AMEA Power Amunet Wind Farm. Biodiversity Action Plan and Offset Feasibility Study

The Project is predicted to have an impact of 0-7 individuals for the 10 target species.

The Project proposes to support four conservation actions, which, in combination, would meet a No Net Loss / Net Gain commitment for the 10 target species.

THE BIODIVERSITY CONSULTANCY

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Table of contents

Executive summary

This document is the Biodiversity Action Plan (BAP) for the AMEA Power 500 MW Amunet wind farm, ~200 km southeast of the capital city of Egypt, Cairo, and aligns with International Finance Corporation (IFC) Performance Standard 6 (PS6) (IFC 2012, 2019). This BAP has been developed for 10 avian species (Table 2): five species for which the Project represents an area of potential Critical Habitat and for which Net Gain (NG) is required, and five additional priority Valued Environmental Components (VECs) for which No Net Loss is required. This BAP sets out the Project's strategy to mitigate and manage biodiversity impacts and defines the suite of actions required to deliver NG or NNL for each species as required.

The impacts of relevance to the 10 species covered by this BAP (Table 2) are from collision with turbine blades, and collision with, or more rarely electrocution on Project transmission lines. Mitigation of these impacts will be through (1) the adoption of shut-down on demand following the protocols established under the Active Turbine Management Program, and (2) installation of Bird Flight Diverters on all Project transmission lines and ensuring that transmission lines, especially pylons, are designed to be wildlife-friendly. Residual impacts, assuming this mitigation is effective, are predicted to range from <1-15, with 0 fatalities predicted for six species (Table 2). Once operational, ongoing fatality monitoring, along with relevant bias trials, will be required to determine the actual impacts to each of the 10 species.

To meet NG/NNL requirements for all species, multiple offset actions are likely to be required. In the Offset Feasibility Study, summarised in this BAP, and included as an Appendix, 19 potential offset actions were evaluated for their gain potential, political feasibility, implementation risk, cost and benefits to other species. 10 options were considered to be feasible options for the Project to support to deliver a NNL/NG goal for all 10 species. At least three actions are needed to cover all species, with multiple combinations of actions which could deliver a NNL/NG outcome for all species. Only one potential action was identified which would benefit Levant Sparrowhawk, while all other species were covered by multiple actions. A suggested approach would be to consider four actions, which provide multiple options for each species (as far as possible) in more detail:

- Retrofitting of power lines in Egypt;
- Retrofitting of power lines in Portugal;
- Supporting monitoring and conservation around the Batumi bottleneck, Georgia; and,
- Habitat restoration of wetlands in Ukraine/Belarus.

For these actions, consideration should be given to the level of funding, and duration of support, which the project would be willing to accept, the likely gains from the preferred level of support, and scope for expansion of support should impacts to any species be greater than the predicted levels. For any final suite of options, the Project and implementing agencies must agree on the scope of support (i.e. level of funding, time period) and a set of financial and management indicators to demonstrate that the action is functioning as intended and likely to deliver the assumed gain.

1 Introduction

This document is the draft Biodiversity Action Plan (BAP) for the AMEA Power 500 MW Amunet wind farm (hereafter referred to as "the Project") in the Red Sea Governorate of Egypt, approximately 200 km southeast of the capital city of Egypt, Cairo. It is a draft BAP as some details of offset actions are still being resolved. Once a decision is made on a final offset package or approach the BAP will need to be updated into a final version. The Project covers approximately 70 km^2 and consists of wind turbines and associated infrastructure including cables connecting the turbines to an onsite substation; a substation and high-voltage connection to the grid; offices and a warehouse; and a network of access roads.

1.1 Purpose of a BAP

The Project is seeking finance from international lenders including the International Finance Corporation (IFC) and therefore intends to align with IFC's Performance Standard 6 (PS6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC 2012, 2019) and other good practice guidance such as the World Bank Group's Environmental Health and Safety Industry General and Sectoral Guidelines on Wind Energy (IFC 2015).

As part of the Environmental and Social Impact Assessment (ESIA) process, and to align with PS6, a Critical Habitat Assessment (CHA) has been undertaken for the Project (EcoConsult 2022a). This CHA determined that the Project is within an area which represents Critical Habitat (CH) for five species of migratory soaring birds (Table 2) for which net gain (NG) is required by PS6. An additional five species have been identified as priority Valued Environmental Components (VEC) (Table 2) and have been set a no net loss (NNL) outcome requirement. For these ten species a BAP is required, which sets out the Project's strategy to mitigate and manage biodiversity impacts, and to define actions required to deliver NG or NNL as required. While Project-specific mitigation will likely reduce impacts to most species to 'close to zero', as the Project is located in an area of Critical Habitat, a net gain is required for the values that designate the area as Critical Habitat. To identify viable net gain actions an Offset Feasibility Study is included within this BAP summarising each of the identified options to determine which actions may be appropriate for inclusion as net gain actions in a final Project BAP.

1.1 Scope of the BAP

This BAP has been developed for the ten avian species and does not consider any other Critical Habitat-qualifying species or natural habitat which may be identified for the Project.

This BAP is based on the current ESIA design and supporting documents and assumes that no further/additional development (e.g. additional turbines) is undertaken. Should the Project change, this BAP would need to be updated.

1.2 Stakeholder consultation

IFC PS6 requires that BAPs should be developed with engagement with relevant expert stakeholders to ensure that the BAP is widely supported. A list of stakeholders consulted during the development of the BAP are included in **Error! Reference source not found.**.

1.2 Biodiversity Management

This BAP should be read in conjunction with a suite of assessment documents for the Project, that collectively outline the Project's predicted impacts and approach to biodiversity management, including:

- Environmental and Social Impact Assessment;
- Critical Habitat Assessment (CHA) (EcoConsult 2022a); and
- Cumulative Effects Analysis (CEA) (EcoConsult 2022b).

The principal roles and responsibilities for the implementation of this plan are outlined below (Table 1). As the Project moves towards operation, a suite of Environmental and Social Management Plans (ESMP) will also be needed that operationalise the commitments made in the four current assessment documents.

Table 1. Roles and responsibilities for implementation of this Biodiversity Action Plan

Role	Responsibilities
Operations Manager	Ensure that all parties comply with the requirements set out in this BAP. Approve sufficient resources for the implementation of this BAP.
Manager of Environment, Health and Safety	Leads reporting requirements, as well as subsequent revisions of this BAP. Communicate the requirements of this plan to all relevant personnel and contractors. Coordinate the completion of the programs outlined in this BAP.
All staff and contractors	Undertake all activities in accordance with the requirements of this plan.

1.3 Project policies & commitments

1.3.1 Corporate policy

AMEA Power has a high-level Environmental Policy document which prioritises the responsible management of natural resources and takes a precautionary approach to biodiversity protection. Where feasible, company policy is to enhance biodiversity and habitats (AMEA Power 2021). It has a more detailed Biodiversity Management document (document AP-QHSE-PRO-010: AMEA Power 2020), which sets out minimum requirements for the management, monitoring and reporting of biodiversity at AMEA Power owned, operated and/or managed operations and lands

with the goal of ensuring a consistent systematic approach to biodiversity conservation and sustainable stewardship of resources, with all activities to comply with IFC PS6.

1.3.2 Lender requirements

AMEA has committed to align with IFC PS6 in their approach to biodiversity management. Specific PS6 requirements applicable to this BAP are highlighted in the relevant sections of this document. As part of these requirements, net gain is required for projects in areas of Critical Habitat for the biodiversity values that qualify for Critical Habitat. Net gains can either be generated via biodiversity offsets (that achieve measurable, additional outcomes) where there are likely to be significant impacts to critical habitat values or via supporting additional conservation activities that are focused on the Critical Habitat values in projects that do not have a significant residual impact.

2 Biodiversity context

The Project is located in the Red Sea Coastal Desert Ecoregion, which runs south from the Suez Canal, parallel to the coastline. Baseline surveys have been completed as part of the ESIA, and characterised the area as 'barren and of low ecological significance and sensitivity' with no sensitive habitats recorded (EcoConsult & Green Plus no date), although the CHA determined that the project was in an area of natural habitat (*sensu* IFC 2012, 2019). The few areas of vegetation that are present can be found along the coast, as well as inland within wadis and other watercourses. The largely bare habitats support a low diversity and abundance of terrestrial fauna.

The Project occurs within the Red Sea/Rift Valley flyway for migratory soaring birds which connects breeding grounds in Europe with wintering areas in Africa (Figure 1). This flyway is used by over 1.5 million individuals from 37 species of migratory soaring birds, as well as a suite of migratory passerines. Due to the Project's location and potential interaction with migratory birds, bird migration studies have been completed during spring 2020, 2021 and 2022 and autumn 2020 and 2021 migration periods (EcoConsult & Green Plus 2022a, 2022b).

During the spring (northwards) migration periods of 2020-2022, the surveys recorded between 98,648-194,353 birds of 27 species. Seven species, Black Kite *Milvus migrans*, Black Stork *Ciconia nigra*, White Stork *C. ciconia*, European Honey-buzzard *Pernis aviporus*, Great White Pelican *Pelecanus onocrotalus*, Steppe Buzzard *Buteo vulpinus* and Steppe Eagle *Aquila nipalensis* were predominant. During the autumn (southward) migration period surveyed, a total of 14,881-18,213 birds of 22 species were recorded. Three species, European Honey-buzzard, Great White Pelican and White Stork were predominant. All other species represented <1% of observations.

The Project also overlaps a small area of the Gebel El Zeit Important Bird Area (IBA) (Figure 2). This IBA 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 northern section of the

IBA is a wide coastal plain with several areas of sabkha, containing pools of hyper-saline water and large patches of saltmarsh (BirdLife International 2018).

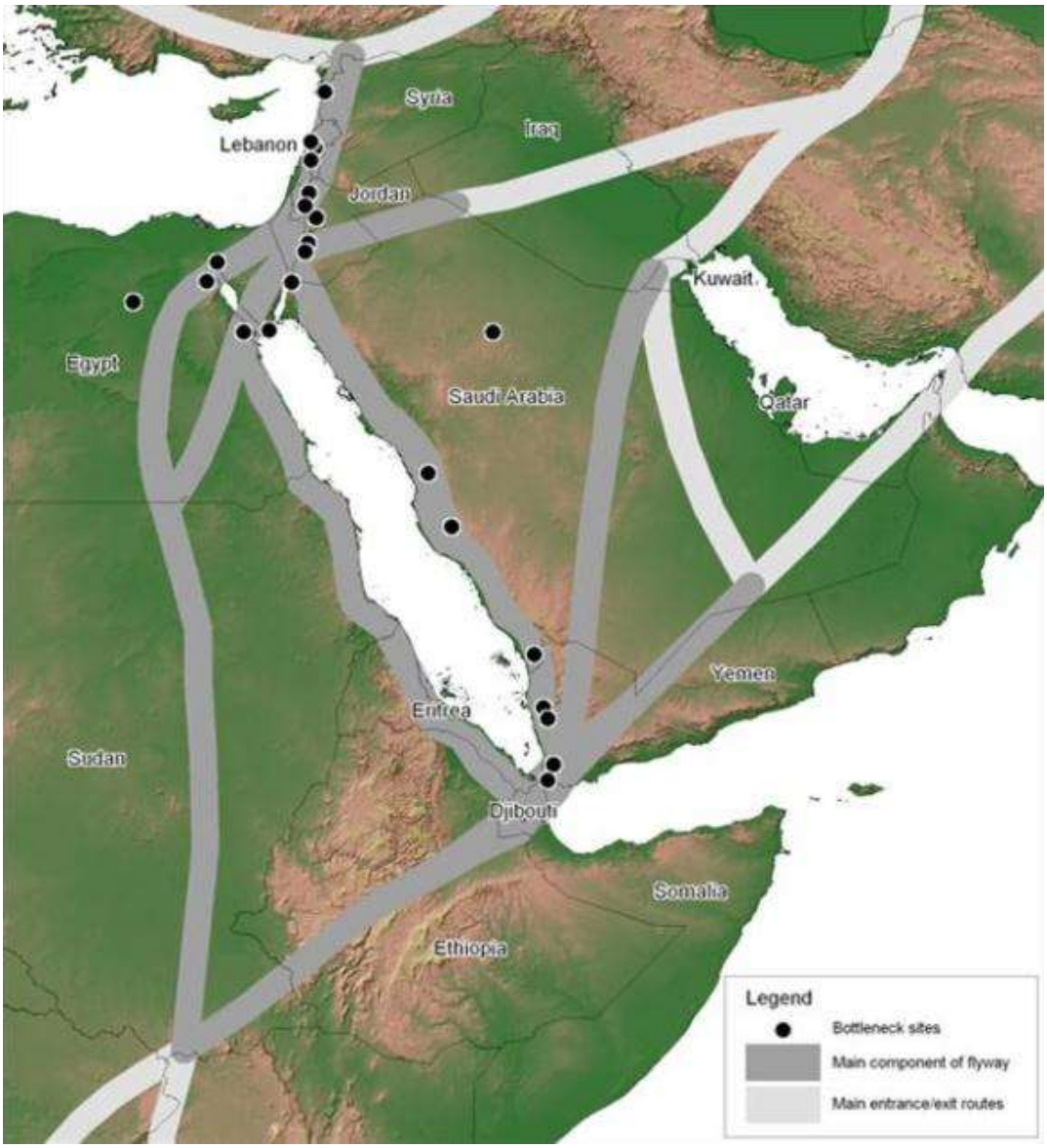

Figure 1. Map of the main elements of the Rift Valley/Red Sea flyway showing key bottleneck sites (source: BirdLife International).

Figure 2. Overlap between the Project area and the Gebel El Zeit IBA (taken from EcoConsult 2022a).

2.1 Critical Habitat-qualifying biodiversity

A Critical Habitat Assessment has been completed for the Project (EcoConsult 2022a) and found that five species of migratory soaring birds have been recorded within the Project area in numbers exceeding relevant Critical Habitat-qualifying thresholds (Table 2). The Project is therefore occurring in an area of Critical Habitat for all five species.

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.

Where these can be demonstrated, a BAP will describe the Project's mitigation strategy to achieve net gain for these species (IFC 2012, paragraph 18).

2.2 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 through the CEA process (EcoConsult 2022b), which identified ten priority VECs and set accompanying acceptable impact thresholds for each species (Table 2). This table provides an estimate of the fatalities that will be verified through monitoring during the operational period. This is a separate process from the determination of Critical Habitat, although the five Critical Habitat-qualifying species were also identified as VECs.

Table 2. Details of species covered in this Biodiversity Action Plan.

Species	IUCN status[a]	Critical Habitat species	Priority VEC[b]	Target	Principal risk:		Fatality threshold[c]	Predicted annual fatalities	Potential gains[e]	Outcome
					Turbines	Transmission lines				
Black Stork *Ciconia nigra*	LC	Yes	Yes	NG		Yes	0	<1	>40	NG likely to be achieved
Booted Eagle *Hieraaetus pennatus*	LC	No	Yes	NNL	Yes		0	0	+	NNL likely to be achieved
Common Crane *Grus grus*	LC	No	Yes	NNL		Yes	0	0	+	NNL likely to be achieved
Egyptian Vulture *Neophron percnopterus*	EN	No	Yes	NNL	Yes		0	<1	+	NNL potentially achieved
Great White Pelican *Pelecanus onocratalus*	LC	Yes	Yes	NG		Yes	0	~2	+	NG potentially achieved
Greater Spotted Eagle *Clanga clanga*	VU	No	Yes	NNL	Yes		0	0	>13	NNL likely to be achieved
Levant Sparrowhawk *Accipiter brevipes*	LC	Yes	Yes	NG	Yes		0	0	+	NG likely to be achieved
Pallid Harrier *Circus macrourus*	NT	No	Yes	NNL	Yes		0	0	+	NNL likely to be achieved
Steppe Eagle *Aquila nipalensis*	EN	Yes	Yes	NG	Yes		0	0	+	NG likely to be achieved

Species	IUCN status[a]	Critical Habitat species	Priority VEC[b]	Target	Principal risk:		Fatality threshold[c]	Predicted annual fatalities	Potential gains[e]	Outcome
					Turbines	Transmission lines				
White Stork *Ciconia ciconia*	LC	Yes	Yes	NG		Yes	7	~7	+	NG likely to be achieved

[a] LC = Least Concern, EN = Endangered, VU = Vulnerable and NT = Near Threatened.

[b] As reported in the Critical Habitat Assessment – these values have not been independently verified.

[c] As defined in the Cumulative Effects Assessment (EcoConsult 2022b).

[d] Thresholds were an output of the Cumulative Effects Assessment.

[e] Assuming all four shortlisted offset projects are implemented.

Table 3. Fatality estimates for the Amunet wind farm.

Species	Predicted annual fatalities from collision	Effectiveness of shut-down	Predicted fatalities from collision with shut-down		Collision fatalities at Lekela (one year's data)		Transmission line fatalities at Lekela (one year's data)	Transmission line fatalities at RasGareb / Zaafaran (only autumn 2021)	Assumed annual transmission line fatalities for Amunet		Predicted annual fatalities for the Amunet Project
Black Stork	6.3	0.98	0.1		0		0	0	0		<1
Booted Eagle	0.3	0.98	0.0		0		0	0	0		0
Common Crane	0.3	0.98	0.0		0		0	0	0		0
Egyptian Vulture	0.7	0.95	0.0		1		0	0	0		<1
Great White Pelican	63.2	0.98	1.3		0		0	0	0		<2
Greater Spotted Eagle	0.3	0.98	0.0		0		0	0	0		0

Species	Predicted annual fatalities from collision	Effectiveness of shut-down	Predicted fatalities from collision with shut-down		Collision fatalities at Lekela (one year's data)		Transmission line fatalities at Lekela (one year's data)	Transmission line fatalities at RasGareb / Zaafaran (only autumn 2021)	Assumed annual transmission line fatalities for Amunet		Predicted annual fatalities for the Amunet Project
Levant Sparrowhawk	0.0	0.98	0.0		0		0	0	0		0
Pallid Harrier	0.0	0.98	0.0		0		0	0	0		0
Steppe Eagle	0.3	0.98	0.0		1		0	0	0		0
White Stork	265.7	0.98	5.3		0		11	17	~2		~7

2.3 Project-related impacts to avian species

The only impacts of relevance to the ten species covered by this BAP (Table 2) are from:

- Collision with turbine blades; or,
- Collisions or, more rarely, electrocutions on Project transmission lines.

Any other impacts to biodiversity are not considered further in this BAP.

3 Mitigation Strategy

3.1 Mitigation hierarchy

By aligning with IFC PS6, the Project is committed to sequential implementation of the mitigation hierarchy (e.g. CSBI & TBC 2015): avoidance and minimisation of impacts, restoration where possible, and if significant residual impacts remain, offset actions to achieve a NNL or NG target.

3.2 Overview of mitigation actions

Avoidance of impacts is not possible without moving the wind farm from within the Rift Sea/Red Valley flyway. Changes to the Project configuration may occur, however all activities will outside the area of overlap between the Project and the Gebel El Zeit IBA.

Minimisation of impacts will occur through two mechanisms:

- Adoption of shut-down on demand following the protocols established under the Active Turbine Management Program: see also proposed mitigation action #2 of the Cumulative Effects Assessment (EcoConsult 2022b); and,
- Installation of Bird Flight Diverters on all Project transmission lines and ensuring that transmission lines, especially pylons, are designed to be wildlife-friendly: see also proposed mitigation action #3 of the Cumulative Effects Assessment (EcoConsult 2022b).

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** is discussed below.

4 Residual impact assessment

For the purposes of this BAP, predicted residual impacts are based on the Collision Risk Model results presented in the Project ESIA (EcoConsult & Green Plus 2022c)[1], adjusted to reflect initial results from the adjacent Lekela wind farm post-construction fatality monitoring (data provided by IFC) and the proposed mitigation effectiveness (Table 3), plus additional fatalities from the Project's high-voltage transmission line based on values recorded along high voltage transmission lines associated with Lekela and Ras Ghareb/Zaafaran wind farms.

The Collision Risk Model provided a range of fatality estimates based on the spring (2020-2022) an autumn (2020-2021) migratory periods, while in autumn 2021 and spring 2022, fatality estimates were also provided for two turbine options –120 metre and 150 metre turbine tip heights. For each estimation period (e.g. spring 2021, autumn 2020) the provided range's upper bound was considered as the value for that period. For periods with two estimates (i.e. when both turbine heights were considered) the higher of the two range's upper bound was used. Estimate values were then averaged within the migratory season to derive a mean estimate of fatalities for spring and autumn, which were summed to derive the mean annual predicted fatalities. These values are shown in column two of Table 3, while the full derivation is included at Appendix 2.

The effectiveness of shut-down on demand is assumed to be 98%, apart from Egyptian Vulture where effectiveness was set at 95% (May *et al.* 2011; SNH 2018). These are on the low end of published values for operational projects (e.g. 100% for both the Kipeto and Barão de São João wind farms: Tomé *et al.* 2017; Kimani *et al.* 2022).

Information on fatalities at the Lekela wind farm (column four of Table 3) were provided by IFC and cover the autumn 2021 and spring 2022 migratory periods, during which one Egyptian Vulture fatality and one Steppe Eagle fatality were recorded. Due to the high detection probability and long carcass persistence at the site, the recorded fatalities are likely to approximate the true number of fatalities and so no bias adjustment (Huso *et al.* 2017) is deemed necessary.

Information on fatalities along the high-voltage transmission lines of the Lekela (~10 km) and Ras Ghareb / Zaafaran (~16 km) wind farms (columns five and six of Table 3) was also provided by IFC. The mean of these values was then reduced by 85% (i.e. 2/13), in proportion to the shorter length of transmission line for the Amunet Project (EcoConsult & Green Plus 2021), for which no fatality estimate has been completed. This approach assumes that the existing Lekela and Ras Ghareb / Zaafaran lines have bird flight diverters installed, and that diverters will be installed on the Amunet line as per the ESIA (EcoConsult & Green Plus 2021; pg. 83).

[1] A revised CRM is planned for autumn 2021 and spring 2022 using height bands <200m: any changes to the CRM would need to be incorporated into a revised version of this BAP.

Using this approach, annual estimated fatalities range from ~0 (six species) to ~7 for White Stork (final column of Table 3), with only four species having predicted annual fatalities >0 (White Stork, Black Stork: <1, Egyptian Vulture: <1 and Great White Pelican: <2).

Once operational, ongoing fatality monitoring, along with relevant bias trials[2], will be required to determine the actual impacts to each of the ten species. This is also required by the proposed mitigation actions #6 and #7 of the Cumulative Effects Assessment (EcoConsult 2022b).

4.1 NNL/NG approach

Offset actions can generate biodiversity gains either through averted loss (i.e. conservation actions that prevent predicted impacts from happening) and/or improvement (i.e. actions that increase a species' survival or productivity).

4.1.1 Good practice for achieving NNL/NG

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.
- **Net gain**: Biodiversity offsets will be designed and implemented to achieve in-situ, measurable conservation outcomes that can reasonably be expected to result in a NG of biodiversity.
- **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.
- **Stakeholder participation**: Offsets will be based upon appropriate, extensive and transparent stakeholder consultation.

4.2 Significance and offset requirements

[2] Bias trials are required as: not all carcasses will fall within the search area, some carcasses will be removed prior to the subsequent search occurring and some carcasses will be missed by the search team (see Huso *et al.* 2017 for detailed discussion).

Annual residual impacts are predicted to be:

- ~0 for six species - Booted Eagle, Common Crane, Greater Spotted Eagle, Levant Sparrowhawk, Pallid Harrier and Steppe Eagle;
- <1 for Black Stork and Egyptian Vulture;
- ~3 for Great White Pelican; and,
- ~15 for White Stork

All species with >0 predicted fatalities are above the relevant species' impact threshold set in the CEA (Table 2) (EcoConsult 2022b) and are considered to be significant for those species. Impacts are not considered significant for species with zero predicted fatalities and a threshold of zero fatalities.

Species for which the Project has a NG commitment will need additional conservation actions, even if there are no annual impacts predicted. Investment in additional conservation actions would need to increase if annual impacts exceed the predicted gains from the offset actions.

5 Offset options

Given the number of species involved, there are a suite of potential offset projects which could be supported by the Project to meet its NNL/NG commitment. Analysis of each option is provided in the offset feasibility study (Appendix 1) with a summary provided here.

Each option was assessed using six parameters to represent the major trade-offs:

1. Coverage (i.e. how many of the target species covered);
2. Demonstrable biodiversity gain (i.e., an assessment of whether the option would provide 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);
3. The political feasibility of the option (i.e., an assessment of whether the option is likely to be credible and acceptable to all stakeholders (e.g. the client, lenders, governments, and conservation organisations);
4. 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);
5. Cost (i.e. a high level estimation of cost of implementing the option); and
6. Additional benefits (i.e. some options will have benefits to only the target species, while others will have broader benefits).

The first four of these were summed for an overall score for each option. Cost was not included in the overall score, as costs are unknown for most projects and will scale with the level of gain required. Other benefits, while important, were also not included in the overall score: where two options are considered equal, then this category could be used as a differentiator.

As the ten species covered by this BAP are wide-ranging within the Rift Valley/Red Sea flyway, potential projects working on these species within Egypt were considered first. However, as many are only passage migrants with few threats in Egypt, there are few opportunities for conservation

actions. Therefore, conservation projects in other countries within the species' ranges were therefore included in the assessment of options.

5.1 Offset actions

A total of 19 potential offset actions were considered for their potential to deliver gains for one or more target species (Table 4), with ten considered feasible options for the Project. Overall scores for feasible actions ranged from 9-19, with higher scoring actions typically covering more of the target species.

At least three actions are needed to cover all species, with multiple combinations of actions which could deliver a NNL/NG outcome for all species. Most species were covered by multiple potential actions. Only one potential action was identified which would benefit Levant Sparrowhawk – a suite of conservation-support at the Batumi migratory bottleneck. Therefore, this option must be taken forward.

From the 19 potential options, a short-list of four projects was identified covering all species:

- Supporting monitoring and conservation actions at the Batumi bottleneck, Georgia. This option the only one covering Levant Sparrowhawk, and also covers Pallid Harrier, with secondary benefit to Greater Spotted Eagle, Steppe Eagle and Booted Eagle;
- Habitat restoration of wetlands and nest protection in Polesia, to cover Black Stork, Greater Spotted Eagle and Common Crane;
- Retrofitting of power lines in Egypt covering the species at risk from powerline collisions - White Stork, Black Stork, Great White Pelican and Common Crane; and
- Retrofitting of power lines in Portugal to cover Egyptian Vulture, White Stork, Black Stork, Booted Eagle, and Common Crane.

This short-list provides multiple options for each species to allow for redundancy, as not all actions will have the same level of benefit for all species, while also providing the greatest benefits for the greatest number of species.

The relevant stakeholders and manager for each of the short-listed projects were engaged[3] to gain a deeper understanding of the project including likely gains and costs, as well as the practicalities of the Project supporting implementation of a conservation action. Detailed results including costings and likely gains (where available) are included in the Offset Feasibility Study (Appendix 1).

Collectively, the four short-list projects could achieve a positive outcome for all species, with many species having benefits from multiple projects (Table 4). Quantification of gains was only possible at this stage for the Polesia project, and so there is some uncertainty whether the current actions and level of effort is sufficient to deliver the NNL/NG commitment for three species: Egyptian

[3] Engagement with the 'Retrofitting of power lines in Portugal' action was not possible in the time available, and no quantitative estimate of gains were possible.

Vulture, Great White Pelican and White Stork (Table 2). As actions are developed, the likelihood of meeting the relevant species commitment will become clearer.

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5.2 Next steps

The initial step would be for the Project and IFC to agree that this suite of actions is able to deliver the relevant NNL/NG commitment.

There are also additional details to be resolved for all actions, including the level of support, likely gains and the practicalities of engagement. The Project may also wish to visit the identified options to provide further assurance that they meet the Project's requirements. For any final suite of options, the Project and implementing agency should agree on:

- The scope of support – i.e. level of funding, time period, responsibilities; and,
- A set of financial and management indicators to demonstrate that the action is functioning as intended and likely to deliver the assumed gain.

This information, along with the approach taken and likely resultant gains, would need to be included in the final Project BAP.

The Project has agreed to support an IFC endorsed offset plan that includes these or equivalent options to achieve NG for CH species and maintain NNL for the other priority bird VEC:

- Habitat restoration, Ukraine and Belarus
- Retrofitting power lines, Portugal
- Retrofitting power lines, Egypt
- Supporting monitoring and conservation around Batumi bottleneck

Amunet Wind Project Company will agree with Lenders the final options and level of contribution for implementation

Table 4. Offsetting options to meet Project NNL/NG commitments showing the overall score for the action (see the Offset Feasibility Study for score breakdown and justification) and the species which each action covers. Scores highlighted in red represent projects which should not be considered further. Potential annual gains are shown for the four short-listed projects (Green) – predicted numbers where available, otherwise denoted as a '+' symbol.

Conservation Action	Overall score	Critical Habitat-qualifying species					No Net Loss species				
	Overall score	Black Stork	Great White Pelican	Levant Sparrowhawk	Steppe Eagle	White Stork	Booted Eagle	Common Crane	Egyptian Vulture	Greater Spotted Eagle	Pallid Harrier
Habitat restoration, Ukraine and Belarus	16	40						+		13	
Protected Area expansion, South Africa	14										
Anti-poisoning campaign, Kenya	11										
Retrofitting powerlines, South Africa	7										
Management of Kafue flats, Zambia	15										
Agrochemical awareness, Zambia	9										
Captive-breeding and release of Egyptian Vultures, Italy	13										
Monitoring raptor populations and threats, Russia and Kazakhstan	12										
Research on White Storks, Tunisia	8										
Identifying mortality hotspots on power lines, Tunisia	15										
Supporting captive-breeding and release of Black Storks, Spain	10										
Supporting captive-breeding and release of Egyptian Vultures, Spain	11										
Enhancing a wild animals recovery centre, Spain	17										
Recovering the Egyptian Vulture population, Cape Verde	9										
Protecting habitat for breeding forest raptors, Portugal	12										

Conservation Action	Overall score	Critical Habitat-qualifying species					No Net Loss species				
	Overall score	Black Stork	Great White Pelican	Levant Sparrowhawk	Steppe Eagle	White Stork	Booted Eagle	Common Crane	Egyptian Vulture	Greater Spotted Eagle	Pallid Harrier
Retrofitting power lines, Portugal	19	+				+	+	+	+		
Retrofitting powerlines, Egypt	13	+	+			+		+			
Rehabilitating Sharm El Sheikh water treatment station, Egypt	11										
Supporting monitoring and conservation around Batumi bottleneck	16			+	+		+			+	+
Short-listed actions		**40++**	**+**	**+**	**+**	**++**	**++**	**++**	**+**	**13+**	**+**

6 Biodiversity monitoring and evaluation

This BAP assumes an appropriate Fatality Monitoring Program will be implemented for the Project which includes protocols for monitoring the effectiveness of mitigation (i.e. carcasses surveys) and adaptive management if carcasses are detected. A high level document, the 'Completion Annex for ESIA AMUNET Wind Power 500 MW Active Turbine Management Program (ATMP) and Fatality Monitoring Program (FMP)' contains the broad outline of the FMP and adaptive management – additional details would be needed to operationalise this document (e.g. search frequency, number of turbines, fatality trials, analysis methods, reporting requirement).

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 manor 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 would be for 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.

7 BAP implementation

Actions outlined in this BAP:

- Implement the agreed mitigation actions during construction (for installing Bird Flight Diverters on transmission lines) and operation (for shut-down on demand);
- Evaluate the effectiveness of these action during operation. A detailed Fatality Monitoring Program document is required to demonstrate how this will occur;
- Agree on a suite of offset actions that the Project will support, the level of such support, and update the BAP once these have been confirmed. The updated BAP must be finalised prior to the commencement of Project operation;
- Ongoing monitoring of the effectiveness of selected offset actions on a regular basis; and,
- Evaluation of the Project's status for each species compared to their NNL/NG commitment on an annual basis. If this commitment is not being met for any species, additional support to conservation actions would be required.

Prior to the Project becoming operational, this BAP must be updated to incorporate the final agreed offset support. Once the Project is operational, the BAP must be updated annually to incorporate:

- Estimated fatalities for each species, as derived from the post-construction fatality monitoring;
- Gains from offset actions;
- The current, and predicted outcome for each species covered by the BAP (i.e. is the Project likely to meet its Net Gain / No Net Loss requirement or not); and,
- Any other relevant information.

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Appendix 1: Offset feasibility study

A total of 16 conservation options have been identified for delivering the project's NNL / NG targets for each of the 12 species (**Error! Reference source not found.**). Conservation 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 rapid review of regional and national avian conservation organizations. A full list of organisations or individuals identified and approached for information is included in **Error! Reference source not found.**: some of which did not respond prior to the development of this BAP and therefore are not discussed further. Amunet Wind Project Company will agree with Lenders the final options and level of contribution for implementation.

Approach to select 'preferred' offset options

Each option was assessed using six parameters chosen to represent the major trade-offs, these were:

1. Coverage of the action (i.e. how many of the target species the action covers);
2. Demonstrable biodiversity gain (i.e., an assessment of whether the option 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);
3. 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);
4. 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,
5. Cost (i.e. a high level estimation of cost of implementing the option and comparison of cost against other options); plus,
6. Other benefits (i.e. some options will have benefits to only the target species, while others will have broader benefits.

Each action was scored against parameters 1-4, with higher values representing better outcomes or less risk (apart from the 'coverage' which was the number of species covered by the option). Inevitably there are trade-offs within options as more financial investment may reduce the implementation risk – these are discussed in the individual projects below.

The first four scores were summed to derive an overall score for each option. Cost was not included in the overall score, as costs are unknown for most projects and will scale with the level of gain required. Other benefits, while important, were also not included in the overall score: where two options are considered equal, then this category could be used as a differentiator. Any option which scored a '1' (lowest score) in any of the first four categories was discounted from further consideration.

Evaluation of potential actions

8.1.1 Retrofitting powerlines, Egypt

Target species: White Stork, Black Stork, Great White Pelican and Common Crane. **Score: 4.**

EEAA (see 8.1.18) has been conducting some limited monitoring work, focusing on identifying mortality hotspots for birds along the electricity transmission and distribution grids in the country. The only well-known mortality hotspot is a ~100 km length of power line between Sharm el-Sheikh and El-Tor, where 107 bird carcasses were found during a recent search. These carcasses were a range of ages (i.e. time since death) and most were White Storks, but other soaring birds, e.g. Common Cranes and Eurasian Honey-buzzards, were also found. In another power line close to Lekela wind energy projects (western side of Golf of Suez), 28 White Storks were found dead from collisions while in 2015, 19 Great White Pelicans died after colliding with a transmission line in Ras Ghareb region. Some of these lines are associated with wind developments, and, according to Egyptian environmental regulation appropriate, mitigation is the responsibility of the developer, and so could not be considered as an offset.

Installation of BFDs has to be operationalized by EETC, the Egyptian Electricity Transmission Company. However, the actions involving monitoring, designing and selecting the best mitigation approaches, and selecting priority areas for avoiding or mitigating collisions and electrocution impacts, should be coordinated and developed within the framework of the Migratory Soaring Birds project (UNDP, BirdLife International, GEF).

Demonstrable biodiversity gain

Carcass monitoring along power lines takes place in an *ad-hoc* fashion at a few sites in Egypt. Retrofitting any of these lines would reduce fatalities (e.g. by insulating cables or marking lines with Bird Flight Diverters) though electrocution or collision (e.g. Bernardino *et al.* 2019) and result in gains in the target species. As monitoring of fatalites has been ad-hoc, quantifying the levels of gain may be challenging. **Score: 3.**

Politically feasible

Although not extensively, EEAA has already been engaging with the electricity transmission and distribution companies in Egypt to identify problematic areas regarding impacts on birds and retrofit power lines to mitigate those impacts. No political opposition or constraints are envisaged respecting a significant expansion of those actions. **Score: 3.**

Implementation risk

No significant implementation risks are identified, as power lines retrofitting has already been implemented in different stretches of the Egyptian transmission and distribution grid, although at a relatively small scale. **Score: 3.**

Cost

Following previous conversations with BirdLife International on the most effective power line marking methods, EEAA is aiming to retrofit transmission power lines sited in higher risk areas with BFDs in all four wires. The cost for retrofitting each 5 km is estimated at ~US$100,000, i.e. a funding of ~1,000,000 US$ would allow for retrofitting ~ 50 km. For developing an extended assessment of mortality impacts and mortality hotspots and retrofitting where necessary along the whole Rift Valley/Red Sea Flyway in Egypt, an estimated ~5,000,000 US$ would be necessary. **Score:1.**

Other benefits

A significant expansion of the retrofitting of power lines along the Rift Valley/Red Sea Flyway in Egypt would likely result also in moderate benefits for a variety of migratory and non-migratory bird species. **Score: 3.**

Total score: 13

Detailed project outline

The proposed project would initially focus on the ~100 km stretch of power line between Sharm el-Sheikh and El-Tor, on the Sinai peninsula where fatalities are known to occur. There is currently an investment of €100,000 by EETC to install BFDs on this line, which is estimated to cover ~10 km. While there are likely to be some economies of scale, an approximate cost of €900,000 would allow installation of BFDs on the remaining ~90 km. Retrofitting of the whole line would reduce mortality by 50% along the line (average of effectiveness in Bernardino *et al.* 2019), which, as a broad approximation, would result in a gain of ~50 birds (assuming the 107 recorded deaths were the annual fatalities, and a ~50% reduction due to the BFDs). As 'most' of the fatalities are White Stork, a gain of ~30 individuals of this species per year might be possible. Retrofitting of shorter lengths would result in a proportionally smaller gain.

8.1.2 Retrofitting power lines, Portugal

Target species: White Stork, Egyptian Vulture, Black Stork, Booted Eagle, and Common Crane. **Score: 5.**

SPEA (see 8.1.15) has been working with the main electricity transmission (REN) and electricity distribution (EDP) companies in Portugal for over 15 years. Several projects have been contracted aiming the monitoring of power lines impacts on birds and the retrofitting of the most impactful lines and structures. Despite this work, there are large areas of lines in areas pre-identified as causing significant mortality of birds for which retrofitted is still required.

Demonstrable biodiversity gain

There is a large body of evidence showing the benefits of retrofitting power lines (e.g. by insulating cables or marking lines with Bird Flight Diverters) in reducing bird mortality though electrocution or collision (e.g. Bernardino *et al.* 2019). Raptors and storks are among the bird groups more affected by these types of impacts, due to their large size, low manoeuvrability or perching

behaviour . Therefore, the significant expansion of retrofitted power lines would likely result in quantifiable gains for some of the target species. Evidence from Portugal shows that 74% of electrocution fatalities identified to species level were either raptors or storks (Sousa 2017). **Score: 4.**

Politically feasible

As mentioned above, similar projects, focusing on the identification and mapping of power lines impacts followed by the retrofitting where necessary, have been developed by SPEA and the main electricity companies for nearly two decades. Hence, an expansion of these activities would benefit from the same widespread corporate and political support. **Score: 4.**

Implementation risk

The proposed project is a follow-up of several successful projects and thus no implementation risks are envisaged. **Score: 4.**

Cost

A cost estimate of ~300,000 € was provided for the retrofitting of approximately 100 km of distribution power lines. **Score: 3.**

Other benefits

Depending on their location and typology, retrofitting impactful powerlines is likely to benefit a variety of non-species which are sensitive to collision or electrocution impacts. **Score: 3.**

Total score: 17

Detailed project outline

The National Board of SPEA requested additional information on the project size and location (approximate), main predicted impacts, list of species more likely to be affected and offset actions being considered (general). This information was provided, but due to holidays season, only in September the Board will decide on their willingness to engage with the offset framework for the Amunet wind farm.

8.1.3 Supporting monitoring and conservation around Batumi bottleneck

Target species: Pallid Harrier, Levant's Sparrowhawk, Greater Spotted Eagle, Steppe Eagle and Booted Eagle. **Score: 5.**

The Batumi bottleneck is located by the south-eastern coast of the Black Sea and close to the town of Batumi, in southwestern Georgia. Every autumn over 1,000,000 soaring birds pass the area during their migration south along the Eastern Black Sea Flyway (part of the East-African Eurasian Flyway). The Batumi Raptor Count (BRC) is a nature conservation NGO that has worked to monitor and conserve birds in the region since 2008, when it has started an autumn raptor

migration count scheme. Although originally created as a monitoring organisation, BRC's mission has expanded to that of a conservation and monitoring NGO.

Since 2015 BRC has been conducting community outreach to understand and reduce the impact of illegal hunting on migratory birds (e.g. Sándor *et al.* 2017) through discussions with hunters and local population, while also promoting local guesthouses and ornithological tourism an important alternative source of revenue for local economy (Hoekstra *et al.* 2020). This successful campaign led to a very significant decrease in illegal hunting in Batumi. However, this threat persists in surrounding villages.

Demonstrable biodiversity gain

A reduction in hunting was clearly demonstrated in the BRC engagement area, and this suggests gains to target species are likely as these are known to be hunted. While these averted losses were not calculated, this appears broadly feasible as the number of hunters and the numbers of birds hunted can both be quantified, although demonstrating a reduction in hunting pressure may be more challenging. **Score: 3.**

Politically feasible

BRC has continued social and institutional support both at the local and national levels: it involves local staff in counts, has a formal partnership with a local association (Fauna and Flora) and has broader institutional support from the Georgian Environmental and Tourism authorities. The BRC project on illegal hunting, although not currently active, had local support when paired with awareness-raising and other income-generating activities, and should a new program commence, it is likely that there would be a similar level of support. **Score: 3.**

Implementation risk

Illegal hunting occurs over a wider region than the BRC was able to cover with the previous project, and so there are clear scope for reductions in hunting, leading to averted loss of the target species, in these new areas. With the previous work, BRC have demonstrated that the methods applied have been successful and it is likely that the same, or broadly similar approaches could be used in the future. BRC feels that it is beyond their ability to expand this work to areas beyond where they are currently active, and so any new communities further from the BRC centre are much less likely to change their practices. **Score: 2.**

Cost

BRC soaring birds monitoring campaigns are highly dependent on an annual baseline funding from OSME, complemented by other grants or donations (e.g. from BirdLife International). The whole project is based on volunteer's work, who pay for their own food and accommodation. Further details on costs are provided below. **Score: 4**.

Other benefits

Hunting targets a range of migratory bird species beyond the targets for this Project, and raising significantly decreasing illegal hunting in a wider region around Batumi would likely also benefit

these species and also mammals, like Golden Jackal (*Canis aureus*) and Brown Bear (*Ursus arctos*) (Sándor *et al.* 2017). **Score: 3**

Total score: 13.

Detailed project outline

BRC is mostly engaged in getting the support to maintain the annual monitoring of soaring bird migration in Batumi, which is currently based on volunteer work. The development of the monitoring scheme, and the consequent attraction of international birdwatchers (leading to an increase in ecotourism) has led to the abandonment of traditional hunting, as local communities realised the economic benefits of having an increased number of visitors. However, BRC is not willing to engage in actions to expand hunting reduction to nearby communities, due to:

- Potential overlapping with the work conducted by other organizations: while BRC is responsible for conducting the migration monitoring, and, in fact, for drawing attention to the importance of Batumi for migratory birds, there are other local organizations (SABUKO, the Birdlife partner, and the Georgian partner of Fauna and Flora International) that assume the role for developing active conservation in the region;
- Lack of local capacity (Georgian staff) to implement active conservation measures, or environmental education actions (e.g. targeting hunters), beyond the support to the migration monitoring scheme;
- Lack of infrastructure: the expansion of the migration monitoring observatories to neighbouring communities (providing the basis for the development of ecotourism that could, in turn, trigger an abandonment of illegal traditional hunting, similarly to what happened in Batumi) is not viable due to a lack of proper access.

In alternative, BRC identified three types of initiatives that could potentially have a positive effect on the target species of soaring birds.

> (i) Support the ongoing work of BRC in Batumi, in order to maintain their presence in the region and the existing conservation gains, and to provide a solid basis to facilitate additional conservation actions;
> (ii) Develop a network of researchers at the East-African Eurasian Flyway scale for assessing and preventing potential cumulative impacts from energy development. This should involve representatives from the energy sector, researchers and international non-governmental organizations (e.g. RSPB, EBCC). This platform would also aim exchanging information on conservation actions, triggering environmental education actions and leveraging the enforcement of hunting laws; and,
> (iii) Develop a joint Turkish / Lebanese / Georgian project to train and improve ranger capacity to enforce existing hunting legislation, and investigate and prosecute illegal hunting, in the three countries. The leading organization for this project would be the Turkish Nature Research Society and would also involve BRC (Georgia), the Society for the Protection of Nature in Lebanon (Lebanon), and Nature Conservation Egypt, responsible for organizing the monitoring of bird migration at the Galala area, north-eastern Egypt.

Options (i) and (ii) would not deliver any direct gains to any target species but would be additional conservation actions. Option (iii) would have direct benefits to the target species, however it is unlikely this could be quantified with high accuracy.

The cost of implementing action (i) for a 3-year period is estimated at €30,000 (including accommodation and travelling for coordinators and some transportations support to volunteers) to €60,000 (if supporting the whole costs of the campaign), while the estimated cost for action iii) would be ~€60,000 also covering a 3-year period.

8.1.4 Habitat restoration of wetlands, Ukraine and Belarus

Target species: Greater Spotted Eagle, Black Stork and Common Crane. **Score: 3.**

Polesia refers to an area of over 18 million hectares across Belarus and Ukraine, spreading east into Russia and west to Poland with the river Pripyat, one of the last major un-modified rivers in Europe, at its core. Polesia is one of the largest and most impressive wilderness areas in Europe, with expansive mires, floodplains, and wet meadows providing habitat for large numbers of globally declining wetland species. The Polesia project, led by the British Trust for Ornithology (BTO), works in this region to halt further destruction to Polesia and to safeguard its diverse fauna and flora through:

- Research and monitoring, especially on High Conservation Value Forest and Greater Spotted Eagle;
- Creating and expanding Protected Areas, and improving Protected Area management;
- Identifying active nests for Greater Spotted Eagle and Black Stork to add to the nest protection passport scheme; and,
- Restoring landscapes, which consists of reflooding of previously-drained mires and floodplains, of which there are ~6,000 hectares which were drained at the beginning of the last century.

Demonstrable biodiversity gain

Mires and floodplains in the Polesia area are key breeding habitat for Greater Spotted Eagle, Black Stork and Common Crane, and are currently being restored as part of the Polesia project. The current project does not directly monitor or quantify gains in either habitat created or the response of the three target species, but gains in habitat are evident and positive species' responses are likely: either of these components could be quantified to a variety of extents depending on the level of assurance required. Nests of Greater Spotted Eagle and Black Stork are also protected under Belarus and Ukraine legislation through a nest protection passport scheme, where known nests have an exclusion buffer to prevent disturbance for nests. This exclusion lasts for five years, after which the nest site needs to be confirmed as active again for the protection to continue. The project estimates that unprotected nests suffer 50% loss due to disturbance, which can be totally prevented when added to the nest protection passport scheme. Gains can be estimated based on the number of nests found, and demonstrating the improvement in productivity is feasible, although challenging. **Score: 3 for both options**

Politically feasible

The Polesia project is an existing action supported by a range of international and relevant national NGOs and government agencies, led by BTO, with base funding providing by the Arcadia Fund for 2019-2023. The project has clearly demonstrated its feasibility through its success in expansion of Protect Areas, identification of nest sites, improved habitat protection and habitat restoration. Any additional actions, with external funding, are assumed to have the same level of support. **Score: 4.**

Implementation risk

The Polesia project commenced in 2019 and the methods used demonstrated as successful through the expansion of Protect Areas, identification of nests, improved habitat protection and habitat restoration. Major implementation risks are likely to have been identified and resolved during this time. The project has identified large areas for restoration so there is little risk that additional areas will be unavailable and has large areas which have not been searched for nests of either Greater Spotted Eagle or Black Stork. At the time of preparing this BAP (July 2022) the war in Ukraine does not appear to be having a major impact on the work of the project, activities are ongoing, but this could change in the future. **Score: 3**.

Cost

Primary costs for the project are covered via the Arcadia Fund, and additional funding would be used to expand the scope of existing works. Both habitat restoration, via closing of drainage channels to restore mires and floodplains, and the identification of nests provide immediate gains, but costs are not easy to quantify and highly variable depending on the location of area to restore or areas to search for nests. Both actions rely on the presence of on-ground staff, which is estimated at ~US$10,000 per person per year, with additional costs for monitoring and expenses. Collectively, ~US$20,000 per year would likely cover both staff time and restoration costs, noting that restoration actions are assumed to deliver gains in perpetuity, which nest protection only lasts for five years. **Score: 3.**

Other benefits

Restoration of wetlands, and the presence of staff to implement the action, would provide conservation benefits to a large range of other threatened and migratory species. These include direct benefits via the creation of new habitats, plus indirect benefits of reduced hunting and disturbance via their presence in the region. **Score: 4.**

Total score: 13

Potential project outline

Based on discussion with BTO, two potential projects are available for support:

Option 1 is support for staff to identify nests of Greater Spotted Eagle and Black Stork, which would then be protected under the nest protection passport scheme. This work would mostly occur in Belarus due to more nests being present in this area and better staff expertise. Support

would be over five years, with an estimated total cost of US$200,000 (i.e. US$40,000 per year) covering staff salary, fieldwork expenses and analysis and evaluation. Over this five-year period, BTO estimates that a minimum of 50 nests of each species could be identified and protected. Greater Spotted Eagle normally raise one chick per year with a 50% fledging rate (i.e. 50 nests would produce 25 chicks), but disturbance can reduce fledging success by >60%. With protection from disturbance, fledging success is assumed to increase to 50%, so 50 nests would produce 25 chicks per year. This would be a net gain of ~13 chicks per year, or ~65 fledglings for the five years of the project. Black Stork normally raise three chicks per year: assuming the same average fledging rates before and after protection, this equates to 40 additional chicks fledged per year, or a net gain of 200 fledglings for the five years of the project. 50 nests is the minimum number of nests for each species protected and an upper estimate of an additional 85 Greater Spotted Eagle and 350 black stork fledglings due to protection is predicted.

To demonstrate the increased fledging success of each species and monitor fledgling survival, key to understanding adult recruitment (the actual number of additional reproductive individuals recruited due to protection), BTO proposes to satellite tag ten individual Greater Spotted Eagle and ten Black Stork fledglings per year to monitor their survival and behaviour. This will provide a robust estimate of additional Greater Spotted Eagle and Black Storks gained from the funded protection.

Option 2 is support for staff in the restoration and protection of additional wetland areas within the Polesia region. This would occur mainly in the Ukraine, as this is where most of the available habitat for restoration occurs and occur both within and outside existing Protected Areas. Support would also be for five years, with an estimated total cost of US$200,000, covering mainly staff salaries and some field expenses. BTO estimates this level of effort could restore ~2.500 ha of wetlands, which would provide additional habitat for three new breeding territories of both Greater Spotted Eagle and Black Stork. Based on annual productivity of 0.5 and 1.5 chicks/year for Greater Spotted Eagle and Black Stork respectively, this would equate to an annual gain of 1.5 and 4.5 Greater Spotted Eagle and Black Stork fledglings respectively. As restoration is assumed to last in perpetuity, these annual gains would accrue for the life of the project. Monitoring of restored wetlands would be undertaken annually to demonstrate that both species have returned to breed, and to estimate nest success.

For both options funding could be provided as either a lump sum or annual payments, and could be made to BTO to disperse, or, if option 2 was preferred, paid directly to the Frankfurt Zoological Society which administers the wetland restoration work.

8.1.5 Protected Area expansion, South Africa

Target species: Pallid Harrier, White Stork **Score: 2**.

Birdlife South Africa runs a Landscape Conservation Program (LCP), which is dedicated to the conservation of South Africa's indigenous, endemic and threatened bird species and their most important sites and ecosystems through facilitating additions to the PA network.

Demonstrable biodiversity gain

Increasing the PA network is likely to improve the habitat and survival of species using these areas. For the species of relevance, these PAs represent non-breeding, or over-wintering habitat, and increasing the quality of these areas is likely to improve their survival during this period. While there is a clear logic that suggests gains are possible, these would be extremely hard to quantify directly due to subtle nature of threats operating in these areas and the high mobility of the target species. **Score: 2**.

Politically feasible

The LCP has played a leading role in the declaration of 150,000 ha of privately protected areas and an additional 35,000 hectares of conservation areas across South Africa. The approach is clearly feasible and widely supported by locals, environmental NGOs and in government. Any additional actions, with external funding, are assumed to have the same level of support. **Score: 4.**

Implementation risk

This project is operational and has demonstrated success in expansion of the PA network. Major implementation risks are likely to have been identified and resolved during this time, and no future risk are anticipated. There are also many more areas which could be added to the PA network so there is little risk that additional areas will be unavailable. **Score: 4**.

Cost

For biodiversity stewardship of privately protected areas, support of US$120,000-150,000 annually for three years has the potential to conserve an estimated 10,000-30,000 ha of habitat. **Score: 2**.

Other benefits

Birdlife targets specific areas in the LCP, which are defined to generate maximum benefit for the conservation of threatened species and are protected in perpetuity. These new PAs are likely to represent areas of high-quality habitat which would also contain diverse ecosystems of non-target species. **Score: 4**.

Total score: 12

8.1.6 Management of Kafue flats, Zambia

Target species. Great White Pelican, Steppe Eagle, White Stork, Pallid Harrier. **Score: 4.**

The International Crane Foundation (ICF), in partnership with, amongst others, the Government of Zambia, local communities and Birdlife Zambia, has initiated a new 20-year partnership for the management and restoration of the Kafue Flats in central Zambia (coverage here). This builds on previous work led by the ICF, which focused on removal of invasive plants in the same area.

Demonstrable biodiversity gain

The ICF-led project is directly addressing many of the threats faced by species in the Kafue flats – poaching, unsustainable land use, invasive species and low management capacity. The project will have clear benefits for the species present in Kafue flats, although this benefit will be different for each species depending on how they were impacted. Due to the subtle nature of the planned intervention, gains are likely for all target species but are unlikely to be able to be quantified, and no gains have been demonstrated for the target species from the previous work in the area. As this is an active project which has been designed to address the key threats in the area, proving additionality from any investment would also be challenging. **Score: 2**.

Politically feasible

The project is an agreement between ICF and the Government of Zambia with the support of local communities and environmental NGOs and will build off an existing successful program. While the new project is significantly expanded in scope, there is clearly political support for the project within the country. **Score: 4**.

Implementation risk

While the methods proposed for this work are not clear, the threats present are similar to those in many other regions in Africa and it is likely that a set of existing approaches can be easily adapted to the local context. Given the community is supportive of the project there is also likely to be limited local resistance to implementation. **Score: 3**.

Cost

Detailed cost breakdowns have not been provided at this stage but are likely to be moderate as contributions would be to expand an existing project so avoids many of the start-up costs associated with new projects. Financial contributions should be made for each year for which gains are needed, as without constant funding threats are assumed to re-emerge. **Score: 2**.

Other benefits

The focal species for the ICF-led project are several threatened avian and mammal species, and any additional support would greatly benefit these species**. Score: 4**.

Total score: 13

8.1.7 Protecting habitat and avoiding disturbance for breeding forest raptors, Portugal

Target species: Black Stork and Booted Eagle. **Score: 2.**

Forest areas in Portugal hold significant populations of Black Stork and raptors, such as Eurasian Buzzard, European Honey-buzzard and Booted Eagle. The majority of the main breeding grounds for these species are located in private-owned properties, belonging to big forestry companies, that produce Maritime Pine (*Pinus pinaster*), Eecalyptus (*Eucalyptus* sp.), or Cork Oak (*Quercus*

suber) forestations for pulp and paper production, timber or cork. Many of the forestry activities coincide with different phases of the breeding season of soaring birds, causing disturbance and nest abandonment or destruction.

SPEA (see 8.1.15) is aiming to develop Black Stork and forest raptor monitoring and nest survey actions, and test the effects of implementing protection buffers around breeding sites, to avoid forestry impacts.

Demonstrable biodiversity gain

This project would likely result in the increase in breeding success of the target species. Moreover, the project results could be incorporated in good practice guidelines to the forestry industry and to municipalities, supporting adequate land planning and management, and preventing future impacts. While population gains are likely, they cannot be quantified accurately. **Score: 2.**

Politically feasible

SPEA has already granted the institutional support of two of the main forest producers in the country, Altri and The Navigator Company, although no on-ground work has yet commenced. The engagement of other business and regulator stakeholders would be important to provide a wider reach for the project goals. **Score: 2.**

Implementation risk

In spite of the technical and scientific capacity of SPEA and other stakeholders to be involved, a better-defined scope of works, including the definition of the geographic scope, other necessary partners, and species-specific actions, has yet to be completed. **Score: 3.**

Cost

At this stage, a cost estimate has not been provided. **Score: 3.**

Other benefits

The implementation of protection buffer areas in forests during the breeding season is likely to bring moderate conservation benefits for forest wildlife in general, and possibly to some flora and natural habitats. **Score: 3.**

Total score: 9

8.1.8 Supplementary feeding, power lines retrofitting and anti-poison campaign for recovering the Egyptian Vulture population, Cape Verde

Target species: Egyptian Vulture. **Score: 1.**

Previously an abundant species in Cape Verde, Egyptian Vultures declined dramatically over the past decades in this African archipelago, and are now on the brink of extinction, with likely less than 20 breeding pairs remaining (Freitas *et al.* 2020). The main causes for this sharp decline have been the formerly widespread and long-lasting use of dangerous pesticides, on-going poisoning of stray dogs, and a decrease in food resources associated with factors linked with development.

SPEA (the Portuguese acronym for Portuguese Society for the Study of Birds), the BirdLife International partner in Portugal, is aiming to develop a project in Cape Verde, focused on addressing the current threats for the species and implement conservation actions that would trigger the recovery of its national population.

Demonstrable biodiversity gain

The project would focus on providing supplementary food to Egyptian Vultures (installing so-called "vulture restaurants"), retrofitting power lines (likely to impact the species through electrocution), and anti-poison and anti-poaching public awareness and monitoring. These actions have already been implemented with considerable success in the Canary Islands, where the species suffers from analogous threats. **Score: 3.**

Politically feasible

The implementation of this project would involve local partners and relevant governmental authorities. Some of the stakeholders to be engaged are already identified (like NGOs Biosfera and Bios CV), but still there is some uncertainty on the political feasibility of the project. **Score: 2.**

Implementation risk

SPEA has a strong technical and scientific reputation, and has been involved in leading and implementing complex conservation projects, including with Egyptian Vulture (e.g. project LIFE Rupis) or in Cape Verde (e.g. reintroduction of Raso lark project or seabird conservation projects), and maintains well-established relationships with different stakeholders in the archipelago. The project's approach would be like that taken in the Canary Islands and that resulted in population gains for the local population of Egyptian Vulture. **Score: 3.**

Cost

At this stage, a cost estimate has not been provided. **Score: 2.**

Other benefits

Although other species in Cape Verde may be favoured by the retrofitting of power lines and power line infrastructures, and by the provision of supplementary food to Egyptian Vultures, these benefits are likely to be low. **Score: 2.**

Total score: 9

8.1.9 Enhancing a wild animal recovery centre, Spain

Target species: White Stork, Egyptian Vulture, Black Stork, Booted Eagle, and Common Crane. **Score: 5.**

GREFA manages the largest Recovery Centre and Wildlife Hospital in Europe (8.1.12), where over 60,000 wild animals have been received and treated during the past decades.

Demonstrable biodiversity gain

A large part of GREFA's subsidies and funds (8.1.12) support the sustainability and success of the association's Recovery Centre and Wildlife Hospital. Additional funding would allow for expansion and improvements of the existing structure, and for the tagging and satellite-tracking of a larger number of soaring birds, released after rehabilitation. While these actions would be probably result in an increase in the survival probabilities of many different birds, the actual gains are very difficult to quantify. **Score: 2.**

Politically feasible

Like other GREFA's activities (8.1.12., 8.1.13), the association's Recovery Centre and Wildlife Hospital benefits from ample support and acknowledgment. **Score: 4.**

Implementation risk

No implementation risks are identified, taking into account GREFA's successful track in implementing and managing the Recovery Centre and Wildlife Hospital. **Score: 4.**

Cost

The funding needed for expanding some of activities in the Recovery Centre and Wildlife Hospital is estimated at ~ 25,000 € per year. **Score: 4.**

Other benefits

As additional funding would be mostly allocated to target soaring bird species, any benefits to other species would likely be low. **Score: 2.**

Total score: 15

Non-preferred options

8.1.10 Supporting captive-breeding and release of Egyptian Vultures, Italy

Target species: Egyptian Vulture. **Score: 1.**

The Vulture Conservation Foundation (VCF) works for the recovery of Europe's four vulture species by initiating, facilitating and supporting conservation actions and research by working with people and organizations. VCF has been collaborating with governments, businesses, local communities and other non-governmental organisations to develop and deliver conservation projects that

protect vultures across Europe. Among other highly impactful conservation projects, VCF has a wide expertise in captive breeding vultures for conservation, reintroducing and restocking vulture populations. In Italy, VCF partners with CERM Endangered Raptors Centre to reintroduce the endangered Egyptian Vulture population in southern Italy, and in monitoring both released birds and the success of release actions. VCF and CERM Endangered Raptors Centre are expanding their delayed release facilities with the aim of releasing an additional 4-5 Egyptian Vultures each year which will be released in suitable areas in southern Italy, and possibly in the Balkans.

Demonstrable biodiversity gain

The CERM Endangered Raptors Centre co-manages the captive breeding centre for Egyptian Vultures, with 37 individuals having been released since the start of operations while testing a range of release techniques. With a current population of ~10 breeding pairs in Italy, these releases represent a large gain for the species and demonstrate the technique is viable. As this work represent a supplement to the existing population, gains are directly quantified, although as some individuals do not survive to adulthood, there is not a one-to-one relationship between released birds and birds recruited to the population. **Score: 4.**

Politically feasible

VCF is a stable and highly reputable conservation organization and has already an agreement with CERM Endangered Raptors Centre for co-managing the existing captive breeding centre for Egyptian Vultures in Italy. No constraints are identified regarding the expansion of current plans to accommodate the development of delayed release facilities and actions**. Score: 4.**

Implementation risk

The captive breeding centre for Egyptian Vultures was created by CERM Endangered Raptors in 2003 and currently holds nearly 40 individuals. Since its start, the project has resulted in the successful release and subsequent monitoring of 37 Egyptian Vultures in Italy. There are no obvious implantation risks. **Score: 4.**

Cost

An estimated €20,000-30,000 per year will be necessary to fund the construction of the required delayed-release facilities and support other associated costs (staffing, release in the wild, satellite-tagging and monitoring). This will add to the annual management and maintenance costs of the captive breeding centre, estimated at ~ €50,000. **Score: 4.**

Other benefits

This action focus in creating benefits to a single species, Egyptian Vulture, and therefore no benefits will result for other target species. **Score: 1.**

Total score: 13, however the IFC does not consider captive breeding as a viable offset and so this option is not considered further. Not a preferred option.

8.1.11 Supporting captive-breeding and release of Black Storks, Spain

Target species: Black Stork. **Score: 1.**

GREFA (stands for the Spanish acronym of Group for the Rehabilitation of the Indigenous Fauna and its Habitat) is a non-profit, non-government organization, based in Spain. It was formed in 1981 and dedicates to the study and conservation of nature. GREFA manages a Recovery Centre and Wildlife Hospital near Madrid, Spain, that is considered the largest and more active in Europe. Additionally, GREFA is acknowledged internationally for its biodiversity conservation projects, especially concerning captive-breeding and reintroduction of threatened species, restocking of wild populations, satellite tracking and nest surveillance.

Most of GREFA funding comes from state subsidies and protocols with private companies allocated to specific projects, as well as from donations and members contributions.

Demonstrable biodiversity gain

For the moment GREFA holds two pairs of Black Storks (irrecoverable birds), that have been captive breeding successfully. However, subsequent survival of released fledgelings has been poor, as it often occurs with other migratory soaring birds (e.g. Egyptian Vulture). GREFA aims to build and manage a new infrastructure that allows for holding a larger number of adult captive breeders, and especially for the acclimatization and delayed release of fledgelings. The ultimate goal is to obtain a higher survival rate and yield a higher recruitment of individuals for the Black Stork population in Spain. **Score: 2.**

Politically feasible

GREFA benefits from ample support from different state and private stakeholders in Spain, and its technical and scientific reputation in acknowledged both internationally and nationally. **Score: 3.**

Implementation risk

GREFA experience in captive breeding and release of wild species is nearly unparalleled in Europe. Moreover, part of the supporting infrastructure required already exists, as well as technically well-prepared staff. Therefore, no implementation risks are envisaged. **Score: 4.**

Cost

The cost of developing the Black Stork captive breeding and delayed release project is estimated at ~80,000 € per year. This comprises the building of the required infrastructures, staffing (2 people), and the purchase of a vehicle and satellite transmitters. Overall cost also depends on the number of released and tagged individuals (cost of ~1,000 €/bird). **Score: 4.**

Other benefits

As the project focus specifically on restocking the Black Stork population, no benefits will results to other species or habitats. **Score: 1.**

Total score: 10, however the IFC does not consider captive breeding as a viable offset and so this option is not considered further.

Not a preferred option

8.1.12 Supporting captive-breeding and release of Egyptian Vultures, Spain

Target species: Egyptian Vulture. **Score: 1.**

Among other conservation and monitoring actions (see 8.1.12), GREFA is also starting a captive-breeding and release project focused on reinforcing the Iberian population of Egyptian Vulture.

Demonstrable biodiversity gain

The captive breeding and release GREFA project with the Egyptian Vulture aim at the development of infrastructures that support the method of delayed release of fledglings, proved to be the most successful in rendering higher survival and recruitment rates (see also 8.1.8). The project has already granted some co-funding and will initiate soon, in the area of Los Alcornocales Nature Park, southern Spain. It comprises the use of rehabilitated birds, as well as individuals from natural populations, as breeding stock, and the construction of the infrastructures needed to allow for acclimatization and socialization of juvenile with older individuals for 1-2 years, prior to release. Additional funding to the project would enable the hosting of a larger number of breeding individuals, more offspring, and a larger number of satellite-tracked released birds (contributing to a more accurate monitoring of the project's success and adaptive management as needed). **Score: 2.**

Politically feasible

Together with the ample societal and political support GREFA has (see 8.1.12), this specific project with Egyptian Vultures is already being implemented and co-funded. **Score: 4.**

Implementation risk

No implementation risks are identified, taking into account GREFA's successful background in similar projects (8.1.12). **Score: 4.**

Cost

The funding needed for scaling-up the Egyptian Vulture captive breeding and delayed release project (that already counts with some co-funding and basic infrastructure) is estimated at 60,000 € - 80,000 € per year. Overall cost also depends on the number of released and tagged individuals (cost of ~1,000 €/bird). **Score: 4.**

Other benefits

The project focus specifically on restocking the Egyptian Vulture population, and therefore no benefits will result to other species or habitats. **Score: 1.**

Total score: 11, however the IFC does not consider captive breeding as a viable offset and so this option is not considered further.

Not a preferred option

8.1.13 Rehabilitating Sharm El Sheikh water treatment station, Egypt

Target species: White Stork. Secondary benefits also Egyptian Vulture and Great White Pelican. **Score: 3.**

It also offers incentives to institutions and individuals engaged in activities and projects directed to environmental protection purposes.

EEAA has been involved in several projects concerning the study and protection of soaring birds, such as the BirdLife International, UNDP/GEF Migratory Soaring Birds Project.

The Sharm el-Sheikh water treatment plant, on the south-eastern end of the Sinai Peninsula, is in need of rehabilitation as the existing station is currently poisoning a range of species, especially White Stork, when they drink the contaminated water from the plant. The Egyptian Environmental Affairs Agency (EEAA), representing the executive arm of the Ministry of Environment in Egypt, is responsible for most of the supervisory, regulatory, management and operational actions concerning environment and biodiversity in Egypt and intends to decrease bird mortality through upgrading of the plant. Furthermore, the project also aims to develop infrastructures like bird observatories, and promote the training of local bird guides, fostering the development of ornithological tourism, as well as general public education and awareness on bird conservation.

Demonstrable biodiversity gain

Every year, ~50-300 White Storks are found dead near Sharm el-Sheikh water treatment station, presumably from poisoning due to the ingestion of contaminated waters. Likewise, other soaring birds (e.g. Black Kites) are also found dead, and the station is commonly used by Great White Pelicans and Egyptian Vultures. The rehabilitation of the station, and the subsequent direct effects on water quality, would likely halt this source of mortality for soaring birds using the Rift Valley/Red Sea Flyway. Assuming the restoration is successful, there will be gains to White Stork, however finances for the full restoration have already been committed and some work undertaken (see below), so there is no opportunity for additional support to deliver gains. **Score: 1.**

Politically feasible

The Egyptian Government, through EEAA, is the developer of the project. Moreover, ~US$500,000 has already been allocated for rehabilitation of the plant by the State's Water Company, so the project is has widespread support. **Score: 4.**

Implementation risk

The proposed actions on water quality enhancement will be implemented by technically well-prepared staff from the national Water Company and EEAA and are likely to result in the suppression of the poisoning threat for soaring birds in Sharm el-Sheikh. **Score: 3.**

Cost

A cost estimate of ~ 1,500,000 US$ was provided for the whole set of actions envisaged in the Sharm el-Sheikh rehabilitation project (including infrastructures and equipment, plus the parallel training, awareness and education actions). Of this money, US$500,000 has already been allocated by the State's Water Company to completely rehabilitate the plant. Additional funding would be used to build an observation/education centre, train ornithologists and create additional pond habitats for White Stork and other migratory species. **Score: 1.**

Other benefits

It is likely that some individuals of other migratory soaring, or non-soaring, birds, or even other bird and mammal species, would benefit from this project. **Score: 2.**

Total score: 11. Not a preferred option.

8.1.14 Retro-fitting of transmission lines, South Africa

Target species. Great White Pelican. **Score: 1.**

The Endangered Wildlife Trust (EWT) works in partnership with Eskom, South Africa's state-owned energy utility, to identify and mitigate impacts to wildlife on South Africa's energy transmission network. The target species for this work are: Lesser Flamingo, Ludwig's Bustard, Blue Crane, Martial Eagle, Vultures and other birds and wildlife affected by energy infrastructure. For Great White Pelican, the program is reactive, in that it responds to issues identified during regular monitoring or maintenance of the transmission infrastructure.

Demonstrable biodiversity gain

Installation of Bird Flight Diverters is known to be close to 100% effective at reducing collisions from Great White Pelicans (L. Lourens, EWT, *pers. comm.*) at the one location where these have been installed in South Africa for the species. As that action resulted in an averted loss, gains were not quantified, but clearly observed. **Score: 3**.

Politically feasible

This action has occurred previously, and there is an established agreement between EWT and Eskom for future similar work, however this agreement means that it is challenging for either party to receive external funding for work and this is not a regular occurrence. **Score: 2**.

Implementation risk

This method has been demonstrated as successful for this species previously in South Africa, however there are currently no sites where this species is being impacted. Thus, at the time of evaluation for this BAP, it is not possible to implement this action successfully. **Score: 1**

Cost

Equipment costs would be low for this option. Installation costs depend on site specific issues (e.g. length of span to be retro-fitted, site access, voltage) and are unable to be estimated. **Score: 2**.

Other benefits

This action is assumed to be in response to reported collisions of Great White Pelican with transmission lines, and so is unlikely to provide benefits to any other species (if the site was a high risk site for other threatened species, it is likely to have been previously identified and retrofitted). Score: 4.

Total score: 7, but this option not considered further as there are no transmission lines with impacts to the Great White Pelican that require retrofitting.

Not a preferred option.

8.1.15 Agrochemical use awareness, Zambia

Target species. Steppe Eagle, White Stork. **Score: 2.**

BirdWatch Zambia (the Zambian BirdLife partner) is seeking funding for a full-time position to advocate for reduced sale and use of agrochemicals due to their ecological effects, including being used for intentional and unintentional poisoning of birds.

Demonstrable biodiversity gain

Reduction in poisoning through less use of agrochemicals will, in theory, benefit species that are currently being poisoned. There are, however, many reasons why gains may not materialise: incomplete spatial uptake may mean birds are still exposed to poisoning as they move between sites, only some agrochemicals may be banned or these might be replaced with other, equally dangerous, products. **Score: 2**.

Politically feasible

This is a newly-proposed action, and, although there is a clear benefit from the project action, it is not clear if widespread support exists within either government or community organisations. **Score: 2**.

Implementation risk

Implementing the proposed project requires high-level engagement with multiple government agencies probably over multiple years. Even if government policy changes, additional effort would be required to ensure that these changes are implemented on the ground and maintained. **Score: 1.**

Cost

Costs would be staff salary, which is unlikely to be high in an international context. **Score: 3.**

Other benefits

Removal of agrochemicals from the environment will benefit a large range of species. **Score: 4.**

Total score: 7, but this option not considered further as the implementation risks are considered too challenging.

Not a preferred option.

8.1.16 Anti-poisoning campaign, Kenya

Target species. Steppe Eagle. **Score: 1.**

The Peregrine Fund (TPF) operates an anti-poisoning project in Kenya to protect vultures and other scavenging raptors from poisoning. This multi-faceted project provides training to individuals in wildlife poisoning interventions to rescue poisoned birds and dispose to poisoned carcasses, community engagement and support to communities to protect livestock from predators to reduce the instances of retaliatory poisoning.

Demonstrable biodiversity gain

In the Maasai Mara this project has reduced vulture poisoning by over 50%. Steppe eagle is also attracted to carcasses, and the program is likely to be equally effective for this species. As the program results in averted loss, any gains would be challenging to quantify, especially as Steppe Eagle are only present in the project area for 6-7 months of each year. **Score: 2**.

Politically feasible

The project has been ongoing since at least 2018 with core support from TPF and supported by the Kenya Wildlife Service and local community organisations in the areas it operates. In further discussion, TPF were unwilling to agree to be involved with compensating for wind farm impacts without being involved from initial project development. **Score: 1**.

Implementation risk

The project methodology has been demonstrated as successful, with a 50% reduction in vulture poisoning in one area the project is active. While continued support for the project in currently active areas faces little risk, there are challenges with expanding to new areas and it is unclear

whether additional funding would support the continuing of existing work or expansion to new areas. **Score: 3.**

Cost

Unknown, pending further information from TPF. **Score: 2.**

Other benefits

This project focuses on reducing the main threat to vultures in the region, and all vulture species are highly threatened: thus the project has high benefits for other species. **Score: 4**.

Total score: 7, but not a preferred option.

8.1.17 Monitoring raptor populations and threats, Russia and Kazakhstan

Target species: Steppe Eagle and Egyptian Vulture. Secondary benefits also Black Stork, Great Spotted Eagle, Booted Eagle and Common Crane. **Score: 6.**

The Altai Project aims to protect natural landscapes and wildlife and support indigenous peoples and traditional lifeways in and around Russia and the 4-nation Greater Altai region, that also includes Mongolia, Kazakhstan, and China. The project is developed as part of the non-profit international environmental organization Earth Island Institute actions since 2007. Main activities of the Altai Project comprise supporting frontline defenders in addressing environmental and human rights issues (e.g. poaching, illegal logging, and gold mining), protecting biological diversity through wildlife research and conservation programs, and promoting effective protected areas management.

In Russia, the Altai Project works in close collaboration with the Russian Raptor Research and Conservation Network (RRRCN) since 2012. Research and conservation actions include the finding and monitoring of ~2,000 raptor nests in the area, the installation of nest-platforms for Black Storks, tagging and satellite-tracking dozens of soaring birds, and monitoring anthropogenic threats to birds (e.g. power line and wind farm impacts). Additionally, the project acts locally e.g. in raising awareness about illegal hunting, and nationally, trying to strengthen Russian regulations and law enforcement regarding the use of poison or best mitigation practices in wind farms and power lines.

Demonstrable biodiversity gain

Whereas monitoring and research on target species may deliver important information on regional threats and conservation needs, direct measurable gains are unlikely or difficult to access. Likewise, the valuable work by the Altai Project on conservation policy and advocacy is likely to produce effects at the medium-long term. However, a direct association with gains to the target species populations will be difficult to establish and to measure. **Score: 1.**

Politically feasible

The Altai Project action in the Altai region started more than 17 years ago. Benefiting from the institutional support of the Earth Island Institute and collaboration with RRRCN, the Project has been building good relationships with policy and regulating authorities in Russia, and raising awareness and support from the local communities. Very recently, a two-years project started in southeast Kazakhstan, focusing on strengthening the relationship with the wind energy industry and raising awareness on the industry's risks to the local populations of raptor species (especially Egyptian Vulture, Steppe Eagle and Eastern Imperial Eagle). **Score: 3.**

Implementation risk

The long-term action of the Altai Project resulted in a well-established network of committed and technically prepared staff and researchers in the Altai region. Although occasionally the Project finds some resistance and wariness, local communities have been increasingly involved in the Project's actions, e.g. by participating in a volunteer "nest guardians" programme. The war in Ukraine caused some obstacles in the on-site participation in activities by non-Russian staff (namely the US-based Director), but did not hinder a good coordination and tracking, which has now been done remotely. However, funding the implementation of actions in Russia territory is likely to be untenable, at least while the war continues. **Score: 1.**

Cost

An estimated 250,000 € would pay for a new two-years project , including baseline research on raptor and stork species in the region (nest finding and surveillance, threats identification and mapping, tagging and tracking with satellite GPS transmitters), technical and scientific capacity-building (training of new field staff, organization of conservation conference), and progressing in engaging with wind energy industry (mainstreaming good international industry practices and preventing impacts). **Score: 2**.

Other benefits

General actions on baseline study and monitoring of birds, and on local communities and industry awareness and engagement on nature conservation topics are likely to result in some secondary benefits to other raptor or steppe species in the Altai region. **Score: 2.**

Total score: 11, but this option not considered further as the implementation risks in Russia are considered currently too challenging.

Not a preferred option.

8.1.18 Study on nest-site selection, breeding success and effect of anthropogenic structures on White Storks, Tunisia

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

Following a funding assigned by The Rufford Foundation, a small team of Tunisian researchers developed a two-years project on the importance of Tunisian IBA's for waterbirds during the wintering period. This team, based at the Faculty of Sciences of Gabès, seeks now support for developing additional baseline and conservation research, especially on the country's White Stork population.

Demonstrable biodiversity gain

The project aims at studying the factors affecting nest-site selection and breeding success of White Storks using artificial (especially pylons in power lines infrastructures) and natural supports. Furthermore, it also intends to investigate how nest site selection and breeding success might be influenced by the distance to wind farms, a type of infrastructure that is expanding significantly in Tunisia. While these research topics may result in important findings for protecting the breeding population of White Storks and managing potential conflicts with anthropogenic infrastructures, direct gains for the species are considered as unlikely or unproven. **Score: 1.**

Politically feasible

No political or other stakeholders' obstacles are envisaged for the project, and most of the necessary field work would not depend on special permits, as a majority of the White Stork nests in the country are easily accessible from existing roads and paths. However, all bird monitoring and study activities by this team have been relying on low-level support and on short-term, limited funding from occasional grants (The Rufford Foundation and University of Gabès, with a current possibility of a support from Tour du Valat institute). **Score: 3.**

Implementation risk

Although the methods proposed for this study are simple and have been implemented successfully in other projects, there is clearly a lack of capacity in the country, with only a very limited number of ornithologists possibly available to conduct the work. A significant part of the ornithological work conducted so far has been done on a voluntary basis, during spare time, outside other full-time assignments. **Score: 3.**

Cost

An estimated 8,000 € would be required to pay for expenses during a single year field season, plus data analysis and reporting. This does not cover the salary of staff for the field work, as this would rely on volunteer work during free time. No cost estimates are available regarding training and establishing a professional team of ornithologists for this purpose. **Score: 4.**

Other benefits

This project focus specifically on White Storks and no benefits are expected to other species or habitats. **Score: 1.**

Total score: 8, but this option not considered further as direct gains are unlikely from the project.

Not a preferred option.

8.1.19 Identifying mortality hotspots along power lines, Tunisia

Target species: White Stork, Egyptian Vulture, Black Stork, Booted Eagle, Common Crane and Pallid Harrier. **Score: 6.**

This project would be developed under the same context and by the same team as in action 8.1.10.

Demonstrable biodiversity gain

The goal of this project is the identification of bird mortality hotspots (due to collision or electrocution) along the Tunisian transmission and distribution power lines grid. These impacts are poorly known in the country and only limited-scale monitoring has taken place so far. However, as such a project would not immediately result in the implementation of appropriate mitigation measures, direct measurable gains for raptor or stork target species would be unlikely. **Score: 1.**

Politically feasible

No major political or other stakeholders' obstacles are envisaged. However, and as mentioned for action 10.1.10, previous actions by this team have relied on very limited and unpredictable support and funding. **Score: 3.**

Implementation risk

Similarly to action 10.1.10, although the proposed approached has been widely and successfully implemented elsewhere, the lack of technical capacity and availability at the national level is a risk for a successful implementation of the project in Tunisia. **Score: 3.**

Cost

Costs for developing this project are not well-established and will depend significantly on the geographic scope within Tunisia. An initial estimate of ~20,000 € was set for a relatively small-scale power line monitoring. **Score: 3.**

Other benefits

The monitoring of impacts on power lines, and the identification of mortality hotspots, are not species-specific and therefore allow for the assessment of impacts on a wide range of flying animals (birds and bats). Yet, and as for the target raptor and stork species, no direct, measurable gains are expected to be obtained immediately. **Score: 2.**

Total score: 13, but this option not considered further as gains are unlikely from the project. Not a preferred option.

Table 5. List of all conservation actions identified, contact details and relevant target species.

Conservation action	Organisation / individual	Country	Potential species
Actions considered in this Offset Feasibility Study			
Habitat restoration	Led by the British Trust for Ornithology, Adham Ashton-Butt	Belarus, Ukraine	Greater Spotted Eagle, Black Stork, Common Crane
Protected Area expansion	Birdlife South Africa, Melissa Whitecross and Sam Ralston	South Africa	Pallid Harrier, White Stork
Anti-poisoning campaign	The Peregrine Fund, Ralph Buij	Kenya	Steppe Eagle
Retrofitting of transmission lines	Endangered Wildlife Trust, Lourens Leeuwner	South Africa	Great White Pelican
Management of Kafue flats	Birding Zambia, Frank Willems	Zambia	Great White Pelican, Steppe Eagle, White Stork, Pallid Harrier
Agrochemical use awareness	Birding Zambia, Frank Willems	Zambia	Steppe Eagle, White Stork
Supporting monitoring and conservation around Batumi bottleneck	Batumi Raptor Count, Rafa Benjumea	Georgia	Pallid Harrier, Levant's Sparrowhawk, Greater Spotted Eagle, Steppe Eagle and Booted Eagle
Captive breeding and release of Egyptian Vultures	Vulture Conservation Foundation, José Pedro Tavares	Italy	Egyptian Vulture
Monitoring raptor populations and threats,	The Altai Project, Jennifer Castner	Russia, Kazakhstan	Steppe Eagle, Egyptian Vulture, Black Stork, Great Spotted Eagle, Booted Eagle and Common Crane
Nest-site selection, breeding success and effect of anthropogenic structures on White Storks	Foued Hamza	Tunisia	White Stork
Identifying mortality hotspots along power lines	Foued Hamza	Tunisia	White Stork, Egyptian Vulture, Black Stork, Booted Eagle, Common Crane and Pallid Harrier
Captive-breeding and release of Black Storks	GREFA, Juan José Iglesias Lebrija	Spain	Black Stork
Captive-breeding and release of Egyptian Vultures	GREFA, Juan José Iglesias Lebrija	Spain	Egyptian Vulture
Enhancing a wild animals recovery centre	GREFA, Juan José Iglesias Lebrija	Spain	White Stork, Egyptian Vulture, Black Stork, Booted Eagle, and Common Crane
Actions identified which did not want to engage with the Project			

Conservation action	Organisation / individual	Country	Potential species
Captive-breeding, population reinforcement, reduction of power line impacts, anti-poisoning and anti-poaching actions and awareness	Bulgaria Society for the Protection of Birds, Stoyan Nikolov	Bulgaria	Egyptian Vulture
Actions identified where there was no response prior to completion of this BAP			
Retrofitting low-voltage lines to be wildlife-friendly	Wildlife Science and Conservation Centre, Nyambayar Batbayar	Mongolia	Steppe Eagle
Prevention of electrocution, installation of nesting platforms	Anton Abushin	Russia	Steppe Eagle
Nest-site restoration and avoidance of power line conflicts	Qenan Maxhuni	Kosovo	White Stork
Habitat improvement, supplementary feeding stations	Zhaskairat Nurmukhambetov	Kazakhstan	Egyptian Vulture
Research, installation of nesting platforms and BFDs, and anti-electrocution measures	Russian Raptor Research Conservation Network, Dmitriy Denisov	Russia	Greater Spotted Eagle, Steppe Eagle
General conservation actions	Kranicheshutz Deutschland, Günter Nowald	Germany	White Stork
General conservation actions undertaken	SABUKO, Khatia Basilashvili	Georgia	[not known which Sabuko may have conservation actions]
General conservation actions, power lines retrofitting	Gurelur	Spain	White Stork
Identification and retrofitting of high-risk electrocution pylons	University of Barcelona, Joan Real i Orti	Spain	Egyptian Vulture, White Stork
Population reinforcement from captive breeding	Mitrani Department of Desert Ecology, Israel Nature and Parks Authority, Ohad Hatzofe	Israel	Egyptian Vulture
Satellite tracking	Finnish Environment Institute, Ari-Pekka Auvinen	Finland	Pallid Harrier

Table 6. Evaluation of offset options (green = very positive option, yellow = positive option, orange = acceptable option, red = undesirable option. As successful offsets must demonstrate biodiversity gain and be politically and logistically feasible, undesirable scenarios in the first three columns are not considered further.

Conservation Action	Number of target species	Demonstrable biodiversity gain	Political feasibility	Implementation risk	Overall score		Cost	Other benefits
Retrofitting powerlines, Egypt	4	3	3	3	13		1	3
Retrofitting power lines, Portugal	5	4	4	4	17		3	3
Supporting monitoring and conservation around Batumi bottleneck	5	2	3	3	13		4	3
Habitat restoration, Ukraine and Belarus	3	3	4	3	13		3	4
Protected Area expansion, South Africa	2	2	4	4	12		2	4
Management of Kafue flats, Zambia	4	2	4	3	13		2	4
Protecting habitat for breeding forest raptors, Portugal	2	2	2	3	9		3	3
Recovering the Egyptian Vulture population, Cape Verde	1	3	2	3	9		3	2
Enhancing wild animal recovery centre, Spain	5	2	4	4	15		4	2
Supporting captive-breeding and release of Egyptian Vultures, Italy	1	4	4	4	13		4	1
Supporting captive-breeding and release of Black Storks, Spain	1	2	3	4	10		4	1
Supporting captive-breeding and release of Egyptian Vultures, Spain	1	2	4	4	11		4	1
Rehabilitating Sharm El Sheikh water treatment station, Egypt	3	1	4	3	11		1	2
Retrofitting powerlines, South Africa	1	3	2	1	7		2	1

Conservation Action	Number of target species	Demonstrable biodiversity gain	Political feasibility	Implementation risk	Overall score		Cost	Other benefits
Agrochemical awareness, Zambia	2	2	2	1	7		3	4
Anti-poisoning campaign, Kenya	1	2	1	3	7		2	4
Monitoring raptor populations and threats, Russia and Kazakhstan	6	1	3	1	11		2	2
Research on White Storks, Tunisia	1	1	3	3	8		4	1
Identifying mortality hotspots along power lines, Tunisia	6	1	3	3	13		3	2

Appendix 2. Derivation of a fatality estimate for the Amunet wind farm

Table 7. Derivation of an annual fatality estimate for the Amunet wind farm

Species	2020 spring (120 m)	2021 spring (120 m)	2022 spring (120m)	2022 spring (150 m)	Average max annual spring fatalities	2020 autumn (120 m)	2021 autumn (120m)	2021 autumn (150 m)	Average max annual autumn fatalities	Predicted max annual average fatalities
Black Stork	0-1	1-7	0	1-11	**6.3**	0	0	0	**0.0**	**6.3**
Booted Eagle	0	0	0	0-1	**0.3**	0	0	0	**0.0**	**0.3**
Common Crane	0	0	0	0-1	**0.3**	0	0	0	**0.0**	**0.3**
Egyptian Vulture	0	0	0	0-2	**0.7**	0	0	0	**0.0**	**0.7**
Great White Pelican	17-168	0-1	0-1	0-4	**57.7**	.1-11	0	0	**5.5**	**63.2**
Greater Spotted Eagle	0	0	0	0-1	**0.3**	0	0	0	**0.0**	**0.3**
Levant Sparrowhawk	0	0	0	0	**0.0**	0	0	0	**0.0**	**0.0**
Pallid Harrier	0	0	0	0	**0.0**	0	0	0	**0.0**	**0.0**
Steppe Eagle	0-1	0	*	*	**0.3**	0	0	0	**0.0**	**0.3**
White Stork	21-206	10-97	17-170	6-59	**157.7**	.8-83	4-41	11-133	**108.0**	**265.7**