Cumulative Biodiversity Effects briefing for Lekela projects in the Gulf of Suez, Egypt

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Key findings

- *Gulf of Suez is the focal region for wind power development in Egypt due to the high wind potential of the area.*
- *Many wind power projects are in operation or planned in the Gulf of Suez, and the area is also a key location for oil and gas operations in Egypt. Therefore, the risks of cumulative impacts are high for Lekela projects*
- *Lekela has the opportunity to play a role of best-practice leader in the region*

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1 Key findings

- Gulf of Suez is a centre of Egypt's oil and gas industry, and the focal region for the development of wind farms in Egypt. The area has high wind power generation potential (Wind Atlas) and it is estimated that the west of Gulf of Suez could host about 20,000MW installed capacity of wind farms (Mansour & Eisa 2014). The government is targeting the development of wind farms providing about 13,500 MW by 2022 (NREA 2015). Lekela Egypt has interests in two projects within Gulf of Suez: Lekela BOO Project and Redbull Project.

- Very limited public information is available on the planned nature, and current status of most potential wind farm developments in the Gulf of Suez. These preliminary findings, and online portal are designed to encourage stakeholders to share information and collaborate in the development of a more complete set of data.

- The Gulf of Suez is an area of international significance for migratory birds (Environics 2016a, 2016b, 2017a, 2017b; BirdLife International 2018a). For example, more than 5% of the White Stork flyway population flew through the Lekela BOO Project area during spring 2016 (Environics 2016b). The Redbull Project is located in the Gebel El Zeit Important Bird Area, which is known to be used by high numbers of White Stork during the migration, as well as 18 species of birds of prey, pelicans and other migratory soaring birds (e.g. observers have seen more than 56,000 White Storks – c. 8% of the flyway population – in one day in Autumn 1996) (BirdLife International 2018a).

- 27 potential priority bird VECs have been identified based on a combination of their vulnerability and the relative importance of the Gulf of Suez in their migration.

- The number of on-going wind projects in the region increases the potential risks from cumulative impacts. Lekela Egypt is committed to adopting industrial best-practices regarding impact management, including impacts to biodiversity (specifically IFC PS6 and EBRD PR6), however poor practices by other operators will not only increase the likelihood of cumulative impacts, but might also reflect badly on Lekela as all operators may be tainted by the same poor reputation. Lekela has an opportunity to take a role of best-practice leader in the region to demonstrate and encourage best-practice. For example, by developing common best-practice mitigation guidelines in collaboration with the government and other stakeholders and by encouraging other companies to adopt these.

2 Scope of the work

This briefing is the first step in understanding potential cumulative effects to biodiversity of the Lekela Projects and other operations in the Gulf of Suez. It aims to provide an outline to encourage discussion of potential cumulative effects in the Project area and to build the scope and the framework of the detailed Cumulative Impact Assessment. The report presents initial findings concerning:

- Potential onshore industrial projects and additional external stressors in the western Gulf of Suez;
- A full long-list of potential Valued Environmental Components (VECs);
- Identification of bird VECs with sensitivity to wind farm developments;
- A summary of potential impacts to VECs from industrial developments, and opportunities for the Lekela to contribute to the management of cumulative impacts.

Data gaps and required support to refine current findings are identified in each section.

3 Methods

In the context of this report, we define the Cumulative Impact Assessment (CIA) area as the entire western side of the Gulf of Suez. This will capture all industrial projects, in the vicinity of the Lekela Projects, that might impact the flyway population passing through Lekela Project areas.

3.1 Mapping of industrial developments in Gulf of Suez

Mapping and initial understanding of industrial activities occurring or in development within the CIA area have been compiled based on information from the following sources:

- Key word search on the web (using words like 'Wind farm'/'Wind concession' in 'Gulf of Suez', in 'Zafarana' or in 'Ras Ghareb', 'oil fields', 'oil concession', etc.);
- Research on websites from official Egyptian organisations/agencies, such as the New & Renewable Energy Authority (NREA), and the Red Sea Governate;
- Website of the Regional Center for Renewable Energy and Energy Efficiency (RCREEE);
- A request for information from informed experts including EBRD, NREA, Kina Advisory Ltd., Environics, and Aecom; and
- Additional grey literature and documents provided by Lekela.

Project locations have been mapped using GIS coordinates, when available, or via digitisation of existing maps. The data have been compiled in an online GIS portal which can be shared with

Lekela, lenders and other interested parties. This portal is a live product which will be updated when new or more accurate data are acquired[1].

3.2 Identification of Valued Environmental Components

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

- physical features, habitats, wildlife populations (e.g., biodiversity),
- ecosystem services,
- natural processes (e.g., water and nutrient cycles, microclimate),
- social conditions (e.g., health, economics), or
- cultural aspects (e.g., traditional spiritual ceremonies).

For this document, VECs were restricted to the identification of flora and fauna species (biodiversity), physical features and habitat. Geospatial data are available for some of these features and have been added to the online portal. Additional data, for example protected areas, and Key Biodiversity Areas for the entire western Gulf of Suez area will need to be purchased from IBAT.

3.2.1 Process to identify Priority avian VECs

For avian VECs, the CEA framework followed a three-step process to identify priority VECs:
Step 1: a preliminary list of potential VECs. This is a long-list of species potentially at risk from developments in the Gulf of Suez. The data were compiled from the Biodiversity Risk Screening for Lekela BOO Project (TBC 2018), supplemented with information from:

- Other surveys and reports from the Lekela BOO Project and Redbull area (Grontmij 2009; Environics 2017b; RCREEE 2017; Environics 2018; RCREEE 2018);
- Species qualifying the listing of Gebel el Zeit as an Important Bird and Biodiversity Area (BirdLife International 2018a);
- The Migratory Soaring Bird Database (BirdLife International 2018b), filtered by species mapped as occurring in the project area; and,
- The lists of bird and bat species included in the assessment of global vulnerability to wind power development compiled by Thaxter *et al.* (2017), filtered by species mapped as occurring in the project area.

Step 2: categorisation of species on this list to one of three categories and determine the appropriate Unit of Analysis (UoA):

- Category 1: Migratory Soaring Birds (as per BirdLife International 2018b);
- Category 2: Other migrants and wintering species; or,
- Category 3: Resident species

Step 3: determine the sensitivity of the species (Table 4), being a combination of the

- Vulnerability, or conservation status, of the species (Table 1); and,

[1] The portal is password protected, login details will be shared separately from this report to increase security.

- Relative importance of the population recorded in the study area in relation to the UoA determined in Step 2 (Table 2 or Table 3).

Species which were determined to have negligible sensitivity will be dropped from subsequent steps.

3.2.2 Unit of Analysis

The Unit of Analysis (UoA) should ideally have a biogeographical basis, hence due to these limitations, the UoA has been defined for:

- **Migratory soaring birds** as the Rift Valley / Red Sea flyway population. Data on populations of these species were sourced from Grontmij (2009), supplemented with information from Porter (2005) as needed;
- **Other migrants** and **resident species** as the global breeding range extent (taken from Birdlife International 2017).

3.2.3 Sensitivity

The sensitivity of each species can be considered a combination of the vulnerability of the species, and the relative importance of the population in the project area.

- **Vulnerability** is defined using IUCN threat categories (IUCN 2017) and, for species where is has been calculation also the Species Vulnerability Index (BirdLife International 2018b) as per Table 1.
- **Relative importance** for MSBs is the proportion of the Rift Valley / Red Sea flyway population recorded in the Project area, and for other migrants and for resident species the global breeding range, with categories as per Table 2 and Table 3 respectively.

The combination of these two factors are combined in a matrix to determine to overall species sensitivity, used to determine which species to progress to detailed analysis.

Table 1. Vulnerability scoring criteria

Vulnerability Rating	Migratory Soaring Birds (and other species where an SVI has been designated)	Other migrants and Resident species
Negligible	• LC on IUCN Global Red List, and SVI of 6 or below	LC on IUCN Global Red List
Low	• VU or NT on IUCN Global Red List and SVI 6 or below; or • LC on IUCN Global Red List and SVI of 7 or 8;	NT on IUCN Global Red List
Moderate	• VU or NT on IUCN "Global" Red List and SVI of 7 or 8; or • LC on IUCN Global Red List and SVI of 9 or 10	VU on IUCN Global Red List
High	• CR or EN on IUCN Global Red List; or • VU or NT on the IUCN Global Red List and SVI of 9 or 10	CR or EN on IUCN Global Red List

Table 2. Relative importance scoring for Migratory Soaring Birds

Relative importance	Maximum count over any one migration period as a percentage of flyway population
Negligible	≤ 1%
Low	>1% and ≤ 5%
Moderate	>5% and ≤10%
High	>10%

Table 3. Relative importance scoring for other migrants and resident species

Relative importance	Global resident or breeding range (km2) – extent of occurrence
Negligible	>10,000,000
Low	>100,000 and <10,000,000
Moderate	>50,000 and <100,000
High	<50,000

Table 4. Sensitivity matrix

Sensitivity		Relative importance			
		Negligible	Low	Moderate	High
Vulnerability	Negligible	Negligible	Negligible	Negligible	Low
	Low	Negligible	Low	Low	Medium
	Moderate	Negligible	Low	Medium	High
	High	Low	Medium	High	High

4 Industrial developments in Gulf of Suez

4.1 Wind Farms

Wind farms are operating, in construction, or planned, in several locations of the western side of Gulf of Suez. They are planned in the areas surrounding Zafarana, Hurghada and Ras Gharib cities. Given the extent of the wind farm concessions around Ras Gharib, they are sub-divided this area into four sub-locations based on the pre-construction studies (as in Figure 4 from Environics 2015). The main results are provided in Table 5 and illustrated in Figure 1.

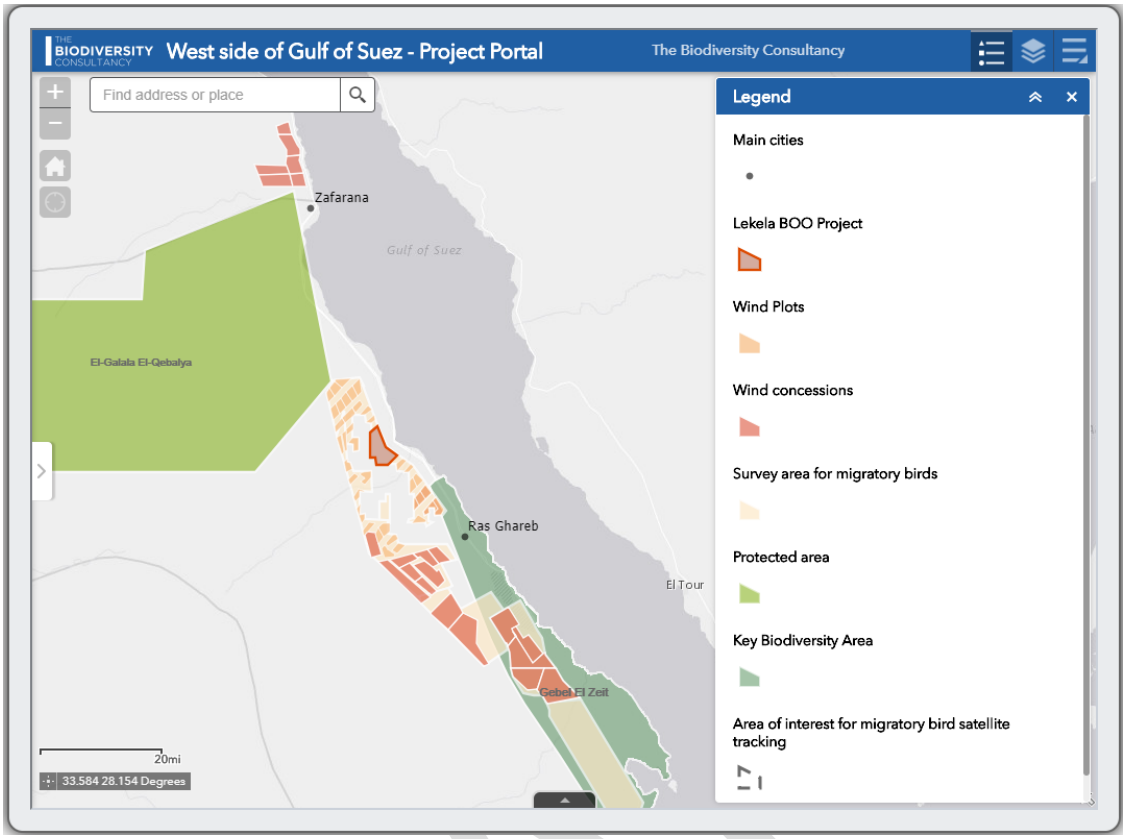

Figure 1: Location of wind farms to the west of the Gulf of Suez mapped in the online mapping portal.

Table 5: Wind farm development in Gulf of Suez

Concession name	Operation stage	Capacity	Reference
North Ras Gharib (from RCREEE 2018) and West Ras Gharib (from Ecoda 2013 in Environics 2015)			
43 plots with a potential of 2100 MW (NREA 2015). 500 MW are sold as BOO (including the 250MW bought by Lekela)			
Lekela BOO Project	In preparation	250 MW	(Environics 2018)
Alfanar Project	In preparation	50MW	(RCREEE 2018)
ACWA Project	In preparation	100MW	(RCREEE 2018)
Data gap: • What is the status of the non-Lekela plots?			
South-West Ras Gharib (KFW 1000MW Study in 2011)			
EU Partners/NREA (AfD Suez 1)	In preparation	200 MW	(NREA 2013, 2015)

Concession name	Operation stage	Capacity	Reference
Masdar/NREA	In preparation	200 MW	(NREA 2013, 2015)
EU Partners/NREA (AfD Suez 3)	In preparation	200 MW	(NREA 2013, 2015)
Engie/Orascom/Toyota BOO	In preparation	250 MW	(ENGIE 2017)
Auction System: A1, A2, A3, A4, A5, A6	n/a	6 * 100 MW	(NREA 2013, 2015)
Data gap: • What is the status of concessions in the BOO and the Auction system? • Projects seem to face delays (NREA was planning operation in 2016, 2017 and 2018). When are they now likely to be operational? • Additional information (such of # of turbines – environmental commitment – use of SDOD) are needed to perform the Cumulative Impact Assessment.			
South Ras Gharib (KFW Gebel El Zeit Strategic Risk Assessment in 2007)			
Italgen (Redbull)	Under implementation	120 + 200 MW	(Grontmij 2010; EcoConServ 2014)
Eps/NREA	Under implementation	200 MW	(NREA 2013, 2015)
JICA/NREA	In Preparation	220 MW	(NREA 2013, 2015)
Spain/NREA	In Preparation	120 MW	(NREA 2013, 2015)
Data gap: • Projects seem to face delays (NREA was planning operation in 2016, 2017 and 2018). When are they now likely to be operational? • Additional information (such of # of turbines – environmental commitment – use of SDOD) are needed to perform the Cumulative Impact Assessment.			
Zafarana			
Zafarana Wind Farm	Operating since 2001	545 MW	(Elsobki 2009; Mansour & Eisa 2014; Abd el-aal *et al.* 2015; Ahmed *et al.* 2015)
Access Power	Initiated in 2016	50 MW	(Access 2016)
Data gap:			

Concession name	Operation stage	Capacity	Reference
• Additional information (such of # of turbines – environmental commitment – use of SDOD) are needed to perform the Cumulative Impact Assessment.			
Hurghada			
Hurghada Wind Farm	Operating since 1993	100 & 300 MW	(Mansour & Eisa 2014)
Data gap: • Additional information (such of # of turbines – environmental commitment – use of SDOD) are needed to perform the Cumulative Impact Assessment.			

4.2 Other industrial developments

Oil and gas concessions exist along the entire Gulf of Suez, with exploration and operation on-shore and off-shore. Solar energy development is also occurring in the region, with projects such as Egysol (Mansour & Eisa 2014). Tourism might be present in some extent too: in the north of Gulf of Suez, presence of cities such as Suez or Zafarana and beaches at Ain Sukhna (the closest beach from the Cairo) and in the south, for beaches and marine wildlife (Hurghada, Ras Mohammed National Reserve)[2].

Data gaps:

- Operation stage of oil and gas concessions, pipeline locations;
- Location of potential additional solar projects;
- Current extent of tourism in Egypt and potential existence of projects in development.

5 Valued Environmental components

193 bird, 8 bat, six mammal, one reptile and eight habitat features potential qualify as VECs (Table 6).

Table 6: Potential VECs identified for the Cumulative Impact Assessment for the Gulf of Suez

Group	Order	Number of potential VECs
Birds	Accipitriformes (diurnal birds of prey)	31
	Anseriformes (waterfowls)	8

[2] https://egyptourism.wordpress.com/tag/gulf-of-suez/, https://www.ask-aladdin.com/egypt-cities/suez/, http://www.touregypt.net/featurestories/beachvacations3.htm

Group	Order	Number of potential VECs
	Apodiformes (swifts, treeswifts and hummingbirds)	3
	Bucerotiformes (hornbills, hoopoe, wood-hoopoe)	1
	Charadriiformes (shorebirds)	43
	Ciconiiformes (storks)	4
	Columbiformes (pigeons and doves)	3
	Coraciiformes (kingfishers and allies)	5
	Falconiformes (falcons and caracaras)[3]	10
	Galliformes (ground-feeding birds)	2
	Gruiformes (cranes, crakes and rails)	5
	Passeiformes (perching birds)	60
	Pelecaniformes (ibis, herons and pelicans)	13
	Podicipediformes (grebes)	1
	Pteroclidiformes (sandgrouses)	2
	Strigiformes (nocturnal birds of prey)	1
	Suliformes (cormorants, gannets and boobies)	1
Bats	Chiroptera	8
Other species	Carnivora (carnivores)	2
	Lagomorpha (lagomorphs)	1
	Cetartiodactyla (ungulates)	2
	Squamata (reptiles)	1
Habitat features		8

5.1 Sensitive bird VECs

For bird species, the long-list was refined using the sensitivity analysis approach to arrive at a final list of 27 priority avian VECs (Table 7, Table 8). This list will be further refined using a risk assessment approach and in consultation with expert stakeholders to arrive at a final list of VECs for the Cumulative Impact Assessment to consider. The risk assessment will consider the sensitivity score (assigned below) and the likelihood of effect from different developments. Where possible this will be based on collision risk models.

Table 7. Avian VECs rated as having a greater than Negligible sensitivity to wind power development in the Gulf of Suez.

Species	Scientific name	Sensitivity
Black Stork	*Ciconia nigra*	High
Booted Eagle	*Hieraaetus pennatus*	High
Common Crane	*Grus grus*	High
Great White Pelican	*Pelecanus onocrotalus*	High

[3] For this analysis we consider Barbary Falcon *Falco peregrinoides* a subspecies of Peregrine Falcon *F. peregrinus*.

Species	Scientific name	Sensitivity
Steppe Eagle	*Aquila nipalensis*	High
White Stork	*Ciconia ciconia*	High
Eastern Imperial Eagle	*Aquila heliaca*	Medium
Egyptian Vulture	*Neophron percnopterus*	Medium
Greater Spotted Eagle	*Clanga clanga*	Medium
Pallid Harrier	*Circus macrourus*	Medium
Bar-tailed Godwit	*Limosa lapponica*	Low
Black Kite	*Milvus migrans*	Low
Black-winged Pratincole	*Glareola nordmanni*	Low
Cinereous Vulture	*Aegypius monachus*	Low
Curlew Sandpiper	*Calidris ferruginea*	Low
Cyprus Warbler	*Sylvia melanothorax*	Low
Dalmatian Pelican	*Pelecanus crispus*	Low
Eurasian Buzzard	*Buteo buteo*	Low
European Honey-buzzard	*Pernis apivorus*	Low
Great Snipe	*Gallinago media*	Low
Hen Harrier	*Circus cyaneus*	Low
Lappet-faced Vulture	*Torgos tracheliotos*	Low
Lesser Spotted Eagle	*Clanga pomarina*	Low
Levant Sparrowhawk	*Accipiter brevipes*	Low
Long-legged Buzzard	*Buteo rufinus*	Low
Saker Falcon	*Falco cherrug*	Low
Short-toed Snake-eagle	*Circaetus gallicus*	Low
White-eyed Gull	*Larus leucophthalmus*	Low

Table 8. Scoring details for the Migratory Soaring Birds identified as potential Bird VECs

Species	Scientific name	Red List status	SVI	Vulnerability	Highest count	Flyway pop	% of UoA	Relative importance	Sensitivity
Black Kite	*Milvus migrans*	LC	8	Low	8251	132,700	6.2	Moderate	*Low*
Black Stork	*Ciconia nigra*	LC	10	Moderate	6738	19,500	34.6	High	*High*
Booted Eagle	*Hieraaetus pennatus*	LC	9	Moderate	418	3,169	13.2	High	*High*
Common Crane	*Grus grus*	LC	10	Moderate	12004	35,000	34.3	High	*High*
Common Kestrel	*Falco tinnunculus*	LC	6	Negligible	120	325,000	0.0	Negligible	*Negligible*
Eastern Imperial Eagle[4]	*Aquila heliaca*	VU	9	High	73	2,125	3.4	Low	*Medium*
Egyptian Vulture	*Neophron percnopterus*	EN	10	High	154	4,535	3.4	Low	*Medium*

[4] Eastern Imperial Eagle did not have a SVI assigned. We scored this species a 9, to align with the scores for both Lesser and Greater Spotted Eagle.

Species	Scientific name	Red List status	SVI	Vulnerability	Highest count	Flyway pop	% of UoA	Relative importance	Sensitivity
Eleonora's Falcon	*Falco eleonorae*	LC	6	Negligible	3	11,750	0.0	Negligible	*Negligible*
Eurasian Buzzard	*Buteo buteo*	LC	7	Low	82540	1,250,000	6.6	Moderate	*Low*
Eurasian Hobby	*Falco subbuteo*	LC	6	Negligible	18	102,500	0.0	Negligible	*Negligible*
Eurasian Sparrowhawk	*Accipiter nisus*	LC	6	Negligible	126	4,000	3.2	Low	*Negligible*
European Honey-buzzard	*Pernis apivorus*	LC	7	Low	35423	1,000,000	3.5	Low	*Low*
Great White Pelican	*Pelecanus onocrotalus*	LC	10	Moderate	31001	70,000	44.3	High	*High*
Greater Spotted Eagle	*Clanga clanga*	VU	9	High	63	2,180	2.9	Low	*Medium*
Hen Harrier	*Circus cyaneus*	LC	8	Low	1	40	2.5	Low	*Low*
Lanner Falcon	*Falco biarmicus*	LC	6	Negligible	4	950	0.4	Negligible	*Negligible*
Lesser Kestrel	*Falco naumanni*	LC	6	Negligible	33	22,500	0.1	Negligible	*Negligible*
Lesser Spotted Eagle	*Clanga pomarina*	LC	9	Moderate	752	50,000	1.5	Low	*Low*
Levant Sparrowhawk	*Accipiter brevipes*	LC	6	Negligible	30134	75,000[5]	40.2	High	*Low*
Long-legged Buzzard	*Buteo rufinus*	LC	7	Low	152	1,800	8.4	Moderate	*Low*
Montagu's Harrier	*Circus pygargus*	LC	8	Low	101	50,500	0.2	Negligible	*Negligible*
Northern Goshawk	*Accipiter gentilis*	LC	6	Negligible	0	53	0.0	Negligible	*Negligible*
Osprey	*Pandion haliaetus*	LC	7	Low	32	17,500	0.2	Negligible	*Negligible*
Pallid Harrier	*Circus macrourus*	NT	8	Moderate	100	1,505	6.6	Moderate	*Medium*
Peregrine Falcon	*Falco peregrinus*	LC	6	Negligible	20	10,750	0.2	Negligible	*Negligible*
Red Kite	*Milvus milvus*	NT	8	Moderate	0	10	0.0	Negligible	*Negligible*
Red-footed Falcon	*Falco vespertinus*	NT	6	Low	605	65,000	0.9	Negligible	*Negligible*
Saker Falcon	*Falco cherrug*	EN	6	High	2	900	0.2	Negligible	*Low*
Short-toed Snake-eagle	*Circaetus gallicus*	LC	7	Low	477	8,783	5.4	Moderate	*Low*
Sooty Falcon	*Falco concolor*	NT	6	Low	28	4,200[6]	0.7	Negligible	*Negligible*
Steppe Eagle	*Aquila nipalensis*	EN	9	High	6488	37,500	17.3	High	*High*
Western Marsh-harrier	*Circus aeruginosus*	LC	8	Low	354	96,843	0.4	Negligible	*Negligible*
White Stork	*Ciconia ciconia*	LC	10	Moderate	212030	450,000	47.1	High	*High*

[5] This value is significantly larger than the Birdlife International estimate (population size 10,000-19,000: BirdLife International 2016).

[6] We assumed the global population of Sooty Falcon uses the Red Sea / Rift Valley Flyway.

Species	Scientific name	Red List status	SVI	Vulnerability	Highest count	Flyway pop	% of UoA	Relative importance	Sensitivity
White-tailed Sea-eagle	*Haliaeetus albicilla*	LC	10	Moderate	0	-[7]	0.0	Negligible	*Negligible*

Table 9. Refinement of potential Bird VECs via the selection process

Group	Initial	After Steps 1-3
Overall	193	27
Category 1: Migratory Soaring Birds	34	18
Category 2: Other migrants and wintering species	110	5
Category 3: Resident species	49	4
Filtered out	-	166

6 Potential project impacts for biodiversity

Wind farm developments contribute four main potential impacts to VECs, and the effect of these may be compounded when many similar developments occur in close proximity. These potential impacts will be considered when determining the likelihood of effect in the risk assessment. Impacts to VECs could primarily occur via:

- **Collision with turbine blades**. Many species are known to collide with wind turbine blades, and collision risk modelling has occurred for some of the proposed wind farms in the CIA area (e.g.: Environics 2017a). Cumulative effects may be greater than the sum of individual project effects, as individuals that would have avoided a single project are now directed into adjacent projects. Thus, collision risk models that use pre-construction counts from individual wind projects may underestimate the number of fatalities by not including birds that have 'avoided' adjacent wind projects.
- **Collision with powerlines**. Many species that are known to collide with turbine blades are also known to collide with high-voltage powerlines. These effects should also be considered when undertaking collision risk modelling.
- **Barrier effects**, where infrastructure prevents or alters normal movement patterns. The large number of turbines in the CIA area may present a real and / or visual barrier to the normal flight paths of migrating species. This may force individuals to use routes that are less preferred, expending additional energy, and potentially exposing them to new threats. For soaring species which rely on thermals to gain height, individuals may be forced to fly through wind turbines, backtrack or land if thermals do not exist where needed to gain height; and,

7 White-tailed Sea-eagle does not have a Red Sea /Rift Valley population estimate, however as no individuals of that species have been recorded from the Project area, any flyway value would result in 0% of the flyway population recorded, and hence a Negligible 'Relative Importance' score.

- **Loss of habitat**. Development of each project will result in ground disturbance and the permanent loss of habitat for ground-dwelling species. The direct footprint of individual wind projects is typically a small portion of the project area, but if species also avoid areas of project infrastructure, the resultant area lost can be large. With multiple developments, this may have implications for the connectedness of populations of some species.

7 Opportunities for Lekela to manage cumulative impacts

The current spacing of c. 1 km between the north-east / south-west alignment of arrays within the Lekela BOO (Environics 2017a, page 5), and similar spacing running north-west / south-east in the Redbull project (Wright 2017, page 13) may provide sufficient space for passage of avian species between arrays of turbines. These should be maintained during project design, with micro-siting of turbines to maximise the gaps between arrays. Micro-siting should also be used to avoid other identified VECs including habitat VECs (wadis, saltmarshes) and burrows or shelter sites used by mammal or reptile VECs.

As proposed in Environics (2017a), Lekela should implement a shutdown protocol at both sites (Lekela BOO and Redbull) to minimise the effect of each project on identified avian VECs (nothing that shutdown will have minimal impact on bat VECs). This protocol should aim for best-practice, and be conservative, in that it should:

- Cover both the spring and autumn migration periods. While the RCREEE surveys (RCREEE 2018) determined that the wider area 'had no particular importance for migrating birds in autumn', those surveys did not cover the full autumn migration period. Additional surveys for the Lekela BOO site (Environics 2016a, 2017a), starting earlier in the season, has shown large autumn movements of potential avian VECs in the project area.
- Extend across most or all of the migration period in each season, with start and end dates robustly justified. While the majority of individuals pass over a relatively short time period (e.g. for the RCREEE area, 88% of all individuals passed in eight days in spring 2016, and 76% of all individuals passed in 10 days in spring 2017: RCREEE 2018), different species migrate at different periods within the overall migration period, and species also vary in their timing between years (MSBP 2013; RCREEE 2018).
- Be supported with field-based observers, to provide real-time information to inform the shutdown process;
- Run in conjunction with robust carcass surveys to ensure that the micro-siting and shutdown protocols are delivering the expected levels of mitigation. As collision risk is highly spatially variable, carcass surveys can also highlight individual turbines where additional mitigation may be required, or where periods of shut-down might be less extensive.

By adopting these best-practice mitigation measures, particularly through a robust turbine shutdown process, Lekela will be able to reduce its impact as far as practicable for the identified

VECs. By doing this, Lekela sets a benchmark for other wind projects in the CIA area, and provides an example of successful best-practice implementation for others to follow. A co-ordinated approach to mitigation approaches, particularly migration monitoring and turbine shutdown would be beneficial to Lekela and all other wind projects in the CIA area. By adopting a single shutdown protocol across the whole CIA area and sharing real-time survey data, individual project operational costs can be reduced (through reduced need for observers throughout each project area) and risks to birds minimised through observations resulting in turbine shutdown right along the flight trajectory across multiple projects.

8 Next steps

These initial findings indicate that while there is the potential for significant cumulative impacts, the nature and status of most developments in the Gulf of Suez is unclear. To refine the results the follow steps are planned:

1. Share the findings and online portal with stakeholders including (but not limited to): government agencies (e.g. NREA), RCREEE, wind farm developers, lenders, NGOs (e.g. Nature Conservation Egypt, BirdLife International), environmental impact experts, and ecologists with local expertise. Comments, corrections and requests for additional information will be sought from all stakeholders.
2. Develop a final list of priority biodiversity VECs through consultation with appropriate experts, and summarise the baseline status of priority biodiversity VECs.
3. Further assessment of potential impacts, including scenario building to identify the potential impact of different patterns of development.
4. Determine the VECs at highest risk based on sensitivity and likelihood of effect.
5. Collaborative development of a set of actions to be taken by Lekela to manage its contribution to cumulative impacts, and demonstrate leadership to other developers.
6. Update the online portal, and documented findings to incorporate additional information.

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