AMUNET WIND FARM 500 MW AT GULF OF SUEZ

NON-TECHNICAL SUMMARY (NTS) IN ENGLISH

August 2023
REV 0
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1. INTRODUCTION

The energy sector is a key driver for the socio-economic development of Egypt, representing around 13% of current GDP and thus making economic growth in the country contingent upon the security and stability of energy supply.

Since 2007, Egypt has experienced an energy supply deficit due to the rapid increase in energy consumption and the depletion of domestic oil and gas resources, shifting its position as a net hydrocarbon exporter for the last three decades to that of a net importer.

This has brought a set of challenges to the energy sector, including electricity shortages, caused in part by the decline of domestic gas production, as natural gas is the main source of electricity, accompanied by highly subsidized energy prices, with negative financial implications for already dwindling government revenues.

In response, the Government of Egypt (GoE) has taken bold steps to adopt an energy diversification strategy with increased development of renewable energy and implementation of energy efficiency, including assertive rehabilitation and maintenance programs in the power sector (IRENA, 2018).

To this extent, in 2013, the Arab Republic of Egypt (through the Ministry of Electricity and Renewable Energy) had developed and adopted the Integrated Sustainable Energy Strategy (ISES) 2015 – 2035, which provides an ambitious plan to increase the contribution of renewable energy to 20% of the electricity generated by the year 2020, of which 12% of wind power plants is foreseen, mostly in the Gulf of Suez (GoS) due to the wind characteristics in the area.

In that respect, the GoE issued the Renewable Energy Law (Decree Law 203/2014) to support the creation of a favourable economic environment for a significant increase in renewable energy investment in the country. The law sets the legal basis for the Build, Own and Operate (BOO) scheme to be implemented. Through the BOO mechanism, the Egyptian Electricity Transmission Company (EETC) invites private investors to submit their offers for solar and wind development projects, for specific capacities and the award will be made to that bidder with the lowest Kilowatt Hour (kWh) price. In addition, the GoE (through the New and Renewable Energy Authority (NREA)) provides the land for the investors.

Through the BOO mechanism, a direct proposal was submitted by AMEA Power Ltd. to EETC for the development of a 500-Megawatt (MW) Wind Power Project in Red Sea Governorate (hereafter referred to as ‘the Project’). The direct proposal was accepted pursuant to the Council of Ministers approval in the Cabinet meeting number 120, held on 2 December 2020, and a Power Purchase Agreement (PPA) was signed on 13 December 2020.

AMEA Power Ltd. established the Amunet Wind Power Co. (AWPC) (hereafter referred to as ‘the Developer’ or ‘Project Company’), a wholly owned AMEA Power Ltd., responsible for the development, execution, and ownership of the Project.

2. PROJECT DESCRIPTION

2.1 Project Setting

The Project is located in the Red Sea Governorate of Egypt, around 230km to the southeast of the capital city of Cairo. More specifically, the Project is located near the Red Sea shoreline and within the Ras Ghareb District of
the Red Sea Governorate, where the closest residential areas include Ras Ghareb city (located 9km to the southeast) and Zaaafarana village (65km to the north) – refer to figure below.

The Project is located within a 284km² area that has been allocated by the GoE to NREA for development of wind farms (presented in green in the figure below). Within this, a land area of 69.4km² (presented in blue in the figure below) has been allocated to the Developer by NREA for the development of this Project.

Figure 1 Project Site in Relation to the Capital City of Cairo

Figure 2 Project Site and Nearest Villages
Table 1: Project Site Coordinates

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2.2 Project Components

Wind turbine technology relies on harvesting the kinetic energy in wind (i.e. movement of wind) and turning it into mechanical energy which in turn is used for electricity generation. The key components of the Project include the following:

- **Wind Turbines**: a typical wind turbine is presented in the figure below. For this Project, there will be 77 wind turbines occupying the project site, each with a capacity of 6.5 MW with a hub height of 94.5 m, a rotor diameter of 171 m and a total tip height of 180 m.

- **Supporting infrastructure and utility** elements for the Project which will include:
- Cables that will connect the turbines to an onsite substation
- Substation that converts the output from the turbines to a voltage that is appropriate for connection with the National Grid
- Onsite building infrastructure that will include an administrative building (offices) and a warehouse for storage of equipment and machinery
- Road network for ease of access of various project components throughout the site

**Associated facilities** which will mainly include an Overhead Transmission Line (OHTL) that will connect from the substation onsite to the National Grid.

![Figure 4: (a) Typical Structural Components of a Wind Turbine, (b) Typical Components of a Wind Farm](image)

### 2.3 Project Phases

The Project will include 3 distinctive phases as follows:

- **Design and Construction Phase** that will include: (i) preparation of the detailed design, (ii) transportation of components to the site, (iii) site preparation activities (land clearing, excavations, etc.), and (iv) installation of components.
- **Operation Phase** that will include the normal daily operation of the wind farm and the undertaking of maintenance activities as required.
- **Decommissioning Phase** that will include the dismantling of the various Project components at the end of the life time.

According to the current timeline, construction of the Project is anticipated to commence approximately April 2024, and will require approximately 18 months for construction and commissioning (i.e. till January 2026). Operation of the Project is therefore anticipated to commence in 2026 for a period of 20 years.
3. SUMMARY OF ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS & IMPACTS

3.1 Introduction

The Environmental and Social Impact Assessment (ESIA) comprised environmental and social baseline studies and an assessment of impacts. Mitigation measures, which are included in the ESMP, were identified for potential significant effects and the significance of residual effects determined. The impact assessment followed an assessment methodology developed to reflect current best practice. The key baseline and impact assessment findings are further discussed below.

3.2 Environmental & Social Baseline Conditions & Impacts

(i) Landscape and Visual

Based on the site visit undertaken for the Project area and the 4-5km radius, no critical visual receptors were identified. In addition, based on the literature review and consultations, no critical visual receptors were identified within the 15km radius with the exception of Ras Ghareb city located at around 9km to the southeast. There are several receptors located within the 15km radius; however those do not classify as key visual receptors. This includes an Air Force Defence Unit, several Petroleum facilities, other wind farm development projects, dams, and other.

Figure 5 View and Landscape of the Project Area

Other key critical visual receptors are located at a distance from the Project area. This includes for example: (1) Zaafarana village located at more than 65 km to the north west; (2) closest key archaeology/cultural heritage site (harbour complex dating to the Old Kingdom located at more than 30 km away), (3) key biodiversity areas (Gabal El Zeit Important Bird Area located near the Project site – refer to following section for more information on the IBA); (4) a touristic resort located 40 km to the north; (5) the nearest police mobile station is located about 5 km from the site on the Ras Ghareb – Sheikh Fadl Road.

There are no mitigation measures, per se, that can be implemented to eliminate visual impacts. Additionally, no mitigation measures are required.

(ii) Land Use

The Project site includes some petroleum mining activities that had been operated by the General Petroleum Company (GPC).
A detailed land use survey was undertaken for the Project site and a 4-5km radius to document and understand any land use activities undertaken such as physical activities (houses, structures, etc.) or economical activities (such as grazing, agricultural, petroleum activities, etc.).

Based on the site surveys and assessment, the only land use activity noted within the Project site and 4-5km radius include mainly petroleum activities that had been operated by the General Petroleum Company (GPC). There are no lodging facilities in these facilities identified above.

Concerning areas of critical concern, the project site minimally overlaps with the Gebel el Zeit Important Bird Area (IBA).

Apart from areas indicating prior petroleum activities, the area in general is uninhabited and vacant with no indication or evidence of any physical or economical land use activities throughout the Project site as indicated in the SESA as well as the land use survey.

Land use activities outside the project site but within the vicinity include a police mobile station, which is located about 5 km from the site on the Ras Ghareb – Sheikh Fadl Road; an Air Force Defence Unit located around 9km to the north.

Apart from the above, it is important to note that area is under the “Ghafra System” of Bedouin Groups (although they have no physical or economical activities within the site), which entails involving such Bedouin groups in the Project (through jobs, services, etc.) for their support. In particular, the key Bedouin Groups known in the area is the Ma’aza Tribe.

Taking the above into account, there are no physical or economical displacement impacts anticipated from the development of the Project and no key issues of concern are expected. Nevertheless, the ESIA identifies mitigation measures to be implemented by the Developer at the planning stage to include:

- Establish coordination via NREA/EETC with the relevant entity (such as General Petroleum Company) to agree on any specific requirements to be taken into account as part of the detailed design for existing facilities such as the petroleum storage facility and oil rig, amongst other requirements; and
- Establish coordination with the Bedouin Groups for inclusion and engagement in employment opportunities during construction and operation to obtain their support.
- No turbines nor project activities are to be permitted to occur within the 1km² overlap with the IBA.

(iii) Hydrology and Hydrogeology (Soil and Groundwater)

Key impacts related to the Project include potential for flood risks which could affect the Project site during the rainy season and especially during flash flood events. The Project site is located is intersected by the outlet of Wadi Hawashiya in the North that could contribute to significant flooding. Flood protection facilities have been constructed to reduce the risk of flash floods due to heavy rainfall. Three dams have been constructed within the wadi extending from the Project sites northwestern edge and are considered sufficient in their mitigative capacities.

Nevertheless, a standalone flood risk assessment was undertaken which concluded the following:

- Turbines were considered to be generally safe and are far from the expected places of surface runoff during severe rainstorms as they mostly placed in elevated locations and therefore considered naturally protected. However, this assessment should be refined during the detailed design to identify the specific turbines which may need additional or supplementary protection.
- Drainage lines impact on the roads within the site is not significant. Therefore, in some places, simple cement culverts with a diameter of one meter at most can be placed to accommodate the surface flow and prevent its flow up the road.
Other potential impacts are mainly from improper housekeeping practices during construction and operation (such as illegal disposal of waste to land) which could contaminate and pollute soil which in turn could pollute groundwater resources. The ESIA has identified adequate mitigation measures which aim to control such impacts and ensure proper conduct, waste management and housekeeping practices are implemented. With the implementation of such measures the impact is considered not significant.

Figure 6: Flood Risk Areas and Location of Dams

(iv) Biodiversity

The biodiversity baseline assessment concluded that the Project site has low vegetation cover with a low number of species (as expected in a desert) and with only few species of conservation concern. The diversity is that typical of the Egyptian Red Sea coast with no exceptional features. In addition, no key or sensitive habitats were recorded within the Project site, and all floral and faunal species recorded where in general considered common and typical to such habitats and generally of least concern. However, special consideration should be given to the globally threatened Egyptian Dabb Lizard *Uromastyx aegyptia*, Nubian Ibex (Capra nubiana) and the Dorcas Gazelles (*Dorcas Gazelle*) since the Project site provides a typical habitat for the species.

The main impacts on biodiversity is related to construction activities altering the site’s habitat and thus potentially disturbing existing habitats. Other impacts are mainly from improper conduct and housekeeping practices by workers (i.e. hunting of animals, discharge of hazardous waste to land, etc.) during the construction and operation phase. The ESIA has identified adequate mitigation measures which aim to control such impacts and ensure proper conduct and housekeeping practices are implemented. With the implementation of such measures the impact is considered insignificant.

However, the ESIA requires the following mitigations to be implanted:
Prior to construction, a detailed Egyptian Dabb Lizard survey should be undertaken for all construction active areas. Should it be identified, the survey should aim to capture and relocate the Dabb Lizard to outside of construction active areas to a similar habitat based on demonstrated good practice.

Implement proper management measures to prevent damage to the biodiversity of the site. This could include establishing a proper code of conduct and awareness raising / training of personnel and good housekeeping.

(v) **Birds (avi-fauna)**

A baseline assessment was undertaken that included an avifauna survey that studied the use of the migratory and resident soaring birds of the Project site, while providing a detailed analysis of the durations that these species use the site and the elevations at which they are present, which would eventually provide an in-depth understanding of the predicted impact of the Project on bird species.

The survey was undertaken through eight (8) observation points that covered the spring 2020, 2021 and 2022 and autumn 2020 and 2021 bird migration seasons. In total, a maximum of (2) VPs were covered daily, where each observation period covered a minimum of 8 hours per day: in spring 2020 – 2,551 hours, 2021 – 2,894 hours, 2022 – 2,157 hours, and in autumn 2020 – 2,815 hours and 2021 – 3,098 hours.

In spring 2020, a total of 194,353 individuals (3,791 records) were recorded while in spring 2021, the total number accounted for 162,848 individuals (2,503 records) of another 23 species and in 2022: 98,648 individuals, 1,924 records and 26 species were recorded in spring, 22 – autumn seasons.

The most abundant species during spring monitoring seasons were the White Stork, Great White Pelican and Honey Buzzard. As for the autumn seasons, the most abundant species also included White Stork, Great White Pelicans and Eurasian Honey Buzzard, with the addition of the Black Kite and Western Marsh Harrier.

Five (5) species were classified as Vulnerable (VU) according to the IUCN Red List: Eastern Imperial and Greater Spotted eagles (Vulnerable), Sooty Falcon (Vulnerable), Egyptian Vulture (Endangered), Steppe Eagle (Endangered), Pallid Harrier (Near Threatened).

Since birds are considered as a key issue, including all soaring birds in the project area, which are protected by both national and international laws and regulations, regardless of their conservation status, a special focus should be given on all species where all species should be recorded and all species that are significant and local levels are important for the area, regardless their numbers.
Key impacts anticipated on birds is during the operation phase and mainly related to risk of bird strikes and collisions with rotors of the operating wind turbines. However, to control such impacts, an Active Turbine Management Plan (ATMP) will be implemented during the operation phase that will include:

- Avi-Fauna Monitoring and On-Demand Turbine Shutdown where during the migration seasons, daily onsite monitoring will be undertaken to shutdown turbine during risky situations to migrating birds to avoid collisions; and
- Fauna Carcass Search that will demonstrate the effectiveness of mitigation measures such as turbine shutdown and allow an estimation of the annual number of bird deaths caused by the turbines.

(vi) Bats

Overall, the site is expected to be of low significance in terms of bat activity. Low bat activity is expected within the area due to arid nature and low vegetation coverage.

Key impacts anticipated on bats is during the operation phase and mainly related to risk of bat strikes and collisions with rotors of the operating wind turbines. Such impacts are anticipated to be not significant due to low activity excepted as roosting sites for bats were not observed on the Project site.

(vii) Archaeology and Cultural Heritage

An archaeological baseline survey was conducted for the Project site. The assessment concluded that there were no records of any sites of interests or significance within the Project area.

The main impact anticipated is during the construction phase from site preparation activities. While there are no impacts anticipated, there is a chance that during construction activities, archaeological remains buried in the ground could be discovered. Improper management (if such sites are discovered) could potentially disturb or damage such sites. Nevertheless, the ESIA requires the implementation of chance find procedures if such remains in the ground be discovered throughout the construction phase. With the implementation of such measures the impact is considered not significant.
(viii) **Air Quality and Noise**

An air quality and noise baseline was undertaken for the Project area. The baseline consisted of a monitoring program targeting key pollutants at 4 points for a total duration of 24 hours at each point. The air quality baseline concluded that the results are significantly lower than the maximum allowable ambient air levels indicated within the legal limits.

With regards to noise, the levels at all monitoring points were within the maximum allowable noise limits set for the area for local limits as well as IFC/WB EHS Guidelines with no exceedances recorded.

Construction and operation activities of wind power project are passive in nature and do no result in any key air emissions or significant noise sources. However, construction activities may increase level of dust and particulate matter emissions, which will temporarily impact ambient air quality. Moreover, the use of machinery and equipment are expected to be a source of noise and vibration within the Project site and its surroundings.

As part of the ESIA, appropriate mitigation measures have been identified for dust suppression and noise control and which will be implemented during the construction phase. This includes for example regular watering of all active construction areas, proper management of stockpiles, the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery, etc. With the implementation of such measures the impact is considered not significant.

(ix) **Infrastructures and Utilities**

**Water Resources and Utilities** – the Project is expected to require water throughout the construction phase. This will include water for construction requirements (concrete works, minimize dust, etc.) and potable use (drinking, washing, etc.). Similarly, during the operation phase, water will mainly be required for potable use of onsite staff but is expected to be minimal and insignificant. The Contractor and Operator are required to coordinate with Ras Ghareb Water Company to secure water requirements for the Project, most likely through tankers.

**Waste Utilities** – solid waste, wastewater and hazardous waste generated during the construction and operation phase will be minimal and is expected to be managed and disposed through coordination with relevant authorities for disposal of waste streams (e.g. Ras Ghareb Water Company and Ras Gharib City Council).

**Road Networks:** Given the increasing size, weight, and length of components of the wind turbines, proper transportation and logistical solutions could be required for managing the heavy-load long-haul requirements. If improperly planned and managed, trucks hauling the various heavy Project components may damage existing roads, highways, bridges, utility lines (e.g. electricity lines), and could also be a public safety concern for other vehicles on the road. The Contractor will be required to prepare a Traffic and Transport Plan before commencement of any transportation activities to ensure that process is properly and adequately managed.

**Aviation and Telecommunication:** Improper planning and site selection of the Project could impact and affect infrastructure elements related to aviation, telecommunication and television & radio links in the surrounding area. ESIA requires establishing coordination with relevant entities to provide information on the Project and include any specific requirements to be considered as part of the detailed design.

(x) **Socio-economic Conditions**

The main impact anticipated on socio-economic conditions is related to potential job opportunities for local communities from the Project during construction and operation. However, such impacts are limited taking into account the nature of activities. No details are available at this stage on the number of job opportunities targeted to local communities, type of jobs, duration, etc.

Taking the above into account, the Project is committed to ensuring that priority for job opportunities are targeted for local community members to the greatest extent possible throughout the construction and operation phase for skilled and unskilled jobs.
At a later stage, a local recruitment procedure will be developed by the Contractors and Operator, under supervision from the Project. The procedure will identify the number of job opportunities targeted for local communities and recruitment process will be undertaken through the Governorate’s Labor Office. Based on that, the recruitment procedure will also include a selection process that is fair, transparent and provides equal opportunities for all including females.

In addition, the Project will also implement a Social Responsibility Program that will be implemented for the local communities based on their needs and requirements.

(xii) **Occupational Health and Safety and Worker Accommodation**

During the construction and operation phase there will be generic occupational health and safety risks to workers, such as working on construction sites, exposure electric shock hazards during maintenance activities, working at heights, etc. The ESIA requires that the Contractor and Operator prepare an Occupational Health and Safety Plan (OHSP) tailored to the Project’s site and activities. Such plans aim to ensure the health and safety of all personnel in order to concur and maintain a smooth and proper progress of work at the site and prevent accident which may injure personnel. With the implementation of such measures the impact is considered not significant.

In addition, the Contractors will prepare a worker accommodation plan, which will define the minimum health and safety standards and principles for worker accommodation and ensure impacts on community health and safety from worker influx are managed and controlled. This could include impacts related to pressure on infrastructure, services and utilities, introduction of new reservoirs of diseases, inappropriate code of conduct by workers towards local communities, possible increase in social vices, and other.

(xii) **Community Health, Safety, and Security**

During construction and operation phase the main impacts on community health, safety and security include the following:

- Wind turbines produce noise during operation. In addition, operating turbines also produce shadow flicker effects which occur when the sun passes behind the turbine and casts a shadow away from the turbine’s location. As the rotor blades rotate, shadows pass over the same point causing an effect known as ‘shadow flicker’. Both noise and shadow flicker could be a source of nuisances and disturbances. However, within the Project site and surrounding there are no sensitive receptors that could be affected by such impacts and therefore this is considered irrelevant.

- Trespassing of unauthorized personnel into the Project site and which could result in potential risks from several hazards of the various Project components. Nevertheless, it is expected that as part of the detailed design the security measures to prevent unauthorized access to the Project site will be identified which in turn will control any such impacts. This could include onsite security guards, fencing of some Project components (substation area), onsite surveillance and other.

- Inappropriate management of security issues and incidents by security personnel towards local communities could result in resentment, distrust and escalation of events. Nevertheless, a Security Management will be prepared which will identify appropriate measures for hiring, rules of conduct, training, equipping, and monitoring of security personnel to control and manage such issues.

4. **ENVIRONMENTAL & SOCIAL MANAGEMENT**

The ESIA includes and Environmental and Social Management Plan (ESMP) which provides a high-level outline plan for managing and monitoring the environmental and social impacts during construction, operation and
decommissioning of the Project. The ESMP identifies the mitigation measures which aim to eliminate and/or reduce the potential impact to acceptable levels and monitoring actions to ensure that the identified mitigation measures are implemented.

In addition, the development and implementation of an Environmental and Social Management System (ESMS) during the construction and operation is considered a key requirement under EBRD and IFC requirements. Therefore, the Developer also prepared a Health, Safety, Social and Environmental (HSSE) Management System (MS) Manual which includes the following:

- Identification of the overall structure and outline for the HSSE MS that will be implemented for the Project during both construction and operation;
- Identification and outline of the key procedures and plans to be developed at a later stage by the Contractors and Operator that will handle the key impacts and risks during construction and operation (e.g. air quality management plan, waste management plan, etc.)
- Identification of an institutional framework to ensure that such plans and procedures are implemented effectively and efficiently. This includes identification of roles and responsibilities, training requirements, monitoring and reporting requirements, and other as applicable;
- Identify approach for periodically auditing entities involved during the construction and operation phase to ensure that HSSE MS requirements are implemented effectively;
- Identification of a high-level framework for labour management that should be adhered to during the construction and operation phase; and
- Identification of a strategy and commitment in relation to local hiring and community support initiatives.

5. STAKEHOLDER ENGAGEMENT PLAN (SEP)

Stakeholder consultation and engagement activities were undertaken as part of the ESIA process. This included consultations with national governmental entities, regional/local governmental entities, Non-Governmental Organizations (NGOs), local communities and others. In general, stakeholders were supportive of the Project and all comments and issues of concern raised throughout such consultations were taken into account and considered within the ESIA process.

In addition to the above, a Stakeholder Engagement Plan (SEP) has also been developed for the Project that will be implemented by the Developer. The SEP identifies in details the stakeholders that are relevant to the Project to include local communities, national governmental and permitting authorities, local government, Non-Governmental Organizations (NGOs) and other. The SEP identifies previous stakeholder engagement activities undertaken for the Project and the key outcomes of such engagement activities. This included in particular several entities such as Red Sea Governorate, Ras Gharib City Council, Bedouin Groups, General Petroleum Company and other. In addition, it also describes the outcomes of a public disclosure session that was undertaken in Ras Gharib City with local communities and other key local governmental entities.

The SEP also identifies in detail a future stakeholder engagement strategy and plan which identifies activities that will be undertaken throughout the Project duration, which provides an opportunity for all stakeholders, including local communities, to express their views and interact with the Project.

The SEP also includes a stakeholder grievance mechanism that is responsive to any concerns and complaints from affected stakeholders and communities.