Ministry of Electricity and Renewable Energy

New and Renewable Energy Authority

THE WORLD BANK

Environmental and Social Review of Wind Development in the West Sohag Concession

Non-Technical Summary

Environmental Solutions ER2M LLC
In association with
Environics, Environment and Development Advisors

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1- Introduction

Presidential Decree No. 51 of 2023 allocated a State-owned area in the Egyptian Western Desert (WD) shown in Figure 1 to the New and Renewable Energy Authority (NREA) for the purpose of establishing wind power projects to be developed by various developers over a total period estimated to be 10 years. The West Sohag Concession (WSC) covers about 9,520 km^2 and is divided into four sections separated by road or railroad rights-of-way.

The concession falls within the administrative boundaries of the New Valley Governorate (NVG), and is also contiguous to the Governorates of Sohag, Qena and Assiut to the east. The total capacity of wind farms to be located in the WSC is approximately 30 Gigawatts (GW).

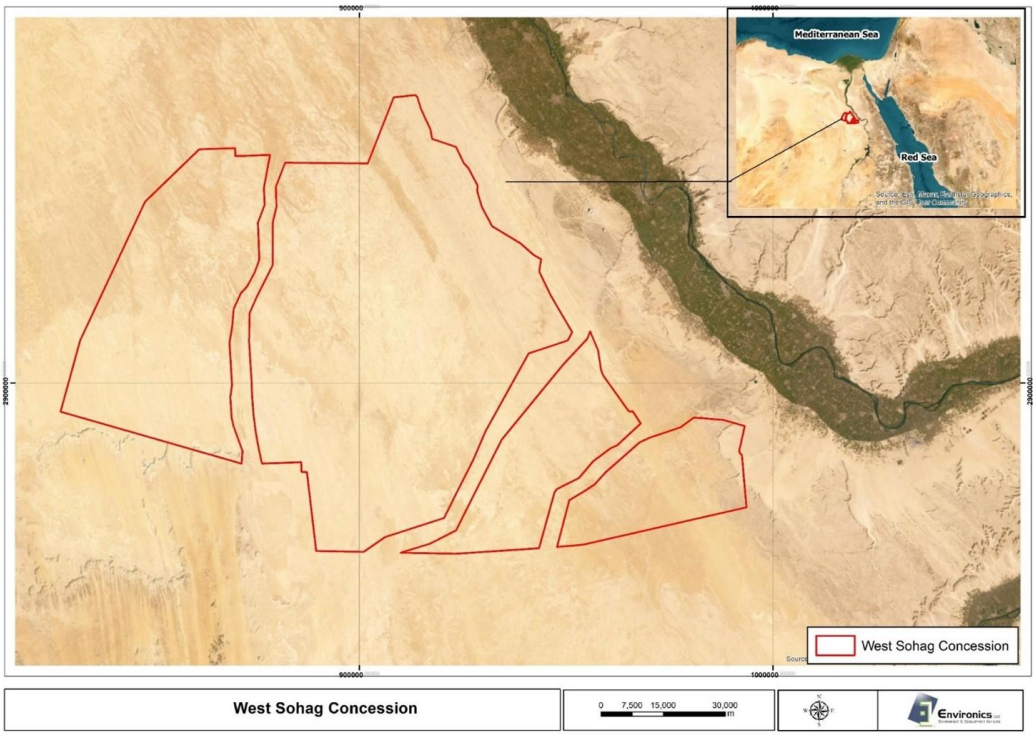

Figure 1: The Location of the West Sohag Concession in the Egyptian Western Desert

An Environmental and Social Review (ESR) of the development was conducted to guide developers in designing and constructing projects so they avoid or minimise potential adverse impacts. This will be reflected in Environmental and Social Impact Assessments prepared by developers for their individual projects.

2- Applicable Standards

The ESR was guided by national regulations, international conventions to which Egypt is party, and World Bank standards, which represent the standards of other international financial institutions that may finance projects.

3- Alternatives

The main alternative considered was not to allocate land in the WSC. This would leave the land in its current state and avoid any interference with its current physical and biological systems. However, the development in the proposed site capitalises on advantages that no other location in Egypt can provide in terms of its size, the generation capacity and economies of scale, the favourable wind

resource, the lack of current land use and the distance from, and thus avoidance of impacts on, existing communities. Moreover, the development will lead to major enhancements of the local road and transmission infrastructure and, thus, contribute to future economic development. Accordingly, if there were another location that provided the same advantages, the environmental impacts would be at least equal.

There are alternative designs and technologies developers may adopt. Among options considered in the ESR:

- Facilities and infrastructure used for water, waste, wastewater, etc. could be provided by the contiguous governorates or by the developers
- Water may be sourced from existing facilities or groundwater extraction
- Various means to protect the fragile ecosystems

The ESR's consideration of these options is intended to provide a basis for developer's evaluation of their alternatives, which will be analysed in project-specific ESIAs. Other alternatives, such as turbine height and locations, will also be considered in the developers' ESIAs.

4- Project Description

The number of turbines will depend on decisions by developers. The ESR assumes turbines will average 5MW capacity, which would result in a total of 6,000 turbines to generate 30 GW of electricity. The ESR further assumes that turbines will 220m high, the maximum height allowed by Egypt, and that that the average distance between turbine rows will be between 700 – 1,100 m, with about 550 – 900 m between turbines in each row. Therefore, wind farm constructions typically result in direct effects on 6 – 8% of the overall land area. This is reduced to 5% or less once the wind farm is operational.

Generally, the main components of a wind farm development include:

- Wind turbines within a nacelle (Figure 2) anchored in concrete foundations
- Transformers to step up low voltage electricity generated by the turbines
- Substation, control building, Operation and Maintenance (O&M) building, worker accommodation
- Overhead transmission line (OHTL) to evacuate power from the substation to the grid
- A crane adjacent to each turbine
- Meteorological masts to measure wind
- Storage and laydown areas, service and utility buildings.

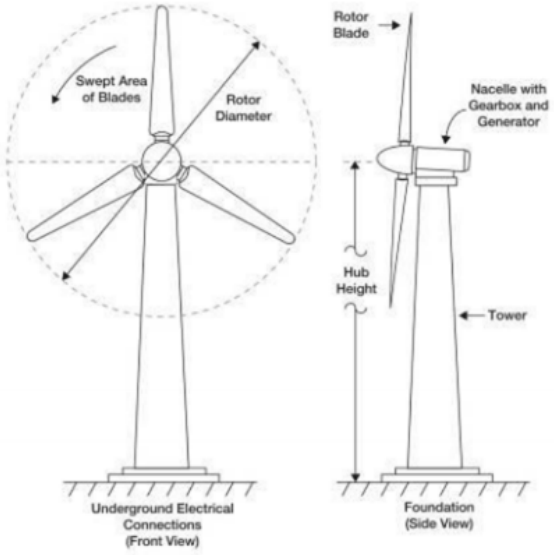

Figure 2. Wind Turbine Components

4-1 Resource and Utility Requirements

4-1-1 Connectivity Requirements

Roads: Connectivity between the WSC and the public road network is limited, with only one paved road providing access to any part of the WSC, the Assiut – El Kharga Road. There are two other main roads running parallel to part of the WSC's perimeter; the Giza – Aswan Road and the El Wahat Road. These roads are not suitable for transporting equipment and large components needed for wind energy development. Good roads will be needed to transport these.

Power Transmission Lines: A transmission line extends through some parts of the WSC, and multiple transmission lines will be needed to the projects to the grid.

Communications: Coverage is limited, and some areas are not covered at all.

Ports: Components will be transported by sea. The port of Safaga is the closest to the WSC but will not be able to receive components until the end of 2026. The ports of Sokhna and Adabiya are available but are at significant distances.

4-1-2 Required Utilities

- **Water:**

Construction Phase

For a maximum workforce of up to 60,000 to 90,000 during peak periods, water for sanitation and domestic uses (100 L/person/day) could peak at 9,000 m^3/day. In addition, at least 10 litres of potable water per day will be required, which would be up to 900 m^3/day of bottled potable water.

Concrete foundations will require about 750 m^3/day and could peak at up to 3,000 m^3/day, and other uses for construction will increase this amount. Water will have to be sourced either from an existing Water Treatment Plant (WTP) or extracted from groundwater.

Operation Phase

Operation of the windfarms will require fewer workers, but still over 10,000 workers. Therefore, much less potable and other water will be needed. These smaller quantities would make trucking a more likely option, but if groundwater extraction infrastructure had been developed, this would likely continue to be used.

- **Waste:**

Construction Phase

a) Solid Waste

Non-hazardous solid waste is expected to be stored on-site until collection by a licensed contractor for disposal in approved disposal sites. Given the scale of development, there will be large amounts of solid waste, likely exceeding the capacity of existing recycling and disposal sites.

b) Hazardous Waste

There will be relatively little hazardous waste generated by each individual wind project, but the total could still be a substantial amount. This will require sizable capacity for treatment and/or disposal, again likely exceeding existing capacity.

c) Wastewater

The wastewater generated during construction will include domestic wastewater generated during construction activities (e.g., sanitary and other domestic water, equipment/concrete wash water). Given the number of workers and the needs of concrete and other uses, a large amount of wastewater will be generated. This wastewater is expected to be collected in septic and/or storage tanks for either off- or on- site disposal and treatment. As with waste, the amount of wastewater generated might exceed existing treatment capacity.

Operation Phase

a) Solid Waste

Solid waste generated during operation, would be orders of magnitude lower than in the construction phase. It is expected this would be managed in the same way as during construction.

b) Hazardous Waste

Hazardous waste, again in much smaller quantities, will be temporarily stored and contained before being collected and disposed by authorised contractors.

c) Wastewater

There will be much less demand for wastewater management during operation, compared with the construction phase due to a smaller workforce.

- **Accommodation for Workers:**

Construction Phase

Given the remoteness of the WSC and distance to sizable communities, daily commuting will not be an option, so on-site accommodations will be needed. This will include dormitories, kitchens, dining, recreational facilities, and medical services.

Operation Phase

The fewer workers would still require permanent workers accommodation, given the remoteness of the WSC.

4-1-3 Other Resources Needed

- **Fuel**

Construction Phase

Diesel used to operate generators and vehicles for construction activities, will be brought to site in tanker trucks.

Operation Phase

Power will be provided by the turbines themselves, with generators providing back up power.

- **Building Materials**

Construction Phase

Demand for cement and steel for reinforced concrete will be substantial. While cement could be sourced regionally, it could require expansion of current capacity. As there are no steel production plants in the region, so steel would need to be transported from more distant sources.

4-2 Associated Facilities

According to World Bank ESS1 and similar requirements of other international financial institutions, Associated Facilities are those that are not part of a project (i.e., funded from sources other than those financing the project), that are necessary for the project's success and that would not be established were it not for the project.

Borrowers must ensure that Associated Facilities meet the institution's E&S standards. For wind developments, such facilities could include:

- **Transmission Lines outside the Concession**
- **Roads Outside the Concession**
- **Facilities for Water Supply and for Waste and Wastewater Management** (if developed separately for wind projects or if existing facilities are expanded to support wind projects)
- **Green Hydrogen Facilities** (that use electricity generated by the wind projects).

5- Environmental and Social Aspects and Areas of Influence

5-1 Construction

The potential E&S aspects anticipated during the construction phase, and their respective primary sources and areas of influence are listed below.

Aspect		Area of Influence
Large-scale Land Uptake	Land Acquisition	Project (including OHTL and Access Roads) Footprint
	Land Access Restriction	Project Footprint
	Land Transformation	Project Footprint (and related physical and biological ecosystems)
Noise		Project/Concession Footprint
Vibration		The immediate vicinity of the project area
Particulate Matter (PM)		A general default distance of 350 m to be considered for dust effects, regardless of the receptor (IAQM, 2012)

Aspect		Area of Influence
Gaseous Emissions		The immediate vicinity of the project area and roads
Water Resource Requirements		The source of water required for construction activities will depend on site-specific conditions, so the area of influence could be a ground water aquifer or the community served by a water treatment plant.
Demand for other Construction Material		The project's substantial demand might affect material availability and price at various levels. The AOI could therefore be the aquifer and its users, or the community served by the plant from which water is sourced.
Increased Transportation Demand	**Transportation of oversized or heavy equipment**	Roads from the potential ports to the eastern side of the Nile Nile crossing bridges from East of the Nile to West of the Nile including. Not all these bridges could accommodate oversized components. Roads from West of the Nile to the concession
	High Trucking Demand	Transportation of material (e.g. cement and steel) and potentially water and waste (solid waste and wastewater) might overstretch the existing transportation fleet. This aspect will be evident at least regionally but could extend nationally.
	On-Site Transportation	Project and Concession Footprint
Worker Influx		Communities with which non-local workers may interact
Temporary Worker Accommodation		The most accessible communities to the project

For most aspects, the Areas of Influence (AoIs) do not go far beyond the development's footprint, but it may extend farther for some, including:

- Along transportation routes and transmission line corridors
- The related physical, biological and social systems affected by changes to the project site
- Water aquifer users
- The local communities from which the necessary labour, supplies/services will be sourced, and the infrastructure (e.g. water and wastewater plants) that will be used.

5-2 Operation

Again, for most aspects, the AoI is mainly confined to the developments' footprint and air space. It, however, extends to:

- Noise could be detected at 2,000 m from the closest turbines
- Local communities from which the necessary supplies/services will be sourced, although this will be at a much smaller scale during operations when compared to the construction phase

Aspect	Area of Influence	
Obstruction of Air Space	The Project's air space (above its footprint)	
Noise	Within 2,000 m of any of the turbines	
Vibration	Ground vibrations may be felt up to about 1,000 m from turbines	
On-site Transportation	Project footprint	
Land Access Restriction	Project footprint	
Visual Aspects	**Glint**	Glint can affect a wider range of receptors
	Shadow Flicker	Shadow flicker expected to occur within 10 rotor diameters from the turbines
Electromagnetic Field	At and near substations and OHTLs	
Worker Accommodation	On-site, impacts confined to workers (distant from communities)	

Aspect	Area of Influence
Water and Waste/Wastewater Resource Requirements	Extending to communities that provide facilities and resources

6- Environmental and Social Baseline Conditions

Baseline conditions in the WSC, were characterized through visits to the concession area, bird monitoring over two migration seasons, biodiversity surveys, archaeology surveys, meetings with knowledgeable agencies and experts, and a comprehensive review of the scientific literature and other available information.

6-1 Physical Baseline Conditions

- **Climate and Meteorology**
  The climate is hot, with extreme heat events. There is minor and almost negligible precipitation year-round, with strong and relatively constant winds, predominantly from the northwest.
- **Geomorphology and Topography**
  The concession is mostly on a limestone plateau composed of carbonates and clastics. Faults are a dominant structural feature. Aeolian landforms are encountered in the WSC, and include linear surface features known as *Kharafeesh,* and sand dunes. Elevation generally varies between 240 and 380 metres above sea level, with the WSC area being higher than its surroundings to the east and the west.
- **Sand and Dust Storms and Encroachment**

The area is subject to sand and dust storms. While less than 1% of the time annually, it increases during the spring months (3% in March and 2% in April). Large quantities of sand move through the area and accumulate in depressions and at obstacles.

- **Karstification**
  Rainwater in historical times moved through fractures dissolving soluble rocks and forming caves. Some of these caves have already collapsed, leaving sinkholes at the surface caves (Figure 3).

  Others remain intact but could collapse in the future, which could create a risk for structures located along the fractures. Where these fractures coincide with fault intersections, the risk of sinkhole formation and land subsidence is higher (Figure 4).

Figure 3: Exposed karst cave along rock fractures, photographed at the WSC

- **Seismic Activity**
  In general, only mild exposure to earthquake risk is expected at the WSC. The distribution of earthquake epicentres in Egypt as related to the WSC are shown on Figure 5.

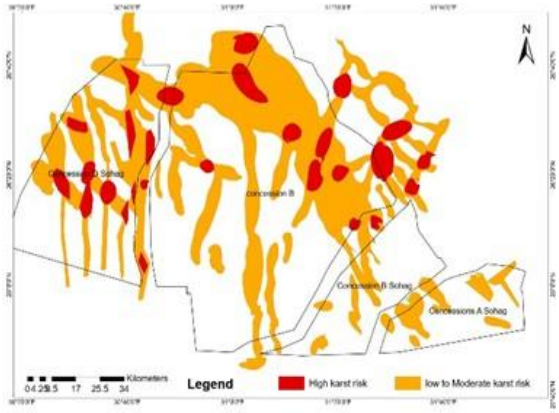

Figure 4: Karst risk map of the WSC

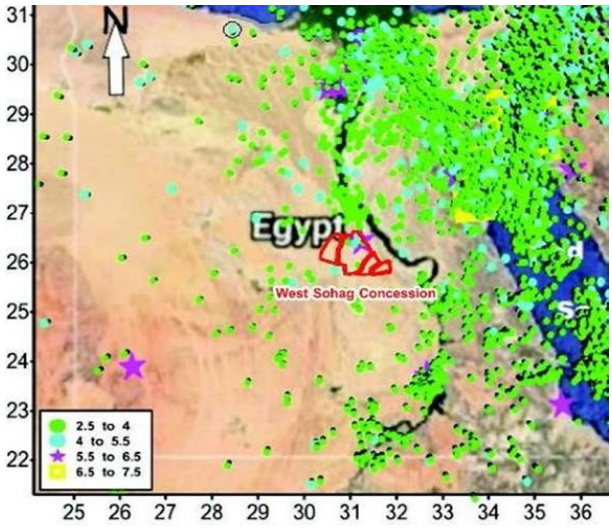

Figure 5:Earthquake epicentres

- **Landslide Susceptibility**

Landslide susceptibility risk is low to moderate. Due to the presence of steeper slopes, landslide susceptibility is higher towards the southern boundary of the WSC's westernmost part, and the easternmost boundary of the concession (Figure 6).

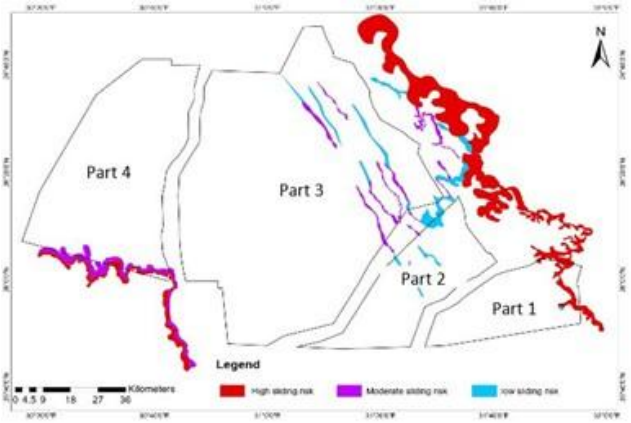

Figure 6: Landslide susceptibility risk map of the WSC

- **Hydrology and Hydrogeology**

There are no permanent surface water bodies in the area, and no flash flooding risks expected in the WSC given its elevations, aridity, and accumulated sand acting as obstacles to floods. However, the temporary accumulation of water in depressions is still possible.

The WSC is underlain by the Upper Cretaceous Aquifer (UCA), a shallow aquifer of low to moderate productivity. The main recharge source of this aquifer is the upward flow from the underlying Nubian Sandstone Aquifer (NSA), the main aquifer system in the region. This aquifer is of moderate to high productivity but lies at a considerable depth below ground surface.

6-2 Biological Baseline Conditions

The information below is derived from a literature review complemented by field surveys (a preliminary site visit, a biodiversity survey and bird monitoring surveys in two migration seasons).

Habitat: The habitats of the WSC area are all hyper-arid desert habitats.

Flora: The WSC is mostly devoid of vegetation, with total vegetation cover being 1.8%, mostly confined to topographic depressions. Three plant species that may occur in the WSC area are categorised as Vulnerable at the national level, but not of conservation concern at the global level: *Haloxylon scoparium* (Syn: *Hammada scoparia*) and Prickly Bassia (*Bassia muricata)*. Acacia trees (*Acacia ehrebergiana*, Syn: *Vachellia flava*) are present in a few locations.

Mammals: A few mammal species occur in the WSC. This includes Rüppell's fox (*Vulpes rueppellii*), the most widespread fox in Egypt, and the Red fox (*Vulpes vulpes*) and two rodents; the lesser Egyptian gerbil (*Gerbillus gerbillus*) and the lesser Egyptian jerboa (*Jaculus jaculus*) (Figure 7). Four bat species could occur at the WSC; Rüppel's pipistrelle (*Pipistrellus rueppelli*i), desert long-eared bat (*Otonycteris hemprichii*), Geoffrey's trident leaf-nosed bat (*Asellia tridens*) and the Greater mouse-tailed bat (*Rhinopoma microphyllum*), however, their presence could not be confirmed.

Figure 7: A lesser Egyptian jerboa (*Jaculus jaculus*) recorded from the WSC

Reptiles: Five lizard and two snake species were recorded in the WSC including the Red-spotted Lizard (*Mesalina rubropunctata*) (Figure 8).

Figure 8: A Red-spotted Lizard Observed in the WSC

Migratory Birds: The WSC is outside any of Egypt's known major migratory flyways. This was confirmed by extremely low intensity passage rates, of 0.038 and 0.82 migratory soaring birds (MSBs) per hour in the Spring and Autumn migration surveys, respectively. These are extremely low rates compared with other locations in Egypt. Over both Spring and Autumn, a total of 14 species were recorded. Four of these are globally threatened, but they were recorded in very small numbers. Figure 9 and Figure 10 show examples of these.

Figure 9: One of several Sooty falcons recorded near a local nesting site at the WSC

Figure 10: Juvenile Egyptian vulture recorded from the WSC during the Autumn survey

Resident Breeding Birds:

One local breeding bird species of conservation concern was recorded during the Autumn migration survey, the Sooty falcon (*Falco concolor*), which is likely to have nests nearby. This is a Vulnerable (VU) species globally and a Critically Endangered (CR) species at the Mediterranean level. None of the other locally breeding birds were of concern. Figure 11 shows a Trumpeter Finch recorded at the WSC.

Figure 11: A Trumpeter Finch seen in the easternmost edge of the WSC

Ecologically Sensitive Areas

The Om El-Dabadeeb proposed Protected Area overlaps with a small part of the WSC's southern section (Figure 12). The WSC does not overlap with any Important Bird Areas (IBAs) of Important Plant Areas (IPAs).

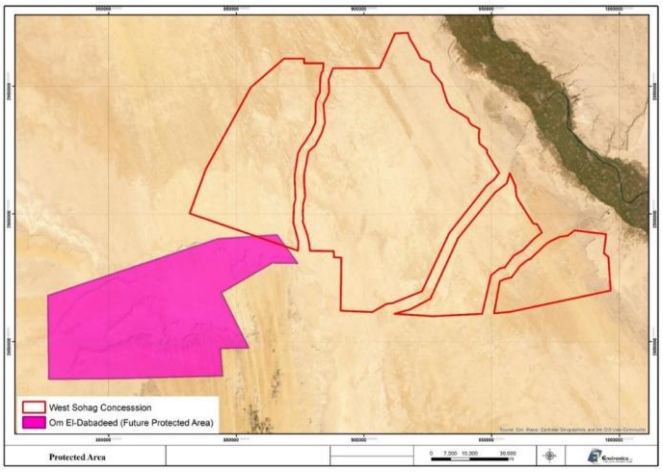

Figure 12: The Proposed Om El-Dabadeeb Protected Area

6-3 Socioeconomic Baseline

Land Use

The WSC is mostly uninhabited. However, an area of reclaimed land falls within a small area in the eastern part of the WSC which includes agricultural lands, water basins, solar panels and some residential buildings. Furthermore, a transmission line extends between the two easternmost parts of the WSC, and a small part of the largest part of the WSC. There are also a few buildings serving as rest-stops providing food and other utilities towards the eastern parts of the WSC. According to GOPP's 2050 spatial development plan, there are no land use changes planned.

Infrastructure and Utilities

All populated areas fall outside the development's direct AoI, and there are no local communities inhabiting the desert hinterlands of the contiguous governorates. In general, the concession does not have the resources to support such communities. The ESIAs of specific projects are expected to confirm this is true for the respective project areas in their assessment of potential impacts.

The governorates of New Vally, Qena, Assiut and Sohag are all well served by public water and electricity networks, but wastewater networks have a much lower coverage, with rural areas being underserved.

Road Network

- The Assiut – El Kharga Road is the main road that facilitates entry into any part of the WSC. The Giza – Aswan Road is also a major road that can provide access to the WSC. There are also several unpaved tracks that traverse the area
- Other roads in the areas surrounding the WSC do not provide access to it. These include the El Wahat Road, which will be connected to the Assiut – El Kharga Road by a road currently under construction.
- None of these are adequate for the transport of the project's components, and the main road, the Assiut – El Kharga Road, is in need of rehabilitation.

Closest Communities

The closest inhabited communities accessed via the Assiut – El Kharga Road from the concession west of the WSC are geographically very distant, the closest being 61.5 km away, in the New Valley Governorate. To the east, the closest local community is Al Hadaya Village, one of the villages belonging to Markaz Assiut, at a distance of around 63 km.

Population

- Assiut is the most populous governorate, followed by the Sohag and Qena governorates. In contrast, the New Valley Governorate is much larger in area but has a very low population.

- All of the contiguous governorates are recipients of internal migrants, with the exception of the Qena governorate, with more people emigrating out than immigrating into it. Nevertheless, migrant flows do not exceed 1% of population flows, except in the New Valley governorate where migrant flows account for around 3% of total flows.
- Poverty rates are higher than the national rate in all governorates
- Qena's illiteracy rate is almost at par with the national rate, while the NVG's illiteracy rate is less than half of the national rate

Labour Force

- The labour pool is large in the three Nile Valley governorates, particularly in Qena, but is limited in the New Valley governorate.
- Most of the workforce in the four Governorates are in one of three major education categories: intermediate technical education, (28-37%) university graduates (8-24%) and illiterate (29–34%).
- Unemployment is lower than the national average in all governorates, reaching about half of the national rate in Qena while approaching it in the NVG.

6-4 Cultural Heritage

The Western Desert in pre-historic times was greener and wetter than today and supported human populations and savanna animals. A desktop investigative study identified landscape features that indicated the potential presence of prehistoric sites (green diamonds in (Figure 13). This was followed by a survey of selected locations, with evidence of prehistoric occupation confirmed in five sites (yellow stars in Figure 13). Although the survey covered only a fraction of the WSC, it confirmed the prevalence of prehistoric human populations in the region and possibly widespread archaeological remains.

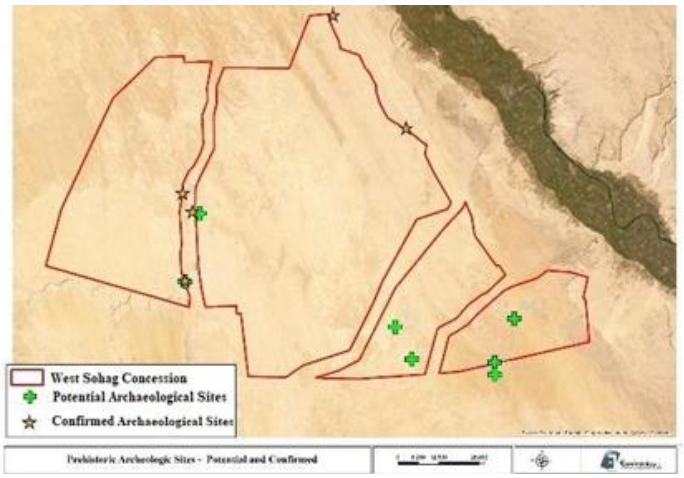

Figure 13: Potential and Confirmed Sites with Archaeological Remains

7- Potential Environmental and Social Impacts

The development of wind projects in the WSC has clear positive impacts on the national and local level, including the increase of the share of renewable energy thus avoiding exhaustion of natural resources and emissions of Greenhouse Gases (GHGs) as well as providing necessary inputs to the envisaged development of Green Hydrogen production. The development also creates large employment opportunities both during the construction and operation phases, as well as instigate the upgrading of regional infrastructure providing the basis for future economic development.

On the other hand, the ESR considered how the same development could result potential risks and impacts on communities, workers, and the environment, then identified measures to avoid, reduce, or otherwise mitigate the potential impacts.

7-1 Scoped Out Impacts

Noise, air pollution and visual impacts from activities on site on communities were scoped out during both construction and operation due to the large distances to these receptors. However, workers will be exposed to these aspects.

7-2 Potential Impacts

7-2-1 Construction Phase – Potential Impacts

Noise and Vibration

Site preparation, excavation, truck traffic (off and on-site), and the operation of heavy equipment and power generators, are the primary sources of noise and vibration on the site. These may cause impacts such as wildlife disturbance, nuisances to workers, and worker health. Noise barriers, PPE for workers, the proper maintenance of equipment, and other Good International Industry Practices are expected to be sufficient to reduce noise to acceptable levels.

Dust/Particulate Matter/Gaseous Emissions

Vehicle movement on-site levelling, excavation and backfilling activities, as well as the use of onsite diesel power generators are the main construction activities that would result in dust/PM/gaseous emissions. These emissions are likely to result in some on-site impacts (e.g., wildlife disturbance, worker health impacts). Vehicle movement off-site also may have potential impacts on nearby local communities. Mitigation measures will include implementing speed limits, maintaining engines, and spraying to suppress dust.

Water Consumption

Water requirements will be substantial during construction, primarily for concrete but also other construction needs and for workers' hygiene, sanitation, and drinking water. Potential impacts include overextraction from water wells or overloading of existing water treatment facilities. To minimise or mitigate these impacts, developers are expected to conduct water use assessments prior to making decisions on water consumption, to make decisions on sources in consultation with authorities, and to maximise reuse.

Wastewater Generation

Worker sanitation facilities will be the primary source of domestic wastewater during construction, with lesser amounts from water used to wash trucks and equipment and water wasted during concreting. Improper management could result in soil contamination, attract wildlife that would be exposed to dangerous conditions, and overtax wastewater treatment facilities. Developers will be expected to conserve water in this arid environment and limit wastage. Wastewater is expected to be stored in tanks on site and trucked for disposal in existing, newly established, or expanded wastewater treatment plant(s) (WWTPs). This will add to transportation impacts and represent an incremental load on the WWTPs. Thus, developers are expected to base decisions on detailed assessments, including of wastewater treatment capacity that may be available. They are also expected to contain wastewater onsite prior to off-site disposal in order to avoid/prevent wildlife accessibility.

Use of Hazardous Materials

Hazardous materials stored and used on project sites will include paints, solvents, lubricating oils, and diesel fuel for onsite generators and equipment. Other than diesel fuel, only relatively minor quantities of hazardous materials will be brought to sites and then stored and used. Spills and leaks during storage and handling of such materials may result in contamination of soil. No impacts would be expected on groundwater due to its depth. To prevent impacts, developers are expected to develop and implement Materials and Waste Management Plans that include protocols for hazardous material storage, use monitoring, and response planning.

Hazardous and Non-Hazardous (Solid) Waste Generation

Non-hazardous waste, mainly construction debris and domestic wastes, is expected to be trucked to existing disposal facilities, which will add to transportation impacts and represent an incremental load on these facilities. Only limited amounts of hazardous waste will be generated, including containers that held hazardous materials, spent oil, unused quantities of hazardous materials, and spill/leak cleanup media. Impacts of waste generation and management may include soil contamination, harm to workers, impacts on wildlife (including wildlife attracted to the area by the waste generated), and impacts on nearby communities due to exceeding the capacity of existing waste management

facilities. A Waste Management Plan including comprehensive guidelines for the transportation, storage, treatment and disposal of waste, are standard mitigation measures.

Transportation
Increases in traffic will be substantial throughout the construction phase due to the need to transport oversized turbine components, large amounts of materials, supplies, water, workers, and the removal of wastes and wastewater. The high traffic load could cause wear and tear and damage the roads, increase the risk of accidents, and expose people who live along the transportation routes to dust, exhaust emissions, and increased journey times for other road users. Developers are expected to prepare a Traffic Management Plan to manage and reduce these impacts as much as possible.

On-Site Movement
Impacts on construction workers and drivers (including injuries/fatalities), wildlife disturbance, and off-road/off-site damage could arise from the movement of heavy equipment and onsite movement of machinery. The above-mentioned Traffic Management Plan is expected to include well-marked site boundaries, off-limit areas, allowable routes (as well as the speed limits, vehicle pre-use checklists, and driver/worker training protocol mentioned above).

Large-scale Land Uptake
Impacts on the area used, including off-site transmission lines and access roads, could include damage to habitats, flora, fauna, and cultural heritage sites, and large-scale land transformation due to clearing and shaping. The concession is almost entirely devoid of human activities, except for an area of reclaimed land in its southeastern tip—this would be confirmed during project-specific ESIAs.. Wind project development would make the continued use of the land impossible permanently or at least for decades. This will affect the livelihood of the parties currently benefiting from the land. Nonetheless, negative impacts are expected to be reduced to some extent by designing projects with these site constraints taken into account, and by properly managing construction activities.

On the other hand, it is not expected there will be any land uptake that would affect private parties, thus no expropriation and impacts on ownership or livelihoods is anticipated. Since the routes of OHTLs, access roads, and other project-related facilities are not known yet, impacts on livelihoods cannot be identified. However, given the remote nature of the concession and its surroundings, significant or widespread adverse impacts are unlikely along most of their alignments.

Worker Influx
The construction of wind farms and associated facilities will create large employment opportunities. Some of the workforce will come from the surrounding governorates but a large influx of migrant workers is inevitable. This could put pressure on health services, water and food needs and could also entail overtaxing the labour market and could result in wage inflation and potential worker misbehaviour in local communities, including sexual exploitation, abuse, and/or harassment. Proactive strategies for avoiding negative worker-community relations and managing potential conflicts include ensuring that migrant workers spend their extended off-duty shifts (weekly, bi-weekly, or monthly) in their home communities. Developers will be expected to prepare Labour Management Plans that include measures to mitigate these impacts, including by establishing employment and procurement protocols/rules and enforcing a worker Code of Conduct. Furthermore, developers will be expected to develop a Stakeholder Engagement Plan (SEP) as well as Accommodation Management Plans that ensure worker welfare. These accommodation management plans are expected to meet or exceed the standards established in “Workers’ Accommodation: Processes and Standards - A Guidance Note” by the IFC and the EBRD. This guidance note includes guidelines for dormitories, sanitation, recreation, medical care, etc. which ultimately help prevent negative impacts on local resources. Developers may also refer to Environmental and Social Standard 2 (ESS2) “Labour and Working Conditions” of the World Bank’s Environmental and Social Framework, as a guideline towards good international practice for labour management.

Worker Occupational Health and Safety (OHS)

The construction workforce will be exposed to typical construction risks (e.g., exposure to air pollution and hazardous materials, injuries or fatalities from falls when working at heights, electrocutions when working with electricity, etc.) Workers will also be exposed to extreme climatic conditions, including high temperatures and sand/dust storms, as well as the potential exposure to venomous snakes and scorpions. The remoteness of the WSC and the distance from medical facilities increase the significance of the risks. It is expected that developers will prepare and implement a robust Occupational Health and Safety (OHS) Management Plan that assesses risks and sets out procedures to prevent illness and injury, as that they will provide medical facilities. As above, adhering to the general principles of ESS2 and referring to its guidance notes facilitates alignment with good international practices in labour management.

Biodiversity

Although construction activities at any project sites will be relatively short term and localised, the resulting land transformation will be essentially irreversible. The occupation of currently unused land will result in habitat loss, and noise, vibration, dust, emitted by equipment and moving vehicles will result in biodiversity impacts, including damage and destruction of local flora and the displacement of native fauna. These might also include the hunting/collection of wildlife by construction workers if not controlled. Most of the WSC is considered natural habitat with evidence of the presence of highly sensitive and valued receptors such as the Sooty Falcon. It also includes or near an area that could qualify as critical habitats to avoid or reduce impacts, it may be necessary to avoid disturbance of some critical areas including areas with dense vegetation or stands of Acacia, Sooty falcon nesting sites, and others that may support plant or animal species of conservation concern, or are in areas of critical habitat. It is expected that developers will prepare Biodiversity Management Plans that include pre-design surveys and other measures approved by the EEAA.

Cultural Heritage

Archaeological remains of past human occupation could be damaged or destroyed by construction activities. Thus, developers are expected to develop a Cultural Heritage Management Plan in consultation with the Ministry of Tourism and Antiquities (MoTA). These plans would generally require pre-design/construction surveys and the implementation of any measures to protect or preserve archaeological remains as specified by MoTA.

Potentially Significant Impacts

The following potential impacts during construction are expected to be of major significance.

- Land Transformation Impacts on biodiversity and cultural heritage
- Transportation impacts on roads, road users and communities along transport routes
- Worker Occupational health and safety
- Pressure on facilities and resources of nearby communities.

All of these are expected to be evaluated in detail in project-specific ESIAs and reduced with the implementation of appropriate mitigation measures.

7-2-2 Operation Phase – Potential Impacts

Many of the aspects and potential impacts of the operation phase are similar to those of the construction phase, but to a much lesser intensity and magnitude due to the smaller workforce and the lower and more localised level of activity. For most of these impacts, standard mitigation measures and impact/aspect sources, including those described above for the construction phase, will be effective in avoiding impacts or reducing impacts to acceptable levels. These include the following.

Air Pollution

Very limited emissions will result from vehicle movement and from engine combustion. Impacts will be minimal.

Water Consumption
Water demand will be longer-term but far lower. Again, careful water planning by developers and regional authorities will reduce impacts to acceptable levels.

Wastewater Generation
Wastewater generation will also be much less during the operation phase but again is long term. The facilities used for treating the larger amounts of construction wastewater during construction can be expected to serve the lower amounts during operation with minimal impact.

Use of Hazardous Materials
The use hazardous material during the operation phase will be much reduced, leading to minimal impact.

Hazardous and Non-Hazardous Waste Generation
The generation and management of waste and any resulting impacts will be minimal during operation, with the same facilities used.

Transportation
Transportation needs during O&M are much reduced compared to those of the construction phase and impacts are not likely to be significant, even cumulatively. It is considered likely the road system will be improved to support construction of projects, so impacts are likely to be positive over the longer term.

Worker Health and Safety
Risks to which workers are exposed are limited compared to those of the construction phase. As during the construction phase, risk assessment and implementation of mitigation measures, including continued medical services, with due reference to the general principles of ESS2, and applying to its guidance notes are expected to reduce the significance to minor.

Biodiversity
Impacts on habitats during operation could occur if vehicles or other activities move on land that had not been previously disturbed. Thus, developers are encouraged to restore and demarcate land no longer needed, and to prohibit movement on land that was not disturbed during construction.

Some impacts are specific to the operation phase, including:

Noise
The blades of operating turbines will generate a steady “whooshing” sound, exposing wildlife to continuous and long-term impacts. Similarly, workers could be affected in fixed workplaces or in their accommodations, or when working near turbines. Developers are expected to undertake noise modelling studies and to implement noise exposure reduction measures (e.g., noise barriers, PPE, worker accommodation location) as needed to avoid or reduce impacts on workers, and to monitor noise to verify it is within legal limits. Wildlife susceptible to noise impacts could be expected to avoid coming near operating turbines.

Air Space Obstruction
Air space obstruction impacts may result in migratory bird mortalities resulting from collisions with blades or transmission lines. However, as the WSC is located far from any major migratory bird pathways, impacts are expected to be minimal. Therefore, long-term monitoring during migration seasons or shut down on demand measures are not considered to be necessary. However, a seasonal carcass survey would allow confirmation that no mitigation was needed or alternatively could indicate the need for further assessment and mitigation. In addition, blade markings could reduce any potential impacts of the rotating turbine blades.

Shadow Flicker
Shadow flicker could affect workers in their accommodations on a long term and intermittent basis, although for only portions of the day during limited portions of the year. Workers during their off period

may be particularly sensitive to the visual nuisance this would cause. As such, developers will be expected to locate and design worker accommodation so that these are not subject to shadow flicker exceeding 30 hours per year or 30 minutes per day and to place barriers between turbines and workplaces and accommodations, if needed.

Electromagnetic Fields
Electromagnetic radiation, mainly from transmission lines, could have impacts on worker stations and accommodation as well as on local communities crossed by the lines. Developers are expected to maintain safe distances as required by law.

Potentially Significant Impacts
The following potential impacts during the O&M phase could be of moderate to major significance if not mitigated. Noise impacts on workforce and biodiversity

- Resource demand impacts on communities and pressures on utilities
- Shadow flicker impacts on workers accommodations
- Occupational health and safety of workers

All these impacts are expected to be assessed in detail in project-specific ESIAs and reduced to minor or negligible significance with the implementation of the appropriate mitigation measures.

8- Stakeholder Engagement

The ESR is accompanied by a Stakeholder Engagement Plan (SEP), which is a dedicated plan to develop and implement throughout the project lifecycle. The SEP includes a brief description of project operations and potential associated impacts, a brief review of the local legal framework and international requirements of consultation activities and project disclosure requirements It identifies and categorises potential project stakeholders. Furthermore, the SEP also includes a formalised grievance mechanism for use by external stakeholder groups, and a plan for disclosing project information and for receiving information from stakeholders.

Moreover, the SEP includes record(s) of prior consultation activities undertaken with a number of key stakeholders including the EEAA, relevant Governorates, regional universities, NGOs, the Red Sea Port Authority, the Ministry of Transportation, Roads and Bridges, potential developers, a representative of the Benban association, and the EETC. Several issues were consistently raised by stakeholders:

- The need for master planning to guide coordination between different organisations and parties, especially during construction, to minimise pressure on services, labour and resources, and to plan labour capacity building, manage impacts on labour retrenchment at the end of construction, and coordinate with authorities to maximise community benefits of construction investments.
- The contiguous Governorates are interested in local job opportunities provided by the project and are prepared to support developers' recruitment efforts and subcontractor procurement.
- Regional development opportunities could capitalise on the potential to kick-start a new community between the Nile Valley and the New Valley Governorates.
- Environmental protection, including ecological fragility, water, and cultural heritage preservation.
- Local community engagement, which could contribute to capacity building in cooperation with developers, educational institutions, and authorities. This could also support in identifying community needs, and informing communities of opportunities

9- Environmental and Social Management

In addition to the typical impacts of wind farms, which can usually be managed with standard mitigation measures, the West Sohag Concession faces unique challenges which require broader planning and coordination. These challenges, which are mentioned above, include:

Natural Characteristics of the Site: Surveys confirmed the fragility of desert habitats and ecosystems, with a few plants and animals of conservation concern that could be significantly impacted by the development.

Archaeological Remains: Surveys suggested widespread occurrence of artefacts across the concession.

Scale of the Concession: The massive scale of the works will place heavy demands on local and regional labour, water, waste facilities, building materials, and other resources.

Remoteness of the Concession and the Development: The concession area is far from population centres. Communities will not be affected by direct physical impacts (dust, noise), but they will face pressure from the demand for workers, water, waste and wastewater management, and supplies. While individual developers will be expected to minimize the impacts of their own projects, it will be necessary to account for the cumulative impacts of multiple developments, which will be beyond the capacity of any developer. Therefore, it is highly recommended that potential developers, in cooperation with the relevant Governorate authorities, develop a Master Plan to guide development. A second-best option would be for NREA to make available to developers the studies and surveys undertaken by other developers so they can take these into account in their own plans. Developers are also expected to consider effective approaches for benefit sharing, especially with the communities whose resources and utilities will be tapped.

9-1 Activities Proposed to be Undertaken Prior to Land Allocation

- **Resolve Issue of Reclaimed Land:** NREA would take the adequate measures to avoid negative impacts on the reclaimed lands located within the WSC. In this respect, the most practical approach is to exclude the reclaimed land from the wind farm development plans by relinquishing the area to the New Valley Governorate.
- **Ensure the Protection of Cultural Heritage:**
  The law requires the Antiquities Authority to be informed of any archaeological finds. Thus, MOTA should be consulted early in each project's development.
- **Ensure that Developers Implement Mitigation Measures**
  Upon approval by EEAA, the mitigation measures specified in this ESR will become conditions for proposed wind projects and the ESIAs prepared by individual developers will adopt these measures, or their equivalent, in terms of mitigation.

9-2 Activities Proposed to be Undertaken Following Land Allocation

Prior to Design

A number of surveys and assessments should be completed as part of project-specific ESIAs to ensure the following:

- Protection of aquifers
- Reduce pressure on regional infrastructure and capacities (labour, water, wastewater, waste)
- Protection of biodiversity, including in the area overlapping with the proposed protected area and near Sooty Falcon nesting sites
- Protection of cultural heritage

In addition, ESIAs prepared by developers will need to describe how they expect to overcome the logistical and resource constraints they will face in this remote area. In order to avoid or mitigate the potential impacts of the environment on the project, developers will also find it beneficial to undertake geophysical surveys and surveys of sand dune migration to optimize turbine placement.

Prior to Construction

Developers are expected to prepare E&S management plans that provide detailed measures for mitigation of impacts.

Prior to Operation

Developers are expected to refine the management plans and mitigation measures for operation. With a few exceptions, the construction plans will require little or no modification other than a reduction in the scale of effort required. Exceptions include the Emergency Preparedness and Response Plan, the OHS Plan, and the Biodiversity Management Plan, as well as a seasonal bird carcass survey.