allow for adaptive management of the ATMP and refine the Project's need for offsets if fatalities are much less or greater than predicted in this BAP.

Recent assessments of the current methods and analysis of the bird monitoring associated with windfarms at the Gebel El Zeit IBA (Camiña *et al.* 2024) suggest that specific monitoring of Project OHTLs should also occur immediately after each sandstorm. This is important to provide realistic information about the impact of this type of environmental event when bird visibility is minimal and manoeuvrability may be limited, likely increasing the likelihood of collision.

Installation of BFDs will be recorded by the Project Ecologist checked prior to the spring and autumn migration seasons to confirm they are in place and operational for these higher risk

periods (EcoConServ *et al.* 2024c). Any damaged or defective BFDs will be replaced within two months of being reported as faulty.

Human activities related to poultry management in the surrounding area of the Project, in particular carcass dumping, could also acting as a factor of attraction of priority birds, increasing the collision risk for the Project. A previous dumping site within the Project area was cleaned but adjacent sites remain a risk. The monitoring of the location remains appropriate to ensure that dumping of carcasses does not resume and should be associated with the implementation of the Carcass Management Plan

The success of the translocation of the Egyptian Spiny-tailed Lizard must be monitored, targeting the translocated individuals as well of non-translocated individuals in the receptor area and other 'control' populations with no intervention. This should include details of any translocations, and the long-term survival of translocated individuals compared to resident individuals.

For the agreed set of offset actions, the Project, in consultation with lenders and implementing partners, would need to:

- Agree on the level of quantification for any predicted gain, and define an agreed set of biological monitoring indicators to demonstrate gains to the level required; and
- Agree on process indicators to show that the action is proceeding in a manner to deliver the assumed gain (i.e. process indicators).

For many actions, the cost of quantifying gains may be disproportionately high compared with the cost of implementing the action. A pragmatic solution in some cases may be for there to be a collective agreement between the Project, lenders and implementing parties on likely gains from any effort or intervention so that the majority of funding can be allocated to implementation.

11 BAP implementation

11.1 Roles and responsibilities

The principal roles and responsibilities for the implementation of this BAP are outlined below, and follow the Project's Environmental and Social Management System (EcoConServ & EcoConsult 2024b). As the Project moves towards operation, additional plans may be required to operationalise the commitments made in this BAP.

The Project Company's Environmental & Social Manager will have overall responsibility for 1) coordinating the implementation of the BAP; 2) coordinate subsequent BAP updates after the Final BAP; and 3) communicate the BAP requirements to all relevant Project personnel and contractors. The Operations Manager will ensure that all parties comply with the requirements set out in this BAP, and will approve sufficient resources for the implementation of the BAP.

The biodiversity mitigation measures described in the ESIA and BMP (EcoConServ & EcoConsult 2024a; EcoConServ *et al.* 2024c) and summarised in Section 6 of this BAP, will be implemented by the EPC Contractor during construction and the Operation & Maintenance Contractor during Operation. The Environmental and Social Manager of the EPC Contractor will be responsible for the implementation of the construction and site-related mitigation measures, and they will report to the Project Company's Environmental Manager.

A Biodiversity Manager will be responsible for the overall implementation of all the biodiversity components during construction and operation.

The key to a successful BAP is the continuous monitoring of its actions and evaluation of their effectiveness in meeting the BAP objectives. The Project Company will employ a suitably qualified biodiversity specialist to monitor whether the specific actions in the BAP are being implemented and highlight requirements for adaptive management. The biodiversity monitoring required for the offset actions will be detailed in future versions of the BMEP and BAP, and will be developed once individual offset actions have been confirmed.

11.2 Budget considerations

Not included in this version of the BAP – estimates of costs for offset actions have been provided separately.

12 References

BBOP (2012) Principles for Biodiversity Offsets. Business and Biodiversity Offsets Programme, Washington D.C., USA.

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.

Bernardino, J., Martins, R., Bispo, R. & Moriera, F. (2019) Re-assessing the effectiveness of wire-marking to mitigate bird collisions with power lines: A meta-analysis and guidelines for field studies. *Journal of Environmental Management* 252: 109651.

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

Brochet, A.-L., Jbour, S., Sheldon, R.D., Porter, R., Jones, V.R., Fazari, W.A., Saghier, O.A., Alkhuzai, S., Al-Obeidi, L.A., Angwin, R., Ararat, K., Pope, M., Shobrak, M.Y., Willson, M.S., Zadegan, S.S. & Butchart, S.H.M. (2019) A preliminary assessment of the scope and scale of illegal killing and taking of wild birds in the Arabian peninsula, Iran and Iraq. *Sandgrouse* 41: 154–174.

Camiña Cardenal, 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.

CSBI & TBC (2015) A cross-sector guide to implementing the Mitigation Hierarchy. Cross-Sector Biodiversity Initiative, Cambridge, UK. http://www.csbi.org.uk/our-work/mitigation-hierarchy-guide/

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-Farpón, 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.

Dwyer, J.F., Karyakin, I.V., Garrido López, J.R. & Nikolenko, E.G. (2022) Avian Electrocutions on Power Lines in Kazakhstan and Russia. *Ardeola* 70.

EBRD (2019) EBRD Performance Requirement 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources. European Bank for Reconstruction and Development, London, UK.

EBRD (2023) EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Guidance Note. European Bank for Reconstruction and Development, London, UK.

EcoConServ & EcoConsult (2024a) Site-Specific Environmental and Social Impact Assessment (ESIA) SWE Plot 2: Biodiversity Management Plan. RCREEE, Cairo, Egypt.

EcoConServ & EcoConsult (2024b) Site-Specific Environmental and Social Impact Assessment (ESIA) SWE Plot 2: Environmental and Social Management System. RCREEE, Cairo, Egypt.

EcoConServ, EcoConsult & Safe Soar (2024a) 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 (2024b) Cumulative Effects Assessment (CEA): Suez Wind Energy BOO Wind Power Plant 1.1 GW - SWE - SWE Plots 1 & 2. RECREEE, Cairo, Egypt.

EcoConServ, EcoConsult & Safe Soar (2024c) Environmental & Social Impact Assessment (ESIA): Suez Wind Energy BOO Wind Power Plant 1.1 GW - SWE South (Plot 2). RECREEE, Cairo, Egypt.

EcoConsult & Turnstone Ecology (2024) Biodiversity Action Plan (BAP): Suez Wind Energy BOO Wind Power Plant 1.1 GW - SWE - SWE Plots 1 & 2. RECREEE, Cairo, Egypt.

Eid, E. & Handal, R. (2018) Illegal hunting in Jordan: Using social media to assess impacts on wildlife. *Oryx* 52: 730–735.

GreenPlus (2021) Shutdown on demand and bird monitoring. NREA wind farm complex. Final collective report autumn 2021 (Report for the New and Renewable Energy Agency). GreenPlus Environmental Solutions, Maadi, Egypt.

GreenPlus (2022) Shutdown on demand and bird monitoring. NREA wind farm complex. Final collective report spring 2022 (Report for the New and Renewable Energy Agency). GreenPlus Environmental Solutions, Maadi, Egypt.

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.

Handal, E.N., Amr, Z.S., Basha, W.S. & Qumsiyeh, M.B. (2021) Illegal trade in wildlife vertebrate species in the West Bank, Palestine. *Journal of Asia-Pacific Biodiversity* 14: 636–639.

ICMM & IUCN (2013) Independent report on biodiversity offsets. Prepared by The Biodiversity Consultancy, available at: www.icmm.com/biodiversity-offsets.

IFC (2012) Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation (IFC), Washington DC, USA.

IFC (2019) International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

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.

Khoury, F., Makarevicz, C., Al-Hmoud, A.-R. & Mithen, S. (2020) The illegal trapping of large falcons in Jordan. *Sandgrouse* 42: 239–247.

Ledec, G.C. & Johnson, S.D.R. (2016) Biodiversity offsets: a user guide (Working Paper No. 110820). World Bank Group, Washington, D.C.

Martín Martín, J., Garrido López, J.R., Clavero Sousa, H. & Barrios, V. (Eds.) (2022) *Wildlife and power lines: guidelines for preventing and mitigating wildlife mortality associated with electricity distribution networks*, 1st ed. IUCN, International Union for Conservation of Nature, Gland, Switzerland.

NCE (2018) Hunting and trapping practices in Egypt's northern Mediterranean coast.

NREA & SafeSoar (2023) Active Turbine Management Program at NREA Wind Farms.

OCDE (2024) Mainstreaming Biodiversity into Renewable Power Infrastructure. OECD Publishing, Paris, France.

O'Donovan, D. & O'Riordan (2018) Translocation trial of spiny-tailed lizard or dhub in Dubai, UAE. in: *Global Reintroduction Perspectives: 2018. Case studies from around the globe*. IUCN/SSC Reintroduction Specialist Group, Gland, Switzerland and Environment Agency, Abu Dhabi,.

Pulikova, G.I., Kaptyonkina, A.G., Smelansky, I.E., Zinevich, L.S., Nikolenko, E.G. & Karyakin, I.V. (2023) The present status of the Steppe Eagle in Kazakhstan. *Raptors Conservation* 247–252.

Qaneer, T. & Demerdzhiev, D. (2023) First data on bird electrocution in Jordan, with comments on the undertaken conservation efforts. *Acta Zoologica Bulgarica* Supplement: 59–66.

Raza, H., Fadhel, O., Ararat, K., Kh Haba, M. & Salim, M. (2011) Animal and bird trade and hunting in Iraq.

RSCN (2019) The status of illegal trade in wild birds at the local market and online with focus on soaring birds.

RSCN (2020) Mainstreaming migratory soaring birds conservation in the five sectors of agriculture, hunting and tourism, waste management and energy in Jordan.

TBC (2023) Biodiversity Action Plan and Offset Feasibility Study for Project Blade. The Biodiversity Consultancy Ltd, Cambridge, UK.

World Bank Group (2015) Environmental, Health, and Safety Guidelines for Wind Energy. World Bank Group, Washington D.C., USA. http://www.ifc.org/ehsguidelines

13 Appendix 1: Offset feasibility study

IMPORTANT NOTE: the SUEZ Wind Energy BOO Wind Power Plant 1.1. GW – SWE South (PLOT 2) Wind Farm Project (this Project) and the Scatec Wind Farm have agreed to investigate feasibility of a shared set of offset actions, aiming to comply with the respective net gain (NG) and no net loss (NNL) goals for the two neighbouring projects in the Gulf of Suez. While details on the relative levels of gains required for each project still need to be finalized, the offset options analysed in the present Offset Feasibility Study have in considered the cumulative NG or NNL species goals from both projects.

Introduction

This Appendix is the Offset Feasibility Study (OFS) for the SUEZ Wind Energy BOO Wind Power Plant 1.1. GW – SWE South (PLOT 2) Wind Farm (the Project) and describes four main offset options (plus four additional options) that have been identified for delivering the project's NNL / NG targets for each of the 14 priority bird species (Table 1). Offset options were identified through TBC's knowledge of ongoing or previous conservation projects for the target species, supplemented with informal discussions with experts and a review of regional and national avian conservation organizations. A full list of organisations and individuals consulted is included in Table 6. This OFS assumes that SUEZ Wind Energy will propose, in agreement with Lenders, a final set of offset options and the level of contribution for implementation.

Table 6. Stakeholders contacted relevant to the implementation of offsets and the engagement status for each up to 04 December 2024.

Stakeholder (country)	Contact	Current engagement status	Offset option (countries)
Nature Conservation Egypt - NCE (Egypt)	REDACTED	Exchange of emails since 25/11/2024; waiting for NCE / BirdLife International to resolve their position on whether to engage with wind projects planned within the Gebel el Zeit IBA.	Overhead Transmission Lines (OHTL) retrofitting (Egypt) Anti-illegal hunting/capture program (Egypt)
Raptor and wildlife researcher, author of publications on the impacts of OHTLs (Kazakhstan)	REDACTED	Exchange of emails since 21/11/2024; high-level proposal prepared, including budget estimate	OHTL retrofitting (Kazakhstan)

Stakeholder (country)	Contact	Current engagement status	Offset option (countries)
Royal Society for the Conservation of Nature - RSCN (Jordan)	REDACTED	Exchange of emails since 26/11/2024; meeting on 02/12/2024	OHTL retrofitting (Jordan) Anti-illegal hunting/capture program (Jordan, Middle East)
Raptor and wildlife researcher, author of publications on the impacts of illegal hunting of birds (Jordan)	REDACTED	Contacted through LinkedIn on 26/11/2024; meeting to be scheduled	Anti-illegal hunting/capture program (Jordan, Middle East)
Ornithological Society of the Middle East, the Caucasus and Central Asia - OSME (Middle East)	https://osme.org/	Contacted through OSME website on 27/11/2024; no response obtained	Anti-illegal hunting/capture program (Middle East)
Environment Protection Society - KEPS (Kuwait)	info@keps.org.kw	Contacted on 27/11/2024; no response obtained	Anti-illegal hunting/capture program (Kuwait, Middle East)
Hierofalcon Research Group, Coordinator of International Single Species Action Plan for the Sooty Falcon 2024-2036 (Italy)	REDACTED	Exchange of emails since 27/11/2024; meeting on 03/12/2024	Support to conservation actions identified in the Single Species Action Plan for the Sooty Falcon 2024-2036 (Middle East)
Tour du Valat (France)	secretariat@tourduvalat.org	Contacted on 27/11/2024; no response obtained	Habitat improvement and threat reduction for Great White Pelicans (Balkans)
SABUKO – BirdLife Georgia (Georgia)	REDACTED	Exchange of emails since 28/11/2024; meeting to be scheduled to 1st week of December	Anti-illegal hunting/capture program (Georgia)

Stakeholder (country)	Contact	Current engagement status	Offset option (countries)
BirdLife Malta (Malta)	REDACTED	Exchange of emails since 28/11/2024; meeting on 04/12/2024	Anti-illegal hunting/capture program (Malta and Egypt)

Screening of offset options

Given the number of biodiversity features with either a NG or NNL target commitment, a range of potential offset projects will be required to be supported by the Project to meet its commitments under the BAP. These initial options were explored for their potential to deliver the required gains (see Table 8) and feasibility (both political and technical[13]), through engagement with the Client, key stakeholders, implementation partners and lenders. The different options investigated are described in detail in the sections below. The following aspects are presented under each offset:

1. Target feature(s) or coverage of the action (i.e. how many of the target species the action covers);
2. Context;
3. Proposed area for the offset;
4. Actions to be implemented for the offset;
5. Key implementing partners and other relevant stakeholders;
6. Demonstrable biodiversity gain (i.e., an assessment of whether the option likely provides an increase to the target species' population, whether there is a clear link between the action and a gain, and the level of quantification possible for the action);
7. The political feasibility of the option (i.e., an assessment of whether the option is likely to be credible and acceptable to all stakeholders (the client, Lenders, Government, conservation organisations);
8. Implementation risk (i.e., an assessment of whether there are likely to be any technical or other risk to achieving biodiversity gains linked to the option); and,
9. Other benefits (i.e. some options will have benefits to only the target species, while others will have broader benefits).

Relevant criteria, chosen to represent the major trade-offs, have been given a score (scale 1-5), with lower scores indicating areas of higher risk that the offset will not deliver the intended outcome of a NG/NNL for the relevant feature. Summary scores for the four primary options considered are provided in Table 7 and target species shown in Table 8. At this stage, these scores are not summed or comparable across options, as actions and desired outcomes are

[13] Note that financial feasibility was not considered at this stage, as accurate costs are unknown for most projects.

different for each option, and it is likely that the whole set of presented offset options will need to be implemented to attain the overall species goals for the Project. Additional four offset options, for which detailed information was not available for preparation of the BAP, may need to be considered to meet the Projects' requirements for all priority biodiversity features.

Table 7. Scoring for each of the four offset options for the SUEZ Wind Energy BOO Wind Power Plant 1.1. GW – SWE South (PLOT 2) Wind Farm.

Offset	Target biodiversity	Demonstrable gain	Political feasibility	Implementation risk	Other benefits
Retrofitting power lines in Kazakhstan	4	5	4	5	4
Retrofitting power lines in Egypt	1	4	4	4	1
Retrofitting power lines in Jordan	4	5	5	5	4
Program against illegal hunting/capture in the Middle East	5	4	4	2	4

Table 8. Target species for each offset option. X – main target species; o – secondary target species. Options in grey are not being considered by the Project.

English name	Retrofitting power lines in Egypt	Retrofitting power lines in Kazakhstan	Retrofitting power lines in Jordan	Program against illegal hunting/capture in the Middle East	Conservation actions for Great White Pelican in the Balkans	Program against illegal hunting/capture in Georgia	Program against illegal hunting/capture in Malta
Levant Sparrowhawk				X		X	
Steppe Eagle		X		X		X	
Eastern Imperial Eagle		o	X	X		o	
Eurasian (Steppe) Buzzard		o		X		X	
White Stork	X		X	X			
Black Stork			o	X		o	o
Pallid Harrier				X		o	
Greater Spotted Eagle				X			
Common Crane				X			o
Booted Eagle				X		X	o
Black Kite		o	X	X		X	o
Egyptian Vulture			X	o		o	o

English name	Retrofitting power lines in Egypt	Retrofitting power lines in Kazakhstan	Retrofitting power lines in Jordan	Program against illegal hunting/capture in the Middle East	Conservation actions for Great White Pelican in the Balkans	Program against illegal hunting/capture in Georgia	Program against illegal hunting/capture in Malta
Great White Pelican				o	X		
European Honey-buzzard		o		X		X	X

Details of potential offset options

Retrofitting power lines in Egypt

Target biodiversity: *White Stork.* **Score: 1.**

Context

RCREEE conducted fatality surveys along *c.* 190 km of power lines in the Gulf of Suez region between 2021 and 2022, to access the existing impacts on migratory soaring birds from the existing electricity grid infrastructure. These surveys resulted in the finding of 21 White Stork carcasses along a 6 km stretch of transmission line due to collisions with the power lines. Previous research by Nature Conservation Egypt (NCE) has also identified areas of high fatalities in the Egpytian grid.

Offset implementation areas

RCREEE has proposed to retrofit 6 km of transmission line in the Zaafaranah/ Ras Gharib region, which was previously identified as a fatality hot-spot for White Stork[14].

Offset actions

This offset would consist of the installation of 'Rotamarka'-type BFDs along a 6 km length of transmission power lines. This action would be coordinated by RCREEE in close cooperation with EETC and other relevant partners. Fatality monitoring of the retrofitted power lines would be conducted for the following two years to assess the efficiency of the mitigation measure and the gains generated for each target species.

Key partners

The key implementation partners for this offset are RCREEE and EETC.

[14] Approximate start and end locations of the OHTL: Lat 28.541839° Long 32.872709° and Lat. 28.509651°, Long. 32.922398°.

Demonstrable biodiversity gain

BFDs are commonly recommended as the most important mitigation measure to reduce bird collisions in existing high voltage power lines, with an average effectiveness of 50% (Bernardino *et al.* 2019) and it is likely that the proposed BFD has similar effectiveness. The gains resulting from this offset action will be based on fatality monitoring along the retrofitted transmission line and the comparison of obtained results with those from pre-retrofitting monitoring.

Score: 4

Politically feasible

As RCREEE have submitted a proposal for the work to the Project, it is assumed that the action is generally politically feasible. Retrofitting of other transmission lines with high numbers of bird fatalities has previously occurred elsewhere, and therefore no constraints are envisaged respecting an expansion of those actions.

Score: 4.

Implementation risk

No significant implementation risks are identified, as power lines retrofitting using BFDs follows standard procedures, BFDs are commercially available, and this type of actions is already being implemented in different stretches of the Egyptian transmission and distribution grid.

Score: 4.

Other benefits

No other benefits highlighted in the RCREEE proposal as viewed by TBC and the length of line proposed to be retrofit is small, however retrofitting of transmission lines along the Rift Valley/Red Sea Flyway in Egypt is likely to result in moderate benefits for a variety of migratory and non-migratory bird species.

Score: 1.

Retrofitting power lines in Kazakhstan

[Note no update of this section since previous version of the BAP]

Target biodiversity: *Steppe Eagle, Eastern Imperial Eagle, Steppe Buzzard, secondary benefits to Short-toed Eagle, Black Kite, Long-legged Buzzard, Red-footed Falcon and Saker Falcon.* **Score: 4.**

Context

Electrocutions on 6-10 kV power lines is one the most impactful threats to raptors in Kazakhstan (Dwyer *et al.* 2023). In spite of existing legislation to prevent negative impacts from electricity

infrastructure on wild birds, law enforcement to restrict the operation of bird-hazardous power lines is poor (Pulikova *et al.* 2023), and electrocution is seen as one of the main causes of the significant decrease of e.g. Steppe Eagles in the country (Dwyer *et al.* 2023). Surveys conducted recently (2022–202) by ACBK (BirdLife International partner in Kazakhstan) and BRCC (Biodiversity Research and Conservation Center) confirmed the high electrocution risk on several power lines in the main Steppe Eagle breeding population cores in Western and Central Kazakhstan, with up to 44 Steppe Eagles electrocuted per 10 km in some sections (ACBK 2024). Electrocution also affects other soaring birds in Kazakhstan steppes, including Eastern Imperial Eagle, Steppe Buzzard, Short-toed Eagle, Black Kite, Long-legged Buzzard, Red-footed Falcon and Saker Falcon (Dwyer *et al.* 2023). Mortality of the same and/or other raptor species due to collisions with power lines also occurs in the same areas but but is probably underestimated or unreported (Dwyer *et al.* 2023).

Offset implementation areas

The areas proposed for implementation of this offset are located in the west Kazakhstan and the Aktobe regions of Kazakhstan, where high numbers of raptors have been found electrocuted and there is relatively good knowledge on the distribution of fatality hotspots (Dwyer *et al.* 2023).

Offset actions

This offset would involve installing bird-protection devices on pre-identified sections of the most dangerous 6-10 kV power lines for birds, where the mortality rate of Steppe Eagles is highest (30-50 individuals/10 km per year). In total, *c.* 10 km of power lines would be equipped to achieve the expected required gains for the different target species (see Section 3.1.5 Demonstrable biodiversity gain).

BRCC would collaborate closely with the energy company operating the power lines, purchasing the required bird-protection devices, identifying the implementation sections, and supervising their application. Bird-protection devices may consist of crossarm configurations that minimise electrocution risk, insulating elements and/or deterrent devices (following Martín Martín *et al.* 2022).

Although there are several providers of such bird-protection devices, those manufactured by Russian companies AVIS or Eco-NIOKR are proposed, as the most hazardous power lines in Kazakhstan are those inherited from the USSR times, for which there is no national production of bird-protection devices.

Fatality monitoring of the retrofitted power lines would be conducted during the following years to assess the efficiency of the mitigation measure and quantify the gains generated from the action to the different target species.

Key partners

The key implementation partners for this offset are BRCC and the a Kazak researcher, with wide experience on the power lines-raptor conflict in Kazakhstan. The national companies operating the power lines to be retrofitted would necessarily be involved as well.

Demonstrable biodiversity gain

Retrofitting of power lines through adequate insulation of exposed wiring, or the installation of anti-perching or safe-perching structures can be extremely efficient in avoiding electrocution mortality (Martín Martín *et al.* 2022). Therefore, retrofitting actions in power lines identified as raptor mortality hotspots in Kazakhstan have a great potential to decrease significantly non-natural mortality for several species, with the consequent associated population gains.

The effectiveness of insulation or deterrent devices in reducing bird fatalities by electrocution can be at least 80% (up to 99%; Martín Martín *et al.* 2022), provided that good quality equipment is used, and adequate maintenance and/or replacement is operated. Therefore, the installation of the bird-protection devices along a total of *c.* 10 km of power lines in the proposed implementation area (where Steppe Eagles mortality due to electrocution reaches 30-50 individuals/10 km per year) can avoid the mortality of a minimum of 24-40 Steppe Eagles per year.

Although the available species-specific fatality rates per km are not so accurate for other species of raptor in the same region, it is very likely that this power line retrofitting offset action would also generate gains for all or some of the following priority species: Eastern Imperial Eagle, Greater Spotted Eagle, Short-toed Eagle, Black Kite, Steppe Buzzard, Long-legged Buzzard and Saker Falcon. It should be noted that fatality rates are lower for many of these species than for Steppe Eagle, and so larger lengths of line would need to be retrofitted to achieve the same amount of gain.

The measurement of resulting gains from this offset action should be based on fatality monitoring along the intervened power lines and the comparison of obtained results with those from pre-retrofitting monitoring.

Score: 5

Politically feasible

Although the Environmental Code of Kazakhstan requires that "when installing, designing, constructing, operating, repairing, reconstructing and modernising electrical networks, measures must be developed and implemented to prevent the death of birds", enforcement of this has been poor to date. Yet, a number of projects and initiatives have been organised by national NGOs – namely by BRCC[15] and ACBK[16] - together with different ministries, energy companies

[15] https://www.brcc.kz/en/projects-and-plans/death-of-birds-on-power-lines/

[16] https://www.acbk.kz/article/default/view?id=660

and other stakeholders to define the best approaches to tackle bird fatalities in power lines in Kazakhstan. Therefore, no political opposition or constraints are envisaged respecting a significant expansion of those actions and the implementation of the proposed offset actions.

Score: 4

Implementation risk

No significant implementation risks are identified, as power lines retrofitting procedures are relatively standard and bird-protection equipment is commercially available.

Score: 5

Other benefits

The retrofitting of power lines in the proposed sensitive area would likely result also in moderate benefits for other raptors species that are not listed as priorities in the Project BAP but have also been found electrocuted in the surveys conducted in the area to date, including Golden Eagle, Common Kestrel, and other Falconiformes (falcons) and Strigiformes (owls) (Dwyer *et al.* 2023).

Score: 4

Retrofitting power lines in Jordan

[Note no update of this section since previous version of the BAP]

Target biodiversity: *Egyptian Vulture, Steppe Eagle, White Stork, Black Kite, secondary benefits to Short-toed Eagle, Black Stork and potentially to all the remaining priority species.* **Score: 4.**

Context

A study led by the Royal Society for the Conservation of Nature (RSCN; BirdLife International partner in Jordan) along 161 km of power lines in the north and south of Jordan and with surveys conducted three migratory seasons (spring and autumn 2019 and autumn 2021) revealed 215 electrocuted birds from nine species (Qaneer & Demerdzhiev 2023). The most common victim (197 individuals) was the White Stork, whereas 1 to 6 individuals of different raptor species (Short-toed Eagle, Black Kite, Steppe Eagle, Egyptian Vulture, Peregrine Falcon and Golden Eagle, by decreasing order of importance) were also found. Other incidental observations from the same areas also reported the presence of Black Stork in electrocutions (RSCN 2020).

As a result of these survey efforts, at least 250 poles causing a high number of electrocutions were identified, especially close to stopover sites used by White Storks during migration (RSCN 2020b). RSCN and Irbid Electricity Company (IDECO) signed an MoU aiming at facilitating the cooperation between the two institutions to provide a joint framework that guides the implementation of powerlines and transformers insulation projects along the flyways of migratory birds. Through the EU-funded "Egyptian Vulture New LIFE" project RSCN purchased

insulation materials that were used to retrofit the most hazardous poles (RSCN 2022). RSCN also signed MoUs with the remaining electricity companies in the country and cooperates with them to identify the power lines and poles that represent higher electrocution risk to birds and need further retrofitting actions (Tareq Qaneer pers. comm.).

Offset implementation areas

The existing information on bird electrocution impacts in Jordan results from relatively limited systematic survey efforts conducted so far (Qaneer & Demerdzhiev 2023). However, in other areas in the country it is likely that impacts of similar magnitude occur in power lines without adequate insulation and poorly designed regarding bird protection. The exact areas/power lines where this offset action should be implemented need to be further accessed with RSCN, aiming to maximize the gains for the Project priority species.

Offset actions

This offset would involve equipping with bird-protection devices (safe crossarm configurations, insulating elements and/or deterrent devices; Martín Martín *et al.* 2022) pre-identified sections associated with a high number of electrocutions. The number of power line poles to be retrofitted would depend on measured current fatality rates, targeting the expected reduction of species-specific fatalities needed to attain the offset targets for the Project.

This action would be conducted by RSCN in close cooperation with the three national electricity companies with whom MoUs have already been established.

Fatality monitoring of the retrofitted power lines would be conducted during the following years to assess the efficiency of the mitigation measure and the gains generated to the different target species.

Key partners

The key implementation partners for this offset are RSCN and the three electricity companies in Jordan.

Demonstrable biodiversity gain

Adequate insulation of exposed wiring, or the installation of anti-perching or safe-perching structures can be extremely efficient in avoiding electrocution mortality (Martín Martín *et al.* 2022). Therefore, the retrofitting of high-risk power line sections/poles can significantly reduce bird mortality. This was also the case in some of the high-fatality poles in northern Jordan, where fatalities were reduced to zero after retrofitting (Tareq Qaaner *pers. comm.*).

Although species-specific fatality rates are not available for the power line sections that would be retrofitted as part of this offset, it is very likely that it would generate significant gains for White Stork and measurable gains also for other priority species, including Egyptian Vulture, Steppe Eagle, Black Kite, Short-toed Eagle and Black Stork.

The measurement of resulting gains from this offset action should be based on fatality monitoring along the intervened power lines and the comparison of obtained results with those from pre-retrofitting monitoring.

Score: 5

Politically feasible

RSCN has established MoUs with the three national electricity companies in Jordan which would facilitate the development of the proposed power line retrofitting in any region of the country. Furthermore, RSCN has developed a national guideline regarding powerlines and bird protection, that was submitted to the Ministry of Environment for legal approval. Also, a regional training curriculum was developed by RSCN to protect birds from the danger of electrocution, and a specialized training was held for electricity companies and relevant stakeholders (RSCN 2022). These previous actions confirm the high reputation that RSCN has among the relevant national stakeholders and therefore no political opposition or constraints are envisaged respecting the implementation of the offset.

Score: 5

Implementation risk

No significant implementation risks are identified, as power lines retrofitting procedures are relatively standard and bird-protection equipment is commercially available.

Score: 5

Other benefits

The proposed retrofitting of power lines would likely result also in moderate benefits for other raptors species that are not listed as priorities in the Project BAP (e.g. Golden Eagle and Peregrine Falcon), as well as for non-raptor species (e.g. Little Egret, Brown-necked Raven) that have also been found electrocuted in surveys conducted in Jordan to date (Qaneer & Demerdzhiev 2023).

Score: 4

Programme against illegal hunting/capture in the Middle East

[Note this option is no longer being considered]

Target biodiversity: *Steppe Eagle, Eastern Imperial Eagle, Greater Spotted Eagle, Steppe Buzzard, European Honey Buzzard, Short-toed Eagle, Black Kite, Long-legged Buzzard, Booted Eagle, Pallid Harrier, Levant Sparrowhawk, Red-footed Falcon, Saker Falcon, White stork, Black Stork and Common Crane. Secondary benefits to other non-priority soaring birds.* **Score: 5.**

Context

The hunting and/or capture of migratory birds is a long-lasting tradition in North Africa and the Middle East. Traditionally using basic hunting techniques and minimal tools, hunting practices have become nowadays more widespread and intensive, based on technological developments and a growing market for illegally captured birds (NCE 2018). Illegal hunting impacts a huge number and variety of migratory bird species, including raptors and other soaring birds. A study conducted by NCE under the Responsible Hunting Programme (RHP) initiative along Egypt's northern Mediterranean coast estimated that more than 13 raptors were captured per day and over 72 raptors were sold per day in markets in the region during the annual autumn migration (NCE 2018).

Brochet *et al.* (2019) also estimated that at least 1.7–4.6 million (best estimate: 3.2 million) birds of at least 413 species, including 3,300–11,700 raptors, may be killed or taken illegally each year in the Arabian Peninsula, Iran and Iraq. Other research conducted in the West Bank/Palestine (Handal *et al.* 2021) and Jordan (Eid & Handal 2018; RSCN 2019) confirmed that several raptors, storks and cranes are regularly hunted or traded in the region.

Offset implementation areas

The programme against illegal hunting/capture in the Middle East would aim to cover several countries in the region, particularly those where well-structured partners could support its implementation: Egypt, Jordan, Kuwait, possibly expanding to other countries (e.g. Iraq).

Offset actions

This programme would include the development of a wide range of actions in the different implementation countries across the Middle East region, including:

- Training and support of rangers' teams and law enforcement agencies to increase vigilance and implementation of relevant environmental laws on illegal hunting/trade;
- Development and roll-out of awareness campaigns targeting hunters, local communities involved in illegal hunting and trade, and general public;
- Support of teams, installations and equipment for the seizing and recovery of illegally captured birds; and.
- Development of social support programs to identify and provide alternative income or livelihood options (e.g. ecotourism).

Key partners

Key implementation partners for developing the Programme against illegal hunting/capture would be required in each of the countries involved. This would potentially include: NCE (Egypt), RSCN (Jordan), KEPS (Environment Protection Society, BirdLife International partner in Kuwait) and possibly OSME (Ornithological Society of the Middle East, the Caucasus and Central Asia). Also, the government agencies responsible of law enforcement in the different countries (e.g. EEAA - Egyptian Environmental Affair Agency, in Egypt) would need to be involved.

Demonstrable biodiversity gain

The reduction of Illegal hunting and trade by local communities or organized groups is very challenging and demands the involvement of multiple stakeholders (e.g. NGOs, Government institutions) and at different levels (national law enforcement agencies, local communities, social media). Yet, an investment in law enforcement, rangers training, monitoring of physical and digital markets and awareness campaigns has already apparently resulted in some reduction of that type of environmental crime in Jordan (Tareq Qaneer *pers. comm.*).

While the overall effectiveness of any program against illegal hunting/capture would be challenging to estimate, it could be expected that even a relatively low success would represent a significant contribution to the offset targets of the Project in terms of number of individuals saved, given the magnitude of the impacts from illegal hunting and trade. Regarding the Project priority species, the available data indicate that, at the very least:

- 7 European Honey Buzzards are sold in markets in northern Egypt every autumn (NCE 2018) (and an undetermined number in Iraq; Raza, et al. 2011);
- 7-14 Steppe Buzzards are sold in markets in northern Egypt every autumn (NCE 2018) (and an undetermined number in Iraq; Raza, et al. 2011); and 2 individuals/year are hunted in Jordan ((Eid & Handal 2018);
- 18-39 Long-legged Buzzards are sold in markets in northern Egypt every autumn (NCE 2018); and 2 individuals/year are hunted in Jordan (Eid & Handal 2018);
- Up to 4 Black Kites are sold in markets in northern Egypt every autumn (NCE 2018);
- Up to 71 Short-toed Eagles are sold in markets in northern Egypt every autumn (NCE 2018);
- Up to 7 Booted Eagles are sold in markets in northern Egypt every autumn (NCE 2018);
- 10-125 Eastern Imperial Eagles are hunted every year in the Arabian Peninsula, especially in Qatar (Brochet et al. 2019);
- 1 Steppe Eagle/year is hunted in Jordan (Eid & Handal 2018);
- 100-312 Greater Spotted Eagles are hunted every year in the Arabian Peninsula, especially in Qatar (Brochet et al. 2019);
- Up to 4 Levant Sparrowhawks are sold in markets in northern Egypt every autumn (NCE 2018);
- 4 Pallid Harriers are sold in markets in northern Egypt every autumn (NCE 2018);
- 56-92 Red-footed Falcons are sold in markets in northern Egypt every autumn (NCE 2018);
- An undetermined number of Saker Falcons is captured every year in Iraq (Raza, et al. 2011) and Jordan (Khoury *et al.* 2020);
- 4 White Storks/year are hunted in Jordan ((Eid & Handal 2018);
- 1 Black Stork/year is hunted in Jordan (Eid & Handal 2018); and,
- 30 Common Cranes/year are hunted in Jordan ((Eid & Handal 2018).

The measurement of resulting gains from this offset action should be based on tracking the number of illegal traps (e.g. (NCE 2018) and the trend in numbers of birds being sold in physical

and digital markets (e.g. Eid & Handal 2018, NCE 2018), and on the comparison of obtained results with those from previous years.

Score: 4

Politically feasible

Previous work has been conducted in different countries, that shows an existing collaboration between potential implementation partners for this offset and the national government authorities responsible for law enforcement respecting illegal hunting and trade of birds. This is the case in e.g. Egypt, where NCE conducted surveys on the hunting and trapping of migratory birds along Egypt's Northern Mediterranean coast for 3 years, in cooperation with EEAA and working closely with the involved local communities (it is worth noting that some extent of trapping and capturing of migratory birds is legally permitted in the region, and that a large number of households is involved in this activity) (NCE 2018). Also, in Jordan RSCN has been working closely with the main national environmental and law enforcement agencies, such as the environmental police unit (Rangers), to protect biodiversity and fight illegal hunting (e.g. RSCN 2019b). As such, no political opposition or constraints are envisaged respecting a significant expansion of actions against illegal hunting or trade of birds in the Middle East.

Score: 4

Implementation risk

While this offset seems not to present political challenges, it is likely that the development of the proposed actions would face some degree of social resistance and objection within local communities. The Program implementation requires a high level of engagement with local communities and law enforcement agencies and staff, and the ability to mainstream biodiversity aspects across to uninterested (or opposing) audiences.

Additionally, metrics to measure accurately the effectiveness of the Programme against illegal hunting/capture may be difficult to identify, as impacts from illegal hunting may tend to be increasingly more difficult to access as the Program implementation progresses.

Score: 2

Other benefits

The proposed Programme against illegal hunting/capture would very likely result in moderate-high benefits for the wide range of other soaring birds and non-soaring birds hunted or captured illegally every year across the Middle East.

Score: 4

Additional offset options

A number of additional offset options have been identified and may be needed for the Project to comply with their NG and NNL requirements. For most of these options, a meeting with the main lead of the conservation project has not taken place (see Table 6), and detailed information is still being gathered. Therefore, a more comprehensive assessment of such options would be included in the final version of this Offset Feasibility Study. The additional offset options, and respective lead stakeholder (see also Table 6), are:

- Implementation of conservation actions in breeding colonies of Sooty Falcon in Egypt/Middle East / Giovanni Leonardi, Coordinator of the International Single Species Action Plan for the Sooty Falcon 2024-2036;
- Habitat improvement and reduction of anthropogenic threats to the Great White Pelican in the Balkans / Tour du Valat;
- Programme against illegal hunting/capture in Georgia / SABUKO; and,
- Programme against illegal hunting/capture in Malta / BirdLife Malta.