

Lekela North 250 MW BOO – Non-technical summary

1. Introduction

The Egyptian government is planning to install 4,300 MW of renewable energy over the coming three years. As part of these plans, “Lekela Egypt” is planning to establish a wind power plant with a capacity of 250 MW, operate (BOO) scheme. The plant is located within wind power plant complex which the Egyptian New & Renewable Energy Authority (NREA) is planning to establish near the Red Sea town of Ras Gharib.

The electricity generated from this complex is intended to be connected to the national electricity grid. EETC will be responsible for construction of the required transmission lines and substation to accommodate the generated electricity from all wind power plants and connect to the national electricity grid.

2. Project Description

The wind plant will comprise of 96 independent 2.6 MW wind turbine generators (WTGs) manufactured by Siemens Gamesa. The maximum net capacity of the plant will be 250 MW. With a tip height of 120m and a rotor diameter of 114m, the turbines are linked in collector circuits that are in turn connected to a new 220kV / MV substation within the site boundary. The wind plant layout has been optimised using wind flow modeling. Areas not suitable for turbine construction – due to environmental, hydrological, geotechnical or other reasons – have been excluded. Several access roads will be built for the transport of components and access during the operations and maintenance phase. The access roads will be made of compacted soil and gravel and approximately 5m wide.

For the grid-connection EETC are constructing a 220kV overhead transmission line to connect the site substation to a 500kV/ 200kV substation where the voltage is stepped up further and the electricity delivered to EETC Transmission System.

An additional ESIA has been commissioned for overhead transmission lines as the 220kV transmission line will be used exclusively by the project until subsequent wind developments transition into operations.

The main permanent components of the wind farm development are as follows:

- Wind turbines
- Pad mounted transformers
- Medium Voltage MV collector system
- Fenced on-site Substation and Control Building and O&M Building
- Three Permanent meteorological masts
- Access roads



Figure (1): Location and Layout of WTGs

3. Project area of influence

The project site is located in the Eastern desert by the Red Sea coast, north of the town of Ras Ghareb. The nearest residential area, the coastal town of Ras Ghareb, is about 28 km to the east of the site. The site is serviced by the Ras Ghareb – Zafarana Highway.

The environmental area of influence for the Project's construction and operations phases generally comprises its physical footprint plus a buffer zone extending 1km (i.e. the approximate distance of 'first carry' of dust particles) from the wind farm area's boundary and from the centerline of the transmission line Right of Way, with localised extensions where needed for access tracks, borrow pits, temporary construction camps and laydown areas, etc.

The Social area of influence includes the Project physical footprint and buffer zone as described above (although there is no settlement within this area) and the town of Ras Ghareb.

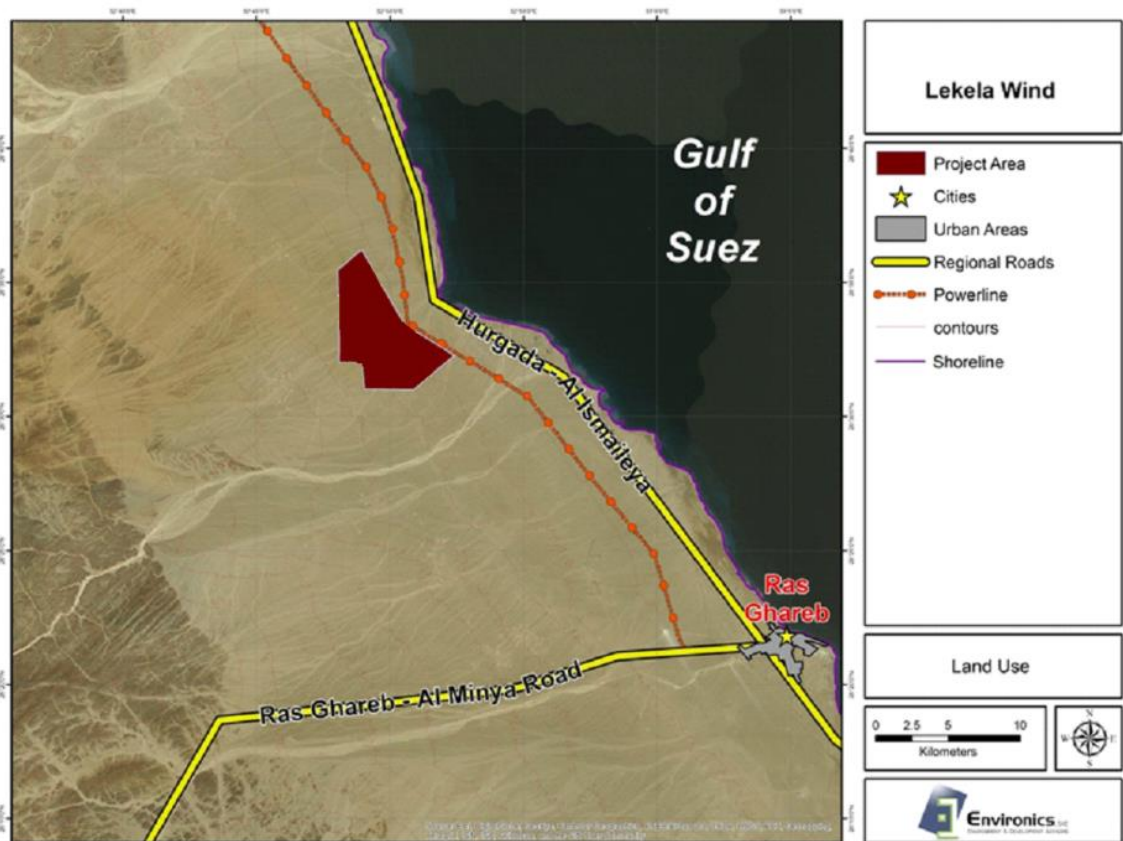


Figure (2): Project Area of Influence

- **Physical Environment**
 - The climate is warm and dry except for rare and sporadic flash floods during the winter.
 - The prevailing NW-NNW wind dominates most of the year. The average wind speed in the area is 9.5 m/s.

- The soil of the project site is composed of a hard sandy substrate covered with gravel, stones and boulders. And there are no permanent fresh surface water bodies or streams in area.
 - The project area falls in an area of low intensity and medium flood risk. Several hydrological surveys have been undertaken to determine the routes and risks associated with ephemeral water courses (wadis). The project design and layout has been optimised accordingly to eliminate flood risk.
- **Biological Environment**
 - The Lekela Egypt site lies within coastal desert plain and the site has an absence of vegetation cover.
 - The littoral area at Ras Ghareb is highly influenced by human activities. This is reflected on fauna which is mainly composed of commensal and opportunistic species. Therefore, potential mismanagement of waste generated during project activities might attract commensal and opportunistic species as well as pest species to the site.
 - **Migratory birds**

Monitoring results of Wider Project area

Given the high importance of this area for Migratory Soaring Birds (MSBs) and the demonstrated potential for these species to collide with turbine rotor blades at wind energy projects, detailed flight activity surveys were conducted during migration periods by Lahmeyer International and Ecoda (2017) for RCREEE as part of the Strategic and Cumulative Environmental and Social Assessment (SESA) Active Turbine Management Program (ATMP) for Wind Power Projects in the Gulf of Suez targeting the overall development area including Lekela project site.

The survey focused on large soaring species (target species) as these birds have limited flight ability are less maneuverable, have larger body sizes and spans and are therefore considered to be significantly more vulnerable by wind farms. The results of the survey indicated that the migratory of birds during the spring is higher than the autumn.

Monitoring results of Lekela specific project area

In addition to the monitoring activities carried out for the wider area, Lekela has conducted detailed bird flight activity surveys focused on the project site over three spring and autumn migration seasons between 2015 and 2018. Specifically:

- Autumn 2015, 16 August to 5 November 2015, for a period of 82 days
- Spring 2016, 10 February to 15 May 2016, for a period of 96 days
- Spring 2017, 20 February to 15 May 2017, for a period of 85 days
- Autumn 2017, 15 August to 5 November 2017 for a period of 83 days
- Spring 2018, 15 February to 15 May 2018, for a period of 90 days.

- Autumn 2018, 15 August to 5 November 2018, for a period of 83 days.

The field methodology and data analysis used for the project surveys followed the guidelines of the “Environmental Impact Assessment Guidelines and Monitoring Protocols for Wind Energy Development Projects with a particular reference to Migratory Soaring Birds” (MSB Project 2013); which includes guidelines developed by the UNDP/BirdLife International Migratory Soaring Birds Project and adopted by the EEAA. This was also the approach adopted by Lahmeyer and Ecoda while undertaking the SESA for RCREEE in 2017. To support seasonal bird surveys and improve Lekela’s understanding of migratory bird behavior two additional studies have been undertaken. Lekela A Critical Habitat Assessment (CHA) of the project area, and a Cumulative Effects Assessment (CEA) to assess the potential impacts of additional wind energy developments in the Gulf of Suez Region. The migratory bird species determined to be at-risk in the absence of mitigation programmes are included in table 1.

Species	Scientific name	Overall risk	IUCN Status	Priority Biodiversity Feature (CHA)	Priority Bird (CEA)	ESIA baseline (max seasonal count – Spring)	ESIA baseline (max season count – Autumn)	Max % of flyway population (recorded in a single spring or autumn baseline monitoring season)
Black Stork	<i>Ciconia nigra</i>	Major	LC	Yes	Yes	2018	1000	8.40
Booted Eagle	<i>Hieraaetus pennatus</i>	Major	LC		Yes	418	NR	1.39
Common Crane	<i>Grus grus</i>	Major	LC		Yes	1002	NR	0.44
Great White Pelican	<i>Pelecanus onocrotalus</i>	Major	LC	Yes	Yes	1078	183	2.7
Steppe Eagle	<i>Aquila nipalensis</i>	Major	EN	Yes	Yes	3077	3	4.6
White Stork	<i>Ciconia ciconia</i>	Major	LC	Yes	Yes	29874	11302	6.6
Black Kite	<i>Milvus migrans</i>	Moderate	LC		Yes	2026	222	1
Egyptian Vulture	<i>Neophron percnopterus</i>	Moderate	EN	Yes	Yes	38	NR	NA
Eurasian Buzzard	<i>Buteo buteo</i>	Moderate	LC	Yes	Yes	NR	NR	0
European Honey-buzzard	<i>Pernis apivorus</i>	Moderate	LC	Yes	Yes	10869	5578	2.09
Greater Spotted Eagle	<i>Clanga clanga</i>	Moderate	VU	Yes	Yes	14	NR	NA
Levant Sparrowhawk	<i>Accipiter brevipes</i>	Moderate	LC	Yes	Yes	1277	9	6.4
Pallid Harrier	<i>Circus macrourus</i>	Moderate	NT		Yes	26	25	NA
Eastern Imperial Eagle	<i>Aquila heliaca</i>	n/a	VU	Yes		16	NR	NA
Sooty Falcon	<i>Falco concolor</i>	n/a	VU	Yes		1	7	NA

- NA= Not Available
- NR = Not Recorded
- Eurasian Buzzard was not recorded in any of the 6 monitoring seasons, a number of other species are not recorded in Autumn, both inside or outside, while the Common Crane was not recorded inside the site in Autumn
- All species are either compared to flyway or global population

Table 1: at-risk migratory bird species

4. Alternatives

The project assessed different configurations including the options of having 120 WTGs rated at 2.1MW with a rotor diameter of 92m, 70 WTGs with 114m diameter rated at 3.6MW, or 96 WTGs with 114m diameter rated at 2.6MW. Collision risk modelling suggested that the selected configuration of 96 WTGs would not present a greater collision risk to species using the project site airspace than the next viable alternative option of 70 3.6MW turbines.”

The “no-development” alternative has not been given further consideration as the land proposed for the development is owned by NREA and has been designated for renewable energy projects. It is worth mentioning that the project allows Egypt to benefit from one of its main renewable energy resources. The project will also contribute to meeting part of continuously increasing energy needs in Egypt. In addition, the project contributes to lessening greenhouse gases emissions that would have been generated if the same amount of energy was generated from fossil fuel fired power plants.

5. Environmental and Social Impacts Assessment and Mitigation

Positive Impacts

- **Employment**

It is estimated that during the construction phase the project would provide about 350 direct job opportunities. During operation, permanent employees on site are expected to be approximately 20. Priority will be given to the local workforce. The project will provide ‘on-the-job’ training for local people which can increase their skills level so that they will be employable on other wind power projects.

- **National energy security**

During operation, this project will directly provide electricity from wind energy at utility scale. Therefore, the project allows Egypt to benefit from one of its main renewable energy resources rather than using fossil fuels.

- **Reduction of GHG Emissions**

Operational wind energy projects generate zero-carbon power. Thus, this project contributes to minimizing greenhouse gases emissions, particularly CO₂, that would have been generated if the same amount of energy had been generated from conventional fossil fuel fired power plants.

Potential Negative Impacts

- **Ambient Air Quality**

Construction activities may result in minor, localized, short term, air quality impacts in the workplace area. Lekela Egypt and their contractors will ensure that all vehicles entering or leaving the site carrying a load that may generate dust are covered. Additionally, Lekela Egypt and their contractors will install, operate and maintain dust control measures and/or equipment.

- **Ambient Noise Levels**

The activities that can generate noise during construction are excavations, earthworks, concreting and construction equipment. The use of

construction equipment may result in localized, short term, increase in noise levels. It is not expected that noise from the construction activities would pose impacts on the neighboring areas as they are located at significant distances. Thus, the impact on ambient noise from the construction activities is considered minor.

- **Soil**

Potential impacts during construction and operation phases generally result from domestic wastewater management, material and waste storage accidental spills from machinery, and potential spills from the diesel generator and lubricating oils. Mitigation measures include good housekeeping and waste management procedures.

- **Water**

Water consumption during construction for the different construction activities is estimated as 62 m³. While domestic water consumption during operation will be primarily due to domestic uses. It is worth mentioning that the impact of this project on water resources consumption is of little consequence and insignificant.

- **Impact on the Biological Environment**

- **Habitats**

The site is located within the vast coastal desert plain. This ecosystem is characterized by an almost total absence of water and, accordingly, the vegetation cover is very low and animal life is mainly found in wadis. Due to the incredibly sparse landscape the project ESIA concluded that the residual impacts of construction on habitats are considered to be low. Various environmental plans will be employed during construction so that the project environmental footprint is managed appropriately.

- **Flora**

As discussed the site habitat is very sparse. Any vegetation on site is extremely scarce and widely scattered. Hence, project activities can easily avoid impacts on vegetation when erecting the turbines and limiting off-road driving within the project sites. Similar to the above, the ESIA concluded that residual impacts on flora would be minimal, and impacts would be managed by applying appropriate environmental management plans.

- **Fauna (excluding migratory birds)**

The importance of the project sites as a habitat for animals is limited. Local animals (including the spiny tailed lizard) might be affected by disturbances during the construction phase. However, disturbance effects are limited to a rather small area. Thus, local animals should be able to find alternative habitats during construction. Moreover, construction works are limited in time and local animals can repopulate the area after construction. The project will undertake mitigation measures such as implementing waste management plans, limiting work activities to daytime and as much as possible, reduce activities during sensitive periods of the year (such as breeding seasons).

Wind turbines can also present a risk to bats due to collisions with turbine blades. The risk to bats has been considered, however the project area is not considered an appropriate habitat for bats and activity is expected to be low.

- **Migratory birds**

It has been determined from extensive surveys, including the project-specific ESIA and RCREEE SESA that the project site is located within a key region for migratory soaring birds traveling between Southern Africa and Northern Europe. Some of these populations are endangered, and the project has undertaken to apply best-practice mitigation across all phases of design, construction and operations.

Design Phase

Decisions were taken at the design stage to reduce potential adverse effects of the project on migratory birds. These included:

- Avoiding turbine options with lattice towers. Lattice towers offer suitable perching sites and, thus, might attract birds
- Ensuring enough spaces between the turbines
- Painting turbine blades to increase blade visibility
- Restrict turbine height to a reasonable maximum total height of 120m
- Reduce lighting of wind turbines to the minimum required by the Egyptian Civil Aviation Authority.
- Connect turbine arrays to the main sub-station by using underground cabling.

Construction phase

The construction phase is not expected to have any material impacts on migratory birds. As above, appropriate designs have been selected to minimise risk once the plant is operational.

Operation phase

The impact of the operation phase on the migratory birds is considered potentially significant. According to the SESA, the major potential hazards to migrating birds are mortality due to collision as well as barrier effects.

In addition to the Strategic Impact Assessment for the whole wind farms in the area, Environics has carried out site specific autumn and spring Collision Risk Assessment for the Lekela project.

The outcome of the study predicts that the total potential casualty level from active wind turbines (without any mitigation measures) within the study area be about between 24 and 61 birds during autumn and 40 and 101 birds during spring.

Biodiversity risk management

The following mitigation measures are proposed for Lekela project during operation phase:

- Conducting bird migration monitoring surveys during peak migration periods in spring and autumn to further understand flight behavior and inform on-going mitigation.
- Maintain the unattractiveness of the site to migrant birds. This is achieved by rigorously banning any type of cultivation, or plantation of green areas in or around the site;
- Reducing risks from power lines by installing markers (flight diverters) or routing power cables underground.
- On-site monitoring and shut-down on demand (SOD) will be undertaken by bird observers situated in key vantage points on the project from the beginning of operations.

- SOD involves WTGs being shut-down when on-site bird spotters believe certain criteria have been triggered (observation of priority species, observation of larger bird flocks, incoming sand storms etc.)
- Avoiding construction in wadis and minimizing impacts to Egyptian Spiny-tailed Lizard through avoidance of burrows and minimizing the risk of mortalities
- Monitoring fatalities and completing carcass surveys to evaluate the effectiveness of SOD.

Additional mitigation and monitoring actions were proposed following supplemental biodiversity and avifauna studies (Section 7).

6. Environmental Management Plan

The project's environmental and social management plan (ESMP) consists of a set of mitigation, monitoring and institutional measures that should be performed during the construction and operation phase to ensure the sound environmental performance of the project.

The project will ensure that contractors will carry out necessary measures to minimize impacts. This is to be included in the contractor's scope of work (contract) and addressed in the contractor management plan. This will be in accordance with the national laws as well as the IFC EHS guidelines and the workers' accommodation processes and standard.

Generally, the main impacts resulted from the project have been identified and will be mitigated by applying the proposed mitigation measures and management plans in the project's design. The rest of impacts will be minimized as much as possible by implementing the mitigation measures proposed in the environmental management plan. The adaptive management program will ensure the continuous environmental compliance.

7. Supplementary Biodiversity and Avifauna studies

Critical Habitat Assessment

A Critical Habitat Assessment (CHA) for the project was undertaken by The Biodiversity Consultancy (TBC). A CHA is a framework for identifying whether the area is of global importance for biodiversity. It follows a set of criteria and thresholds developed by the IFC and EBRD. Specifically, this CHA set out to:

- 1) Identify Critical Habitat-qualifying biodiversity, Priority Biodiversity Features and Natural Habitat associated with the Project (as defined by IFC Performance Standard 6, and EBRD Performance Requirement 6).
- 2) Outline the implications of the outcome of the assessment for the project and
- 3) Identify and recommend next steps for project in order for them to meet lender requirements.

The assessment considered a broader area than just the direct Project footprint, to ensure all Project risks were taken into consideration. For migratory birds, TBC assessed the potential presence of Critical Habitat in the entire migratory bird flyway corridor within Egypt and the Important Bird Area (IBA) in Gebel Al-Zeit which lies less than 12 km from the proposed project area .

The assessment concluded that, since there was no evidence that the migratory bird species regularly use the area as a stop-over site in normal

circumstances, or that this area is a particular bottleneck within the already-restricted flyway, the Project does not occur in Critical Habitat. Nonetheless, it is close to an area of Critical Habitat (Gebel El Zeit IBA) and globally important numbers of migratory soaring birds pass over the Project area. This means the Project will need to pay special attention to management of biodiversity impacts, particularly to avoid collisions of migratory soaring birds and highlights the priority biodiversity that the Project needs to consider during more detailed mitigation planning .

As the Project is located in an area which seasonally sees globally-important concentrations of migratory soaring birds, contains Priority Biodiversity Features and is broadly Natural Habitat, the Project will need to achieve at least no net loss for the Egyptian Spiny-tailed Lizard, eleven priority migratory soaring bird species, and Natural Habitat, and to demonstrate this achievement through a robust monitoring and adaptive management programme.

Analysis of Cumulative Effects to Biodiversity

An additional cumulative effects analysis undertaken by TBC provides an assessment of the potential cumulative effects to biodiversity for the Lekela project in the study area. The analysis includes:

- A list of priority VECs assessed to be at highest risk of cumulative effects from wind farm development in the study area (13 birds and two bats), and information on three potential ecosystem-level VECs;
- Impact thresholds for bird VECs above which adaptive management actions are required; and
- Mitigation and monitoring actions for priority VECs, including identifying opportunities where Lekela can contribute to the management of cumulative effects.

An approach modelled on the Tafila Region Wind Power Projects Cumulative Impact Assessment (IFC 2017) was developed and modified to local conditions to determine priority VECs for the Project. For birds the approach relies on five integrated steps. Step 1 identified a list of 193 bird species which were known, or likely, to be present in the study area. Step 2 refined this list to 35 'sensitive' species, based on a combined assessment of their vulnerability (ie global rarity) and the relative importance of the Gebel El Zeit study area for each species. Step 3 assessed the cumulative Likelihood of Effect of wind farm developments in the study area on each of 35 sensitive species. Step 4 identified fatality thresholds for priority bird VECs. In step 5, a suite of Mitigation and Monitoring Actions are proposed. A similar (but simplified) approach is followed for mammals and reptiles.

The results show that 13 bird species, and two bats are considered priority VECs for the Project.

A set of mitigation and monitoring actions are proposed. These include those to be adopted by Lekela, and those that Lekela will undertake or support in order to contribute to managing cumulative effects from wind farm developments in the wider region. These mitigation and monitoring actions are aimed at minimizing turbine blade and power line collision fatalities for the 13 priority bird VECs, as well as for other bird and bat populations identified as at high risk, during the operational phase. The approach follows industry good practice and focuses on two areas:

- 1) On-site mitigation and monitoring methods, to minimise collision risk, validate the effectiveness of proposed mitigation methods, allow estimation of residual impacts and provide information to adapt monitoring and mitigation to prevailing conditions; and,
- 2) Collaborative efforts with other wind farm entities, to minimise the cumulative effects of all the proposed wind farm developments in the area.

By adopting these best-practice mitigation measures and monitoring actions, 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 study area and provides an example of successful best-practice implementation for others to follow.