



## Site-Specific Environmental and Social Impact Assessment (ESIA)

NIAT and RASGHA 500 MW Wind Farm in Gulf of Suez, Egypt

Draft Environmental and Social Impact Assessment (ESIA)

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## LIST OF ABBREVIATIONS

<b>Acronym</b>	<b>Definition</b>
<b>ACFTU</b>	All-China Federation of Trade Unions
<b>ATMP</b>	Active Turbine Management Plan
<b>BERR</b>	Department for Business, Enterprise and Regulatory Reform
<b>BHRRC</b>	Business and Human Rights Resource Centre
<b>BMP</b>	Biodiversity Management Plan
<b>BMP</b>	Bird Migration Protocol
<b>BOO</b>	Build, Own, Operate
<b>BOP</b>	Balance of Plant
<b>CAAs</b>	Competent Administrative Authorities
<b>CAPMAS</b>	Central Agency for Public Mobilization and Statistics
<b>CBD</b>	Convention on Biological Diversity
<b>CBO</b>	Community Based Organization
<b>CEA</b>	Cumulative Effects Assessment
<b>CHA</b>	Critical Habitat Assessment
<b>CITES</b>	Convention on International Trade in Endangered Species of Wild Flora and Fauna
<b>CLO</b>	Community Liaison Officer
<b>CO</b>	Carbon Monoxide
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>COVID</b>	Corona Virus
<b>CRM</b>	Collision Risk Model
<b>CSR</b>	Corporate Social Responsibility
<b>DEM</b>	Digital Elevation Model
<b>E&amp;S</b>	Environmental and Social
<b>EBRD</b>	European Bank for Reconstruction and Development
<b>EEAA</b>	Egyptian Environmental Affairs Agency
<b>EETC</b>	Egyptian Electricity Transmission Company
<b>EGP</b>	Egyptian Pound
<b>EGPC</b>	Egyptian General Petroleum Corporation
<b>EHS</b>	Environmental, Health & Safety
<b>EHSS</b>	Environmental, Health, Safety and Social
<b>EIA</b>	Environmental Impact Assessment
<b>EM</b>	Environmental Management
<b>EMP</b>	Environmental Management Plan
<b>EMU</b>	Environmental Management Unit
	Engineering, Procurement, and Construction
<b>ESHS-MS</b>	Environmental, Social, Health and Safety Management System
<b>ESIA</b>	Environmental and Social Impact Assessment
<b>ESMP</b>	Environmental and Social Management Plan
<b>ESR</b>	Environmental and Social Requirement (EBRD)
<b>ESS</b>	Environmental and Social Standard
<b>ETSU</b>	Energy Technology Support Unit
<b>ETUF</b>	Egyptian Trade Union Federation
<b>FGD</b>	Focus Group Discussion
<b>FGM</b>	Female Genital Mutilation
<b>GBVH</b>	Gender-Based Violence and Harassment
<b>GDP</b>	Gross Domestic Product
<b>GHG</b>	Greenhouse Gas
<b>GIIP</b>	Good International Industry Practice
<b>GIS</b>	Geographic Information System
<b>GoE</b>	Government of Egypt



<b>GoS</b>	Gulf of Suez
<b>GPG</b>	Good Practice Guide
<b>GPS</b>	Global Positioning System
<b>GWh</b>	Gigawatt Hour
<b>H&amp;S</b>	Health and Safety
<b>HDI</b>	Human Development Index
<b>HEPCA</b>	Hurghada Environmental Protection and Conservation Association
<b>HIV</b>	Human Immunodeficiency Virus
<b>HR</b>	Human Resources
<b>HRDD</b>	Human Rights Due Diligence
<b>HSE</b>	Health, Safety and Environment
<b>HW</b>	Hazardous Waste
<b>IBA</b>	Important Bird Area
<b>IBAs</b>	Important Bird Areas
<b>IFC</b>	International Finance Corporation
<b>IFI</b>	International Financing Institutions
<b>ILO</b>	International Labour Organization
<b>IOA</b>	Institute of Acoustics
<b>IRENA</b>	International Renewable Energy Agency
<b>ISES</b>	Integrated Sustainable Energy Strategy
<b>ISO</b>	International Organization for Standardization
<b>IUCN</b>	International Union for Conservation of Nature
<b>IWGIA</b>	International Work Group for Indigenous Affairs
<b>KPI</b>	Key Performance Indicators
<b>LC</b>	Least Concern (IUCN status)
<b>LGU</b>	Local Government Unit
<b>LoS</b>	Line of Sight
<b>MoM</b>	Minutes of Meeting
<b>MS</b>	Management System
<b>MSB</b>	Migratory Soaring Birds
<b>MSDS</b>	Material Safety Data Sheet
<b>MSW</b>	Municipal Solid Waste
<b>MV</b>	Medium Voltage
<b>MW</b>	Megawatt
<b>NCHR</b>	National Council for Human Rights
<b>NE</b>	Northeast
<b>NGO</b>	Non-Governmental Organization
<b>NO<sub>2</sub></b>	Nitrogen Dioxide
<b>NO<sub>x</sub></b>	Nitrogen Oxides
<b>NPL</b>	Noise Pressure Levels
<b>NREA</b>	New and Renewable Energy Authority
<b>NSR</b>	Noise Sensitive Receiver locations
<b>NTRA</b>	National Telecom Regulatory Authority
<b>NTS</b>	Non-Technical Summary
<b>NW</b>	Northwest
<b>O&amp;G</b>	Oil and Gas
<b>O&amp;M</b>	Operation and Maintenance
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>OHL</b>	Overhead Line
<b>OHS</b>	Occupational Health and Safety
<b>OHSP</b>	Occupational Health and Safety Plan
<b>OHTL</b>	Overhead Transmission Line

<b>OSH</b>	Occupational Safety and Health
<b>OSHA</b>	Occupational Safety and Health Administration
<b>PBF</b>	Priority Biodiversity Features
<b>PCFM</b>	Post-Construction Fatality Monitoring
<b>PM</b>	Particulate Matter
<b>POPs</b>	Persistent Organic Pollutants
<b>PPA</b>	Power Purchase Agreement
<b>PPE</b>	Personal Protective Equipment
<b>PR</b>	Performance Requirement
<b>PS</b>	Performance Standard
<b>PV</b>	Photovoltaic
<b>RAP</b>	Recognized Air Picture
<b>RAMSAR</b>	Ramsar Convention on Wetlands
<b>RCREEE</b>	Regional Centre for Renewable Energy and Energy Efficiency
<b>RIGW</b>	Research Institute for Groundwater
<b>RoW</b>	Right of Way
<b>RVRSF</b>	Rift Valley/Red Sea Flyway
<b>SCA</b>	Supreme Council of Antiquities
<b>SCADA</b>	Supervisory Control And Data Acquisition
<b>SCS</b>	Soil Conservation Service
<b>SE</b>	Southeast
<b>SEAH</b>	Sexual Exploitation, Abuse and Harassment
<b>SEP</b>	Stakeholder Engagement Plan
<b>SESA</b>	Strategic and Cumulative Environmental and Social Assessment
<b>SGRE</b>	Siemens Gamesa Renewable Energy
<b>SNH</b>	Scottish Natural Heritage
<b>SO<sub>2</sub></b>	Sulphur Dioxide
<b>SPV</b>	Special Purpose Vehicle
<b>SRTM</b>	Shuttle Radar Topography Mission
<b>SW</b>	Southwest
<b>TBD</b>	To Be Determined
<b>TBT</b>	Tool Box Talks
<b>TEOW</b>	Terrestrial Ecoregions of the World
<b>ToR</b>	Terms of Reference
<b>TSP</b>	Total Suspended Particulate
<b>TV</b>	Television
<b>TVET</b>	Technical and Vocational Education and Training
<b>TVOC</b>	Total Volatile Organic Compound
<b>UK</b>	United Kingdom
<b>UN</b>	United Nations
<b>UNDP</b>	United Nations Development Programme
<b>UNGP</b>	United Nations Guiding Principles on Business and Human Rights
<b>UNICEF</b>	United Nations Children's Fund
<b>VHF</b>	Very High Frequency
<b>VP</b>	Vantage Points
<b>VPS</b>	Vantage Point Survey
<b>WB</b>	World Bank
<b>WGS</b>	World Geodetic System
<b>WHO</b>	World Health Organization
<b>WMRA</b>	Waste Management Regulatory Authority
<b>WTG</b>	Wind Turbine Generator
<b>WWTP</b>	Wastewater Treatment Plant

**XUAR**

Xinjiang Uyghur Autonomous Region

## 1 INTRODUCTION

### 1.1 Background

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 originally targeted 20% renewable electricity by 2022, a goal subsequently revised upward to 42% by 2030 and 60% by 2040 as Egypt accelerated its energy transition.

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, Special Purpose Vehicles (SPV) NIAT and RASGHA for Wind Energy (hereafter referred to as ‘the Developer’), has been selected for the development of a 500-Megawatt (MW) Wind Power Project (hereafter referred to as ‘the Project’). The Project is located in the Gulf of Suez (GoS) on a land area of 73km<sup>2</sup> provided by NREA.

Note: it is important to note that the ESIA was developed in 2021 / 2022 and at that stage the Project development did not progress. Therefore, the ESIA has been updated in 2026.

### 1.2 Project Location and Components

The Project is located in the Red Sea Governorate of Egypt, around 250km 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 8km to the east) refer to the figure below.

The Project is located within a 300km<sup>2</sup> Strategic Area that has been allocated by NREA for wind farm development Projects with a total capacity of 1,500 MW. Refer to Figure 3 for the Strategic Area location in relation to the Project site. A strategic ESIA study has been undertaken for the 300km<sup>2</sup> area known as the “SESA for an Area of 300km<sup>2</sup> at the Gulf of Suez” (Lahmeyer & Ecoda, 2013) (hereafter referred to as “Strategic ESIA”), where this Strategic ESIA investigated the Environmental and Social (E&S) issues at the cumulative and strategic level. Within this, a land area of 73km<sup>2</sup> (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 Egypt



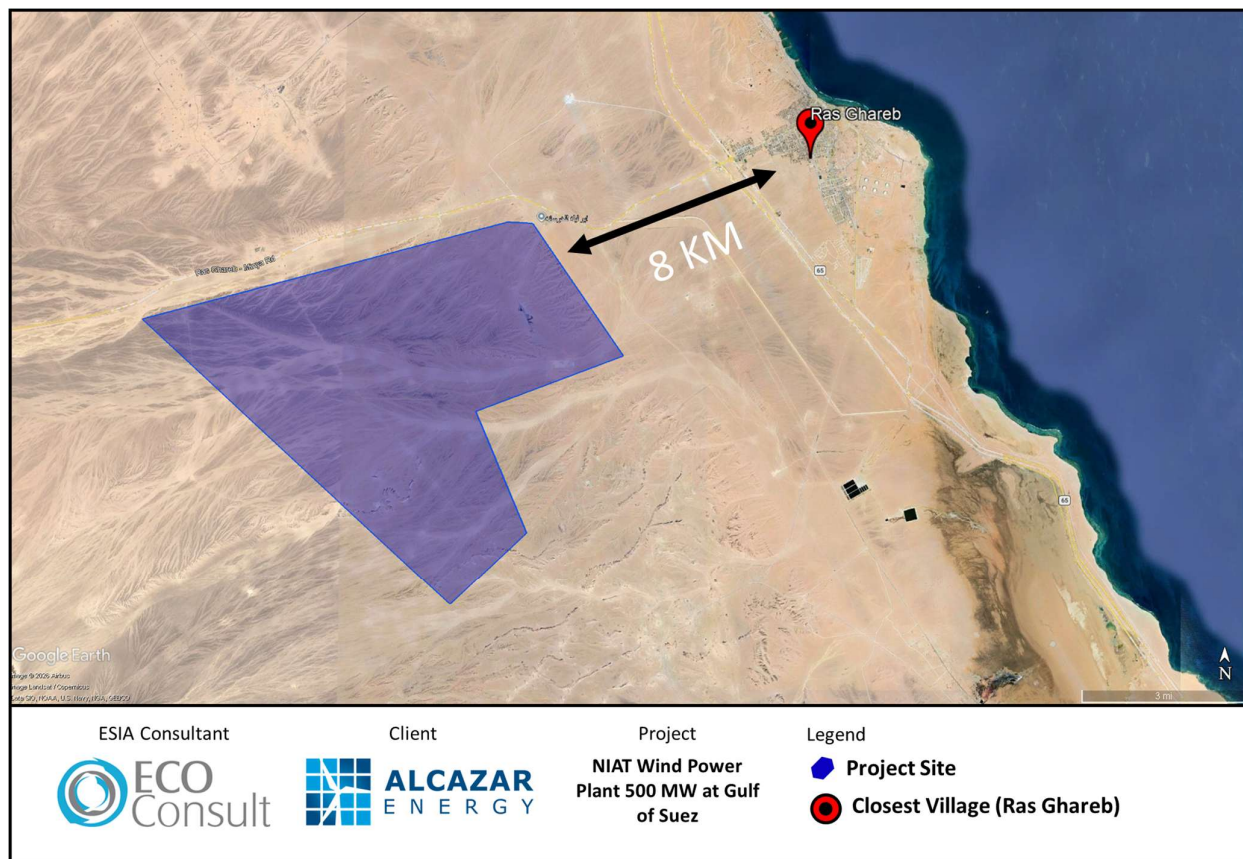
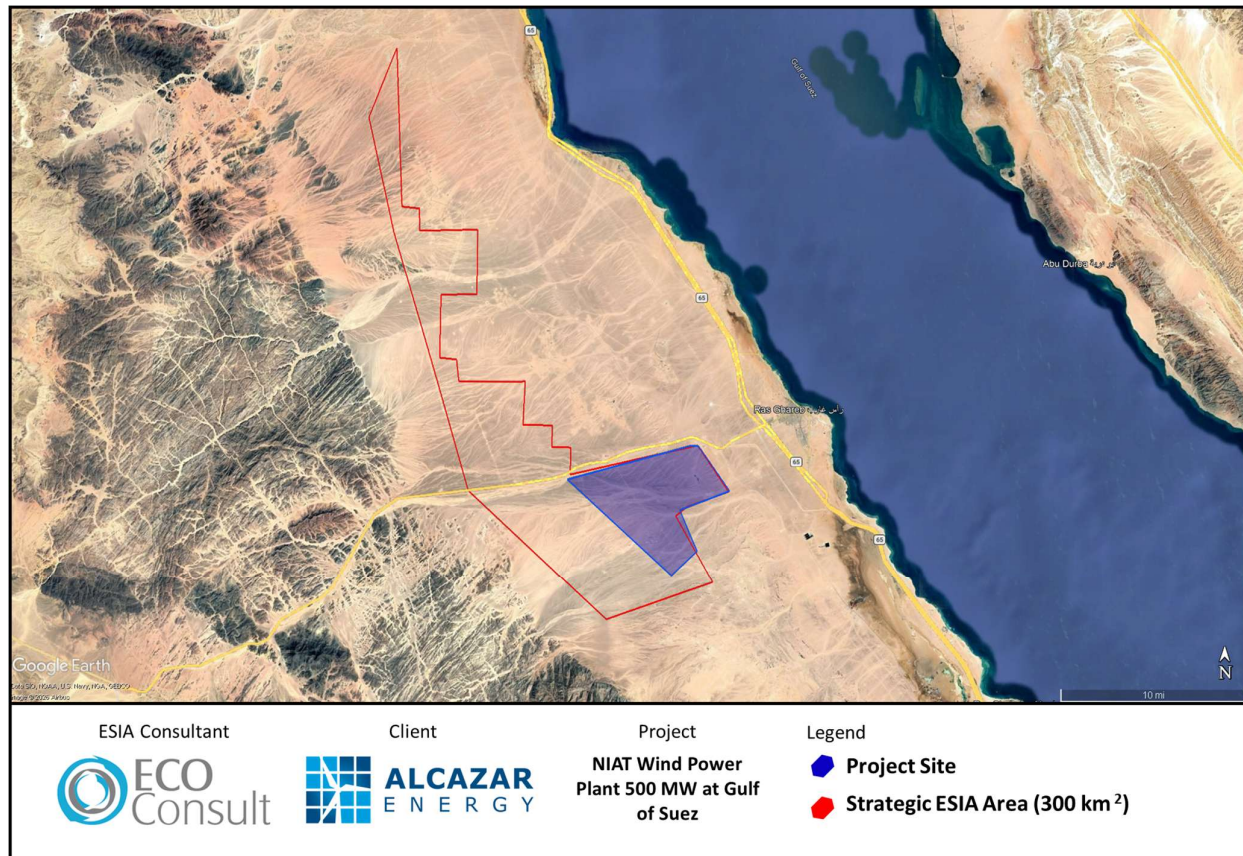


Figure 2: Project Site and Closest Villages



**Figure 3: Project Site as Part of the 300km<sup>2</sup> Area Allocated for Wind Farm Developments**

### 1.3 Environmental and Social Impact Assessment Report

The environmental clearance for this Project is governed by the Egyptian Environmental Affairs Agency (EEAA) as stipulated by the Law No. 4 of 1994 (Law on Protection of the Environment). Executive Regulations 1995 (Prime Ministers Decree 338) issued in accordance with the Law, classifies a wind farm development of such nature and capacity (i.e. this Project) as “Category C”, requiring a comprehensive Environmental and Social Impact Assessment (ESIA) in order to obtain the environmental clearance and permit, in order to commence with construction and operational activities.

The Project is seeking financing from International Financing Institutions (IFIs) and therefore the Developer wishes to design and manage the Project in accordance with Good International Industry Practice (GIIP), which also includes the ESIA. This ESIA is being developed based on the following IFIs:

**Table 1: Compliance Framework**

Applicable local and national E&S (including occupational health and safety) regulatory requirements
International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability, 2012
IFC Environmental, Health, and Safety (EHS) Guidelines, 2007
IFC EHS Guidelines for Wind Energy, 2015
IFC EHS Guidelines for Electric Power Transmission
European Bank for Reconstruction and Development (EBRD) Environmental and Social Requirements, 2024
European Investment Bank (EIB) Environmental and Social Standards, 2022

The Asian infrastructure Investment Bank Environmental and Social Framework, 2021
The U.S. International Development Finance Corporation's Environmental and Social Policy and Procedures, 2024
Equator Principles IV
UN Universal Declaration of Human Rights and UN Guiding Principles on Business and Human Rights
Principles underpinning the Sustainable Development Goals (SDGs) and the Ten Principles to the United Nations Global Compact (UNGC)
International Labour Organization (ILO) instruments including Conventions and Recommendations, Codes of Practice and Guidelines, specifically but not limited to ILO Fundamental Conventions and ILO Declaration on Fundamental Rights and Principles at Work
Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises
European Union (EU) Taxonomy Alignment for 'Production of Electricity from Wind Power
Guidance Notes from leading Financial Institutions recognised as Best International Practice

## 1.4 Document Structure

The following table provides an overview of the Chapters within this ESIA document. The ESIA includes a standalone Non-Technical Summary (NTS) & a Stakeholder Engagement Plan (SEP).

**Table 2: ESIA Document Structure**

Chapter	Description of Content
Chapter 2 – Project Description	Provides a detailed description of the Project in relation to its location, the key Project components and an overview of the proposed activities that are to take place during the various Project phases.
Chapter 3 – ESIA Approach and Methodology	Presents the methodology and approach that was adopted for the ESIA study.
Chapter 4 – Project Stakeholders and Consultations	Discusses in detail the stakeholder consultation and engagement activities which were undertaken as part of the ESIA process for the Project and provides an overview of the findings. In addition, this Chapter also discusses the future stakeholder engagement and consultation plans which are to take place at a later stage.
Chapter 5 – Regulatory and Policy Framework	Provides an overview of the environmental and social regulatory and policy framework applicable to the Project.
Chapter 6 – Analysis of Alternatives	This chapter investigates several alternatives to the Project development and the reasons for the preferred choice. This includes alternatives in relation to the Project site, selected technology, Project design, and finally investigates the 'no action alternative' – which assumes that the Project development does not take place.
Chapter 7 – Existing Physical, Biological, and Social Environment	This Chapter presents the baseline conditions within the Project site and surroundings. This includes the following: Landscape and Visual (section 7.1), Land Use (section 7.2), Geology/Hydrology/Hydrogeology (section 7.3), Biodiversity (section 7.4), Birds (section 7.5), Bats (section 7.6), Archaeology and Cultural Heritage (section 7.7), Air Quality and Noise (section 7.8), Infrastructure and Utilities (section 7.9), Occupational Health and Safety (section 7.10), Public Health and Safety (section 7.11), and Socio-economics (section 7.12).
Chapter 8 – Impact Assessment	This Chapter assesses the anticipated impacts from the Project throughout its various phases on such a receptor. For each identified impact a set of mitigation and monitoring requirements have been identified which aim to eliminate the impact and/or reduce it to acceptable levels. This includes the following: Overview of Strategic Environmental and Economic Impacts (section 8.1), Landscape and Visual (section 8.2), Land Use (section 8.3), Geology/Hydrology/Hydrogeology (section 8.4), Biodiversity (section 8.5), Birds (section 8.6), Bats (section 8.7), Archaeology and Cultural Heritage (section 8.8), Air Quality and Noise (section 8.9), Infrastructure and Utilities (section 8.10), Occupational Health and Safety (section 8.11), Public Health and Safety (section 8.12), Socio-economics (section 8.13), Human



	Rights and Supply Chain (8.14), Climate Change Risk Assessment (8.15), Summary of Anticipated Impacts (section 8.16), and Assessment of Cumulative Impacts (section 8.17).
Chapter 9 – Environmental and Social Management Plan (ESMP)	Presents the ESMP for the Project; which mainly summarizes the impacts identified as well as the mitigation measures and monitoring requirements to be implemented throughout the various Project phases. In addition, this Chapter describes the institutional framework and procedural arrangement for the ESMP implementation.

## 1.5 Key Involved Entities

Different entities are involved in the planning and implementation of the Project. The responsibilities of each key entity which is of relevance to the ESIA are listed in the text below along with a general description of their roles.

- SPVs NIAT for Wind Energy and Alcazar Rasgha For Energy: The owner and developer of the Project (hereafter referred to as ‘the Developer’). The SPVs are owned fully by Alcazar Energy;
- Regional Center for Renewable Energy and Energy Efficiency (RCREEE): is responsible for managing the ESIA process with the Consultant including review of deliverables and submissions. RCREEE is also responsible for providing ornithological baseline data for the NIAT Project, including site-specific vantage point (VP) survey data from spring and autumn 2021 and 2022, as well as Strategic Environmental and Social Assessment (SESA) VP survey data collected across the Gulf of Suez during spring and autumn 2024 and 2025. In addition, RCREEE provided autumn 2025 avifauna data for the NIAT site, as well as spring 2026 avifauna survey campaign between 10 February and 31 March 2026.
- Egyptian Environmental Affairs Agency (EEAA): the official governmental entity responsible for protection of the environment in Egypt. The EEAA is responsible for approval of the ESIA and making sure it complies with the “Environmental Protection Law No. 4 of 1994” and granting the environmental clearance for the Project. It is worth noting that the Environmental Permit has already been secured;
- Original Equipment Manufacturer (OEM) Contractor: responsible for preparing the detailed design and layout of the Wind Turbine Generators (WTGs); supply of WTGs; turbine erection and operating the WTGs,
- Balance of Plant (BOP) Contractor: responsible for preparing the detailed design and layout of all project components other than WTGs; supply of material and equipment, construction and operation and maintenance of all project components other than the WTGs. This includes internal roads, building infrastructure, internal substation, cables, etc.
- Egyptian Electricity Transmission Company (EETC): the offtaker of electricity and is the entity that signed the Power Purchase Agreement (PPA) with the Developer. In addition, they are responsible for designing, building and operating the associated interconnection facilities. This will include the Overhead Transmission Line (OHTL) that will connect from the Project wind farm substation to the existing national grid.
- New and Renewable Energy Authority (NREA): is entity responsible for allocation of the land for the development of the Project;
- Consultant (ECO Consult): hereafter referred to as the ‘ESIA Team’ who is the ESIA Practitioner and the consultant commissioned by the Developer to prepare the ESIA for the Project in accordance with the requirements of the “Law No. 4 of 1994” as well as international best practice E&S requirements as detailed in the Compliance Framework.

## 2 PROJECT DESCRIPTION

This chapter provides a detailed description of the Project in relation to its location, the key project components and an overview of the proposed activities that are to take place during the construction, operation, and decommissioning phase.

### 2.1 Administrative Set-up and Project Location

Egypt is divided into 27 Governorates. The Project site is located within the Red Sea Governorate that is bordered by the Red Sea Coast to the east and Beni Suef, Minya, Assyut, Sohag, Qena, Luxor and Aswan Governorates to the west, Suez Governorate to the North, and Sudan to the south (refer to figure below). Red Sea Governorate's total area is around 120,000 km<sup>2</sup>, forming 11.9% of the country's total area.

Administratively, the Red Sea Governorate is divided into 7 Cities (also known as Districts), each headed by a Local City Council. The capital of the Governorate is Hurghada that is located around 150km south of the Project site.

The Project site is located within the Ras Ghareb City (or District) and therefore administratively is under the Ras Ghareb City Council. The Ras Ghareb District is further divided into Ras Ghareb town as well as 2 rural (village) local units (Zaafarana and Wadi Dara). The closest community settlement to the Project site is Ras Ghareb city (located 8km to the east).

Ras Ghareb City is the second-largest city in the Red Sea Governorate, and the most important Egyptian city in terms of oil production.

As discussed earlier, the Project is located within a 300km<sup>2</sup> area that has been allocated by the GoE to NREA for development of wind farms. Within this, a land area of 73km<sup>2</sup> has been allocated to the Developer by NREA for the development of this Project.

It is important to note at this point that within the Project site there is an informal dumpsite that has been used for disposal of solid waste streams by the City of Ras Ghareb for over a decade, that will be subject to a relocation process. This issue is discussed further in "Section 7.9.6".

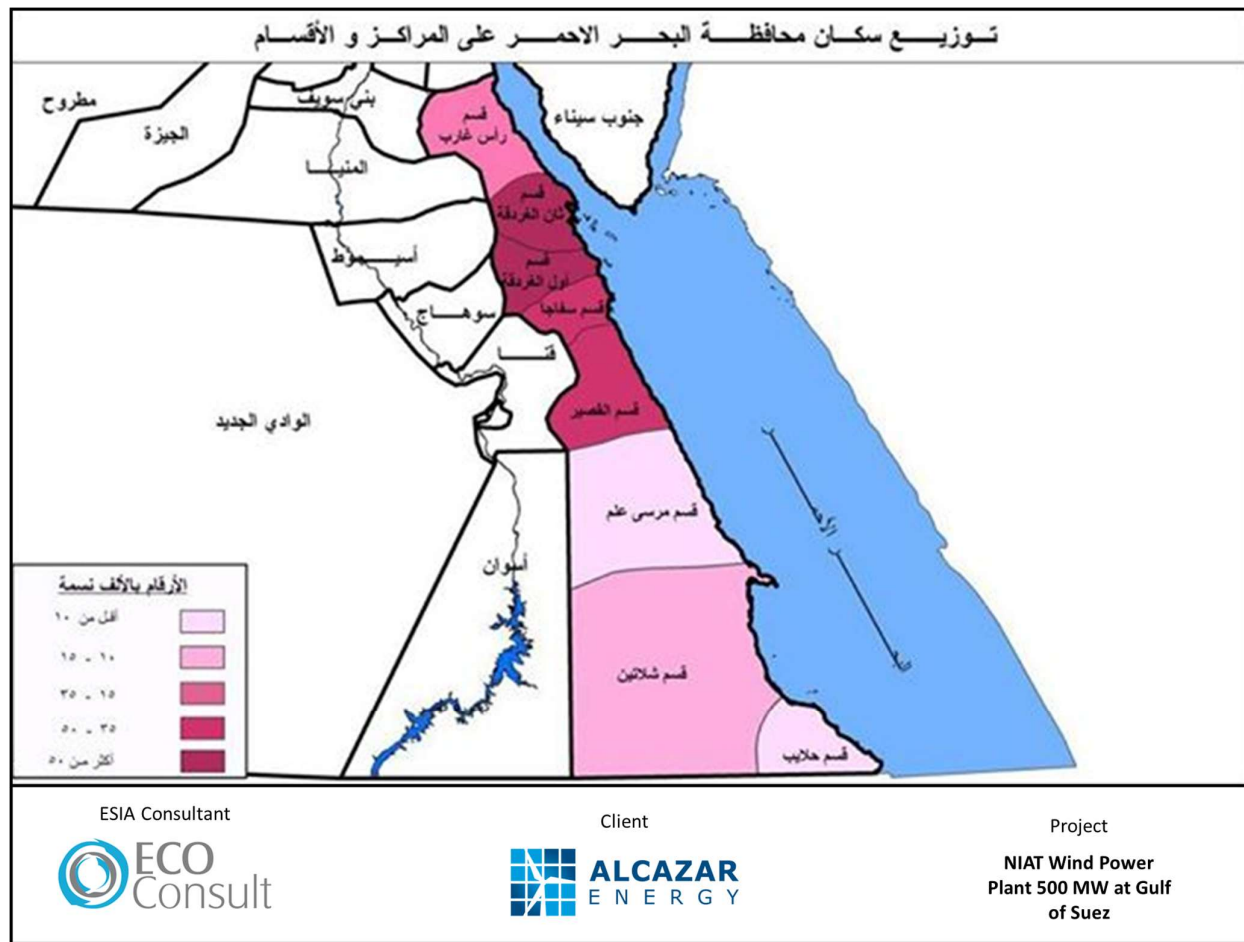


Figure 4: Administrative Borders of the Red Sea Governorate

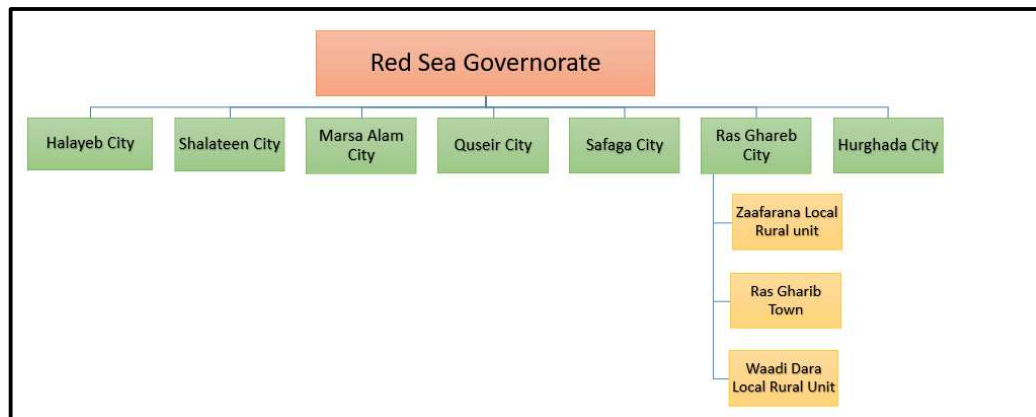


Figure 5: Administrative Division of Red Sea Governorate

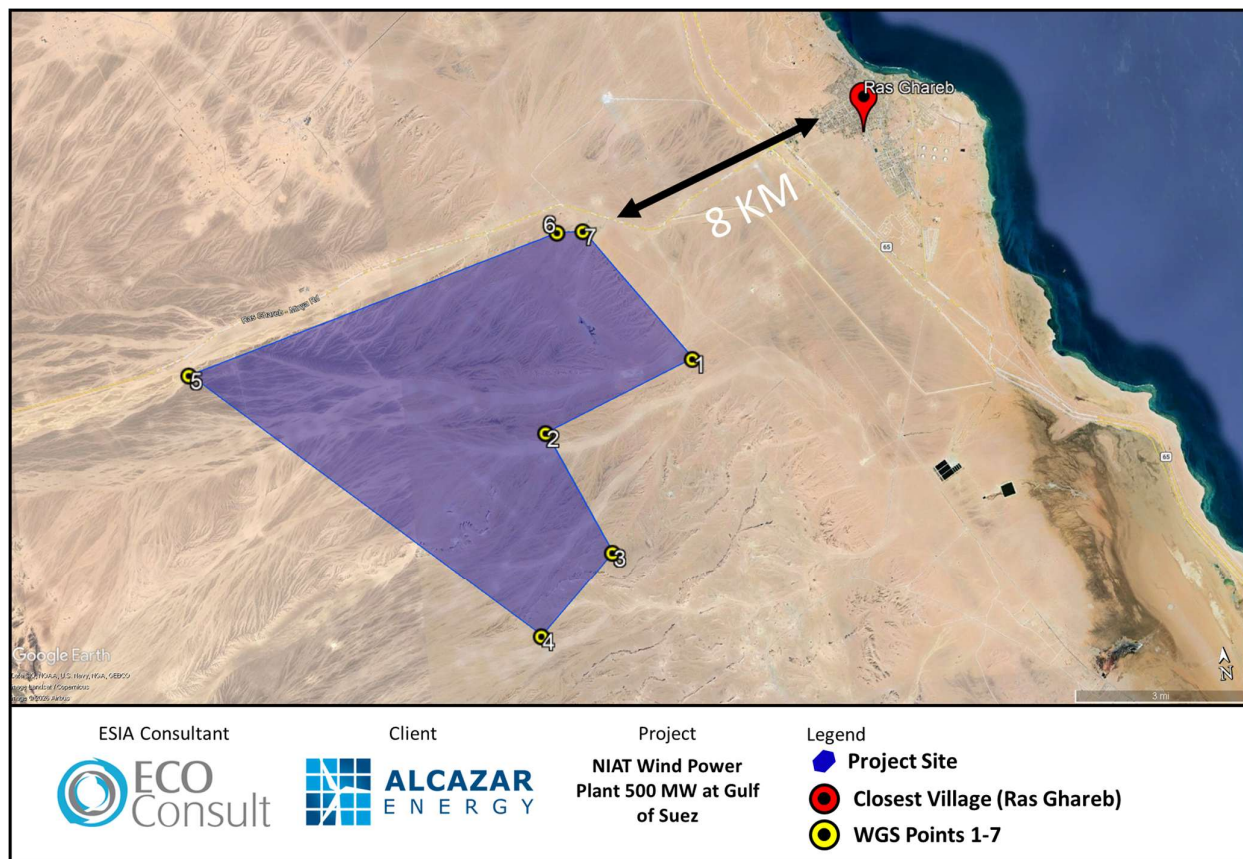


Figure 6: Project Site and Closest Village

Table 3: Project Site Coordinates

Point	World Geodetic System (WGS) Coordinates	
	Latitude	Longitude
1	28°17'59.11"N	33° 1'19.12"E
2	28°17'6.44"N	32°58'42.58"E
3	28°15'13.43"N	32°59'37.72"E
4	28°14'4.91"N	32°58'17.08"E
5	28°18'30.53"N	32°52'48.30"E
6	28°20'4.56"N	32°59'15.00"E
7	28°20'3.55"N	32°59'41.35"E

## 2.2 Outline of Wind Turbine Technology

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. To capture wind, turbines consist of rotor blades which are elevated from the ground using towers to take advantage of faster and less turbulent wind. As

wind speed increases, the rotor blades begin to rotate which then spins a shaft that is connected to a generator thereby converting wind energy to electricity.

Wind turbines produce electricity at a certain voltage which must be matched to the grid it connects to. Therefore, transformers are used to convert the output from the wind turbines to a higher voltage that matches the grid.

## 2.3 Project Components

The table below provides a summary of the key Project components, along with a detailed description of each of those components to follow. The section below has been developed based on information provided by the Developer at this stage of the Project. The final selection of wind turbines will depend on an ongoing feasibility study as well as a technical and economical evaluation that is currently being undertaken by the Developer.

**Table 4: Summary of Key Project Components**

Component	Description
Project Generation Capacity (MW)	500
Technology Type	Wind Power
Wind Turbine Generators (WTG ) Model	SG 5MW 145 HH90 manufactured by Siemens Gamesa Renewable Energy (SGRE)
Number of Wind Turbines	100
Rated Power per Turbine (MW)	5.0
Rotor Diameter (m)	145
Hub Height (m)	90
Tip height (m)	162.5
Project area to be covered (km <sup>2</sup> )	+/- 73
Infrastructure and Utilities	This includes: (i) internal road network; (ii) underground MV cables; (iii) warehouse and offices; (iii) substation; and (iv) associated facilities such as the high voltage overhead transmission line.

### 2.3.1 Wind Turbines

Generally, a wind turbine consists of a foundation, tower, nacelle, rotor blades, a rotor hub, gearbox, generator and a transformer (refer to Figure 8 below). The foundation is used to bolt the tower in place. The tower contains the electrical conduits, supports the nacelle, and provides access to the nacelle for maintenance. Typically, three (3) blades are connected to the hub which then connects with the nacelle; the box-like component that sits atop the tower and which most importantly contains the gearbox (which steps up the revolutions per minute to a speed suitable for the electrical generator) and the generator (which converts the kinetic energy into electricity).

Foundations will be constructed to bolt the tower of the turbine in place (one for each turbine); where in general each foundation will consist of a circular footing of around 20.3m diameter and a depth of around 3m. The foundation will be built with concrete reinforced with structural corrugated steel. In addition, each turbine is equipped with a transformer that converts/steps up the output from the turbine to a higher voltage (from 690V to 33kV) to meet a specific utility voltage distribution level that is appropriate for connection with a substation (explained in details below).

In addition, next to each turbine will be a crane pad to accommodate cranes for the installation of the wind turbines and for maintenance activities during operation. The crane pads will be suitable to support loads required for the erection, assembly an operation and maintenance of the turbines. Generally, crane pads have an area of around 3,200m<sup>2</sup>.

The figure below presents the turbine layout as provided by the Developer.



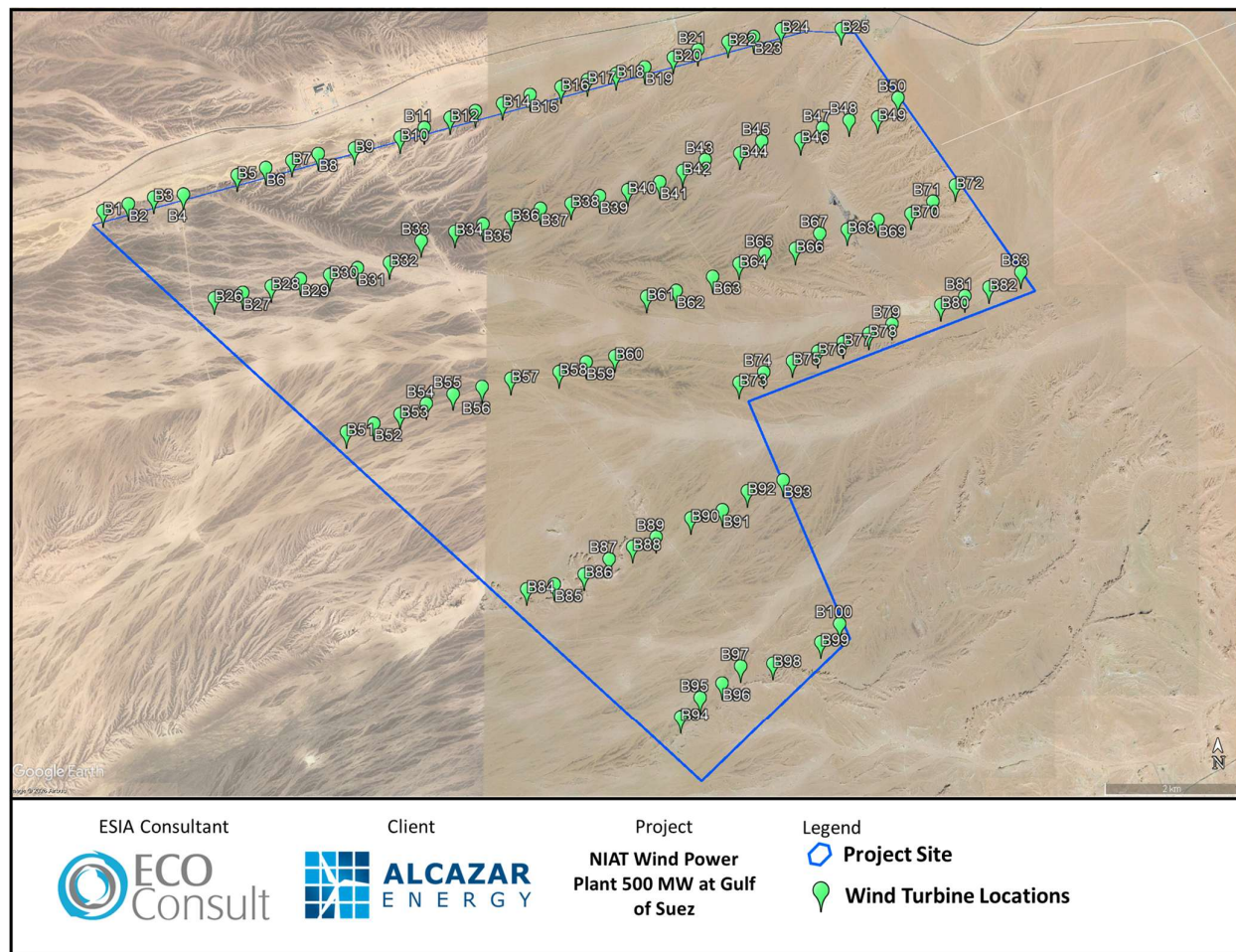


Figure 7: Wind Turbine Distribution

### 2.3.2 Infrastructure and Utilities

The following highlights the infrastructure and utilities requirements of the Project.

- **Medium Voltage (MV) Cables:** The wind turbines will be connected through medium voltage cables (33kV) to an onsite substation (discussed below). The connection between the turbines and the substation will be made using underground transmission cables buried in the ground inside trenches.
- **Communications Network:** The Project will have a Supervisory Control and Data Acquisition (SCADA) system for the remote operation of the facilities. A communication network will be installed which will consist of fibre optic cables connecting the turbines together to the SCADA system at substation. The communication system will be installed in the same trenches as the MV cables discussed above.
- **Substation:** The substation includes several high voltage transformer units that collect and convert the output from the turbines to a higher voltage (from 33 kV to 220 kV) that is appropriate for connection with the High Voltage National Grid (220 kV). The substation also includes all the control and protection equipment, like circuit breakers, relays, disconnectors, surge arrestors.
- **Building Infrastructure:** Onsite building infrastructure will be required for the daily operation of the Project. Such buildings could include an administrative building (offices) used for normal daily

operational related work, control room, workshop and a warehouse for storage of equipment and machinery such as spare parts, oil cartridges, fuel, lubricants, etc.;

- **Road network:** A road network will be required for installation of the turbines during the construction process and for ease of access to the turbines for maintenance purposes during operation.

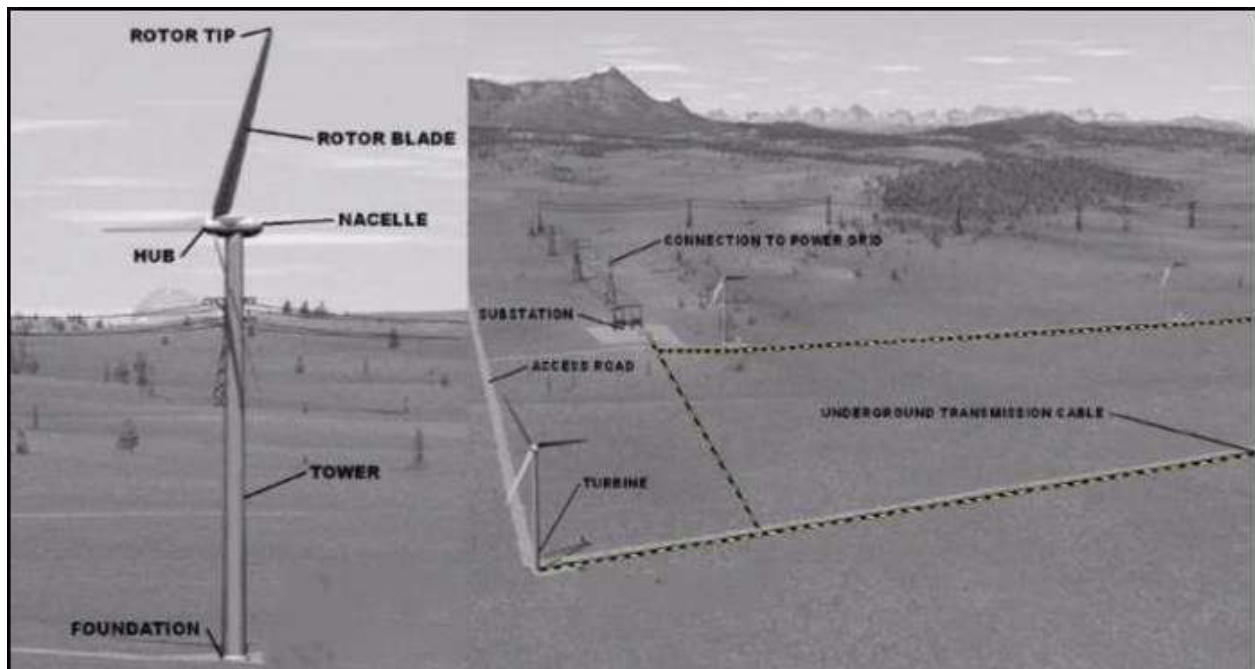


Figure 8: (a) Typical Structural Components of a Wind Turbine, (b) Typical Components of a Wind Farm (Source: EHS Guidelines for Wind Energy, IFC)



Figure 9: Typical 33/220kV Substation

### 2.3.3 Associated Facilities

As discussed earlier, the EETC will be responsible for connection works from the Developer's onsite substation point of common coupling to the National Grid. EETC will be responsible for preparing the detailed design



(including identification of the OHTL route), construction activities, as well as operation and maintenance activities of the OHTLs. Internal and external 33 kV OHTLs will be fully underground. EETC will construct two 220 kV OHTLs connecting to the Infinity and West Bakr S4 substations, with the final routing to be confirmed by EETC. It is important to note that, at this stage, there are no details available from EETC on the OHTL specifications (route, height, number of electrical towers, etc.). A separate standalone ESIA will be developed for the OHTLs. A standalone report for the OHTL is presented in Annex 10.1.

## 2.4 Footprint of the Project Components

This section provides an estimate on the footprint of the Project taking into account the components discussed in the previous section and based on assumptions made by the ESIA team to determine footprint values. As noted in the table below, the total area of disturbance for the Project is significantly small, calculated at around 1% of the total boundary of the Project area (which is 73km<sup>2</sup>).

**Table 5: Footprint of the Project Components**

Component	Area	Description
Turbines	0.35 km <sup>2</sup>	Typically, each crane pad is around 3,200m <sup>2</sup> in area, whereas each foundation typically consists of a circular footing of 20m diameter.
Substation and Warehouse and Storage facilities	0.05 km <sup>2</sup>	Typically, footprint for substation and building facilities is around 0.05km <sup>2</sup> .
Trenches for MV cables and communication cables	0.1 km <sup>2</sup>	This includes trenches with a calculated length of around 100km and a width of 1m.
Road networks	0.36 km <sup>2</sup>	This includes the road network with a total length of and a width of 6m.
Total Project Footprint	0.9km <sup>2</sup>	
<b>Total Project site Boundary Area</b>	<b>73 km<sup>2</sup></b>	<b>Project footprint is around 1% of the total boundary of the Project area.</b>

## 2.5 Overview of Project Phases

This section presents the likely activities to take place during the Project development and which will include three distinct phases: (i) planning and construction, (ii) operation, (iii) decommissioning and (iv) project schedule each of which is summarized below.

### (i) Planning and Construction Phase

The typical activities that will take place during the planning and construction phase for wind farms include the following:

- Preparation of the detailed design and layout of wind turbines within the Project site in addition to the various other infrastructure/utility elements (buildings, roads, substation, etc.);
- Transportation of wind turbine components to the Project site. The components are expected to be transported to the closest marine port (Al Adabiya Port) and then transported by road to the Project site;
- Site preparation of the turbine foundation. Such activities are limited to relatively small individual footprints of the foundations and will include excavations and land clearing activities for building the foundations;
- Installation of turbine components to include tower assembly, hub, blades and nacelle lift and rotor assembly which most likely will occur through onsite mobile cranes;
- In addition to the erection of each turbine, there is additional construction work (which could include excavations, land clearing activities, electrical work, etc.) that must be conducted to connect each turbine to the power grid, this could include the installation and laying of transmission and communication cables, installation of substations, and installation of project transmission line;

- Other construction works (which could include excavations, land clearing activities, etc.) for the potential access road construction or upgrade and for the building infrastructure (warehouse and offices).
- Commissioning tests of the wind farm which usually involves standard electrical tests for the electrical infrastructure as well as the turbine, and inspection of routine civil engineering quality records. Careful testing at this stage is vital if a good quality wind farm is to be delivered and maintained. Commissioning of an individual turbine can take little more than two days with experienced staff;

(ii) Operations and Maintenance Phase

Wind turbines generally require limited operational activities as this mainly includes the following:

- Normal daily operation of the wind farm. The long-term availability of a commercial wind turbine is typically in the range of 97 percent and to be agreed between the Developer and the WTG OEM (i.e. 97% of the time, the turbine will be available to work); and
- Maintenance will also take place through a dedicated team. Typical preventive maintenance time for a modern wind turbine is 40 hours per year. Corrective maintenance may be of a similar order. Although minimal, maintenance activities may include turbine and rotor maintenance, lubrication of parts, washing of blades, maintenance of electrical components, full generator overhaul, etc.

(iii) Decommissioning Phase

According to the PPA agreement, the Project is expected to be operational for 25 years. In the case of complete decommissioning of a wind turbine, the tower and blades of the removed wind turbine will be taken down by a crane, disassembled into components, and then the turbine will be refurbished at source and used elsewhere for another Project or recycled. The foundation will typically be left in place and covered by gravel and peat or loam. Tracks used for maintenance vehicles will be restored and can be kept as agricultural routes.

(iv) Project Schedule

According to the current timeline information available by the Developer, construction of the Project is anticipated to commence around Q3 2026, and will require approximately 26 to 27 months for construction and commissioning (i.e. till Q4 2028). Operation of the Project is therefore anticipated to commence in 2028 for a period of 25 years based on the PPA agreement.

## 2.6 Workforce and Training

The Project will require the following workforce throughout the construction and operation phase:

- The construction phase (approximately 26-27 months) will require a temporary workforce, with peak workforce levels expected to exceed 1,000 workers at certain stages of the construction period. This will mainly include skilled job opportunities (to include engineers, technicians, consultants, surveyors, etc.) and unskilled job opportunities (mainly labourers but will also include a number of security personnel).
- Around 50 job opportunities (to include direct and indirect) during the operation phase for a duration of 25 years. This will include skilled job opportunities (such as engineers, technicians, administrative employees, etc.) and unskilled job opportunities (such as security personnel, drivers, etc.).

Taking the above into account, the Developer is aiming to hire local community members to the greatest extent possible throughout the construction and operation phase for skilled and unskilled jobs. The Developer is committed to adhering to transparent recruitment procedures which includes local community members as discussed in further details in "Section 8.13".

### 3 ESIA APPROACH AND METHODOLOGY

This chapter describes the approach and methodology that was adopted for the ESIA study including the following:

- Approach for the analysis of alternatives;
- Approach to stakeholder engagement;
- Approach to determining the spatial and temporal study area;
- Methodology for assessment of the baseline environmental and social conditions;
- Methodology used to assess the potential environmental and social impacts of the Project - including the approach to determining significance, development of mitigation measures and the assessment of residual effects;
- Approach used for the assessment of cumulative effects; and
- Approach for development of an ESMP.

#### 3.1 Analysis of Alternatives

The Egyptian Regulations to include the “Guidelines of Principles and Procedures for Environmental Impact Assessment” (EEAA, 2009) requires that the ESIA identify and analyse alternatives and present the main reason for the preferred choice. The examination of alternatives is also considered to be a key element of the ESIA process under good international practice, including but not limited to IFC PS 1, World Bank ESS 1 and EBRD ESR 1.

The analysis of alternatives is presented in “Chapter 6”. The chapter discusses and compares several alternatives to the Project development in relation to: (i) the Project site, (ii) the chosen technology, (iii) the Project design, and finally investigated the ‘no action alternative’ - which assumes that the Project development does not take place.

#### 3.2 Stakeholder Engagement

Stakeholder consultation and engagement is an essential part of the ESIA process, and has been carried out in accordance with the regulatory requirements in Egypt and the requirements of IFC, World Bank (WB) and EBRD. Stakeholder consultation and engagement activities undertaken to date, including those carried out in 2021 and 2022, as well as more recent activities in Q1 2026, together with planned future engagement activities are summarized below and discussed in detail in “Chapter 4”.

The Project to date has included extensive stakeholder consultation and engagement with various stakeholder groups such as national governmental entities, local governmental entities, non-governmental organizations, and other as appropriate. This has been undertaken through bi-lateral meetings, e-mail communication, phone communication, formal letters, and other.

“Chapter 4” also discusses future stakeholder engagement and consultations which are to take place at a later stage. This mainly includes: (i) a public disclosure session with stakeholders to present the findings and recommendations proposed within the ESIA; and (ii) implementation of the Stakeholder Engagement Plan (SEP)

by the Developer which describes the planned stakeholder consultation activities and engagement process to take place at subsequent project phases.

### **3.3 Delineation of Study Boundaries and Scope of Assessment**

#### **3.3.1 Definition of Spatial Area of Influence**

The overall Study Area for the ESIA represents the potential area of influence of the Project. “The project’s area of influence encompasses, as appropriate: (i) the area likely to be affected by the project and the client’s activities and facilities that are directly owned, operated or managed; (ii) impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; and (iii) indirect project impacts on biodiversity or ecosystem services upon which Affected Communities’ livelihoods are dependent.”<sup>1</sup>

In general terms, the study area for the Project ESIA includes the footprint of Project disturbance as demarcated in the figure below. This includes the Project Site with a total area of 73 km<sup>2</sup>.

However, for certain environmental and social parameters (such as landscape and visual, noise and shadow flicker, infrastructure and utilities, socio-economics, etc.), the study area goes beyond the actual footprint of the Project site, and therefore an appropriate thematic study area is determined for each theme on a case-by-case basis. Such a thematic study area is clearly identified within the relevant chapter it relates to throughout this ESIA.

In identifying these thematic study areas, the type and degree of the potential direct and indirect effects were taken into consideration. The core area where direct effects are likely to occur was determined, as well as the

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<sup>1</sup> IFC PS1

wider area of influence where indirect, combined and cumulative effects are likely to occur on the surrounding areas and communities.

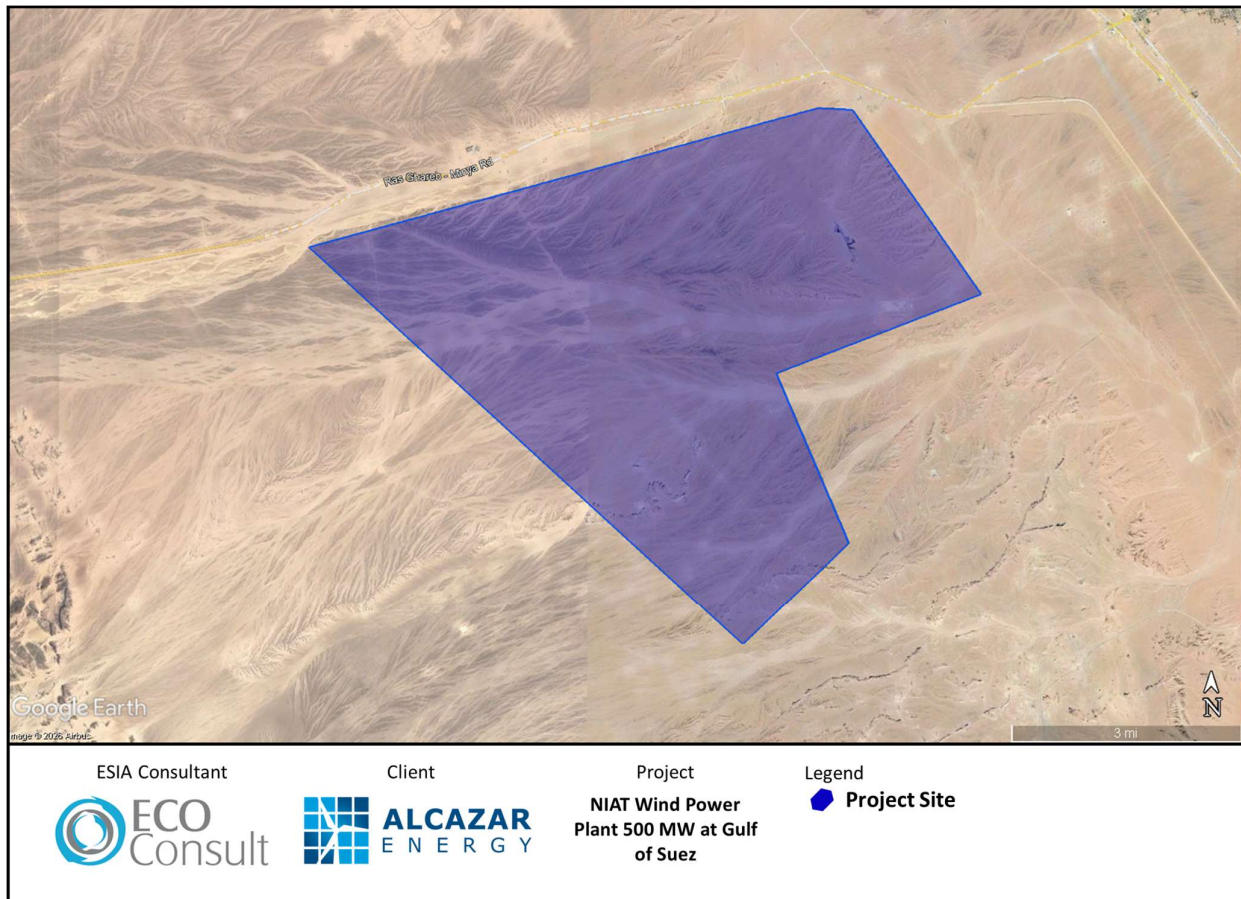


Figure 10: Study Area

### 3.3.2 Temporal Scope of the Assessment

The Project will be developed in a three-phase sequence as follows. The potential impacts are assessed throughout the various Project phases.

- Planning and Construction Phase;
- Operation Phase; and
- Decommissioning Phase.

#### (i) Planning and Construction Phase

This includes onsite construction activities which will be undertaken by the OEM and BOP Contractors under the guidance of the Developer. This mainly includes preparing the detailed design and layout of the turbines,

transportation of Project components onsite, construction of the substation, as well as onsite site preparation and construction activities for installation of wind turbines.

(ii) Operation Phase

This includes activities to be undertaken by the Project Operator. Activities expected to take place mainly include the normal daily operation of the Project and the routine maintenance activities.

(iii) Decommissioning Phase

Generally, the anticipated impacts throughout the decommissioning phase are similar in nature to impacts assessed during the construction phase – and specifically in impacts related to soil and groundwater (from improper management of waste streams), air quality and noise, and occupational health and safety. Therefore, the assessment of impacts for those receptors and mitigation identified during the construction phase is assumed to apply to this phase in particular without the need to reiterate or emphasize this throughout subsequent chapters.

### 3.4 Environmental and Social Baseline Conditions

As part of the ESIA process, the baseline environmental and social conditions of the study area were established. Describing the baseline includes identifying and defining the importance and sensitivity of the various environmental and social resources and receptors likely to be impacted, i.e. within the study area. Understanding the value or sensitivity of the resources and receptors to impacts and changes is an important consideration when determining the significance of effects, and allows for better identification of the most appropriate measures that could be employed to avoid impacts, and to mitigate any adverse impacts.

The description of environmental and social baseline conditions has considered a wide range of data and information gathered from various sources, including:

- Desk-based studies and literature reviews;
- Data from statutory and non-statutory stakeholders; and
- Field surveys and site investigations.

These studies have covered all the environmental and social aspects related to the Project. The baseline conditions are treated as those conditions which would prevail in the absence of the Project.

Studies of the environment and social baseline are described in “Chapter 7” to include the following: landscape and visual; land use; geology/hydrology/hydrogeology; biodiversity; birds (avi-fauna); bats; archaeology and cultural heritage; air quality and noise; infrastructure and utilities; and socio-economic conditions. Within each chapter, the methodology which was undertaken for assessment of the each of those baseline conditions is described in detail.

### 3.5 Impact Assessment Methodology

Given the scale and type of the Project, the ESIA commences with an assessment of the positive environmental and economic impacts on the strategic and national level given the current challenges the energy sector in Egypt faces – as highlighted in “Section 8.1”.

It then moves forward into the main body of the ESIA undertaking the assessment of impacts on environmental and social parameters for each receptor under the relevant chapter, from “Section 8.2” to “Section 8.13”. The



following section provides a description of the approach, methodology and process adopted for the impact assessment presented within this ESIA.

### **3.5.1 Approach to Assessment of Impacts**

The adverse and beneficial environmental and social impacts of the Project have been identified and assessed against the established baseline. A consistent approach to the assessment of impacts was followed to enable environmental and social impacts to be broadly compared across the ESIA. A set of generic criteria were used to determine significance (see below) which were applied across the various environmental social and environmental parameters.

As far as possible, environmental and social impacts were quantified. Where it was not possible to quantify impacts, a qualitative assessment was conducted using professional experience, judgment and available knowledge, and including the consideration of stakeholder views. Where there were limitations to the data, and/or uncertainties, these have been recorded in the relevant chapters, along with any assumptions that were taken during the assessment.

In order to determine the significance of each impact, two overall factors are considered:

- The importance and/or sensitivity of the environmental and social receiving parameter, as determined during the assessment of baseline conditions; and
- Magnitude and Nature of the impact.

### **3.5.2 Sensitivity of the Receiving Parameter:**

Receiving parameter sensitivity was determined using information taken from the baseline description on the importance, significance or value of the social or environmental component under examination. It is important to understand the sensitivity of the receiving parameter, as this is a measure of the adaptability and resilience of an E&S parameter to an identified impact. The following categories of sensitivity were applied to the assessment:

- High: The E&S parameter/receptor is fragile and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.
- Medium: The parameter/receptor has a degree of adaptability and resilience and is likely to cope with the changes caused by an impact, although there may be some residual modification as a result; and
- Low: The parameter/receptor is adaptable and is resilient to change.

### **3.5.3 Magnitude and Nature of the Impact:**

The magnitude of the impact is the scale of change which the impact may cause compared to the baseline and how this change relates to accepted thresholds and standards. The following categories were applied to the assessment:

- High: a large change compared to variations in the baseline. Potentially a clear breach of accepted limits;
- Medium: change which may be noticeable and may breach accepted limits; and
- Low: when compared with the baseline, change which may only just be noticeable. Existing thresholds would not be exceeded.

Furthermore, in determining the magnitude of the impact it is important to take into account and consider several other factors which define the nature of the impact. This includes the following:

#### **Type of Impact**

- Positive: applies to impacts that have a beneficial E&S result, such as enhancement of conditions; and
- Negative: applies to impacts that have a harmful aspect associated with them such as loss or degradation of environmental resources.

#### **Type of Effect**

- Direct: applies to impacts which can be clearly and directly attributed to a particular E&S parameter (e.g. generation of dust directly impacts air quality); and
- Indirect: applies to impacts which may be associated with or are subsequent to a particular impact on a certain E&S parameter (e.g. high levels of dust could affect occupational health and safety).

#### **Duration (how long the stressor or its effect last)**

- Short Term: applies to impacts whose effects on the environment will disappear within a 1-year period, or once construction activities are completed;
- Medium Term: applies to impacts whose effects on the environment will disappear within a 5-year period; and
- Long Term: applies to impacts whose effects on the environment will disappear in a period greater than 5 years.

#### **Reversibility**

- Reversible: applies to impacts whose significance will be reduced and disappeared over time (either naturally or artificially), once the impacting activity ceases; and
- Irreversible: applies to impacts whose significance will not be reduced nor disappeared over time (either naturally or artificially), once the impacting activity ceases.

### **3.5.4 Assessing the Significance of the Impacts**

The concept of 'significance' is central to the ESIA process and aids the identification and categorization of E&S effects. As noted, in order to determine impact significance, the sensitivity of each E&S parameter/receptor is considered in combination with the magnitude of the impact. The table below demonstrates how these parameters are considered in the assessment of significance.

**Table 6: Determination of Significance**

Sensitivity of Receiving Parameter/Receptor \ Magnitude of Impact	Magnitude of Impact		
	Low	Medium	High
Low	Not significant	Minor	Minor
Medium	Minor	Minor	Moderate
High	Minor	Moderate	Major

While the above matrix provides a framework for the determination of significance, and enables comparison across E&S parameters, a degree of professional judgement must be used and some parameter-specific factors



to be considered in making the determination of significance. Below provides additional guidance to the degrees of significance used in this ESIA. Note that positive impacts are defined, but are not rated for significance.

- Major significance: requires thorough investigation in the ESIA. These impacts have been studied extensively by consulting expertise in the areas of the identified impacts to design needed mitigation and environmental management measures. Moreover, conducting specific studies and assessments to some of the key issues identified.
- Moderate significance: requires reasonable investigation in the ESIA. These impacts have been studied by expertise in the areas of the identified impacts to design needed mitigation and environmental management measures.
- Minor significance: must be listed, and addressed in some way, but which did not require detailed assessment in the ESIA.
- Not significant: for completeness, impacts which have been included in the assessment but determined not to be significant, are rated formally as 'not significant'.

### 3.5.5 Management Measures

Based on the impact assessment undertaken a set of management measures are identified for each impact which aims to address it. Management measures include the following:

- Additional Requirements: those are generally regulatory requirements which have been identified and which must be taken into account at a later stage.
- Additional Studies: for certain E&S receptors additional studies must be undertaken at a later stage. Such studies and their scope, timing, etc. have been highlighted where relevant.
- Mitigation Measures: a vital step in the ESIA process is the identification of measures that can be taken to ensure that impacts are mitigated or reduced to acceptable levels. The ESIA will firstly consider the significance of any impacts caused by the Project and then assigned mitigation options through applying the following hierarchy:
  - Avoiding or 'designing out' impacts wherever possible;
  - Considering alternatives or modifications to the design to reduce the impacts wherever possible;
  - Applying measures to minimize and manage impacts on the receptor; then
  - As a last resort, identifying fair compensation, remediation and offsetting measures to address any potentially significant residual effects.

Some negative impacts can be easily mitigated, whilst others cannot or are too difficult and costly to mitigate. The various potential impacts are described in this ESIA, along with the provision of 'feasible mitigation measures' that can be implemented.

- Recommendations: for positive impacts it is not possible to identify mitigation measures, but rather recommendations have been identified which aim to enhance the positive impact.

### 3.5.6 Assessment of Residual Significance

If there are mitigation measures it is then necessary to make an assessment of the 'residual significance' after mitigation has been taken account. A re-assessment of Project impacts is then made, taking into account the effect of the proposed mitigation measures in order to determine the significance of the residual effects.

Residual effects are discussed for each E&S theme in the ESIA chapters, and their significance determined and summarized in an Impact Assessment Table in “Section 8.16”.

### 3.6 Assessment of Cumulative Impacts

For each of the impacts assessed, the ESIA investigates the cumulative impacts which could result from incremental impacts from other known existing and/or planned developments in the area, and based on currently available information on such existing/planned developments. Assessment of cumulative impacts is presented in “Section 8.17”.

### 3.7 Development of Environmental and Social Management Plan (ESMP)

Based on the results of the impact assessment, development of management measures, and development of monitoring plan, an ESMP was compiled into a single table that details all of the above. The ESMP will be a key document and will list the environmental/social requirements and detail the procedures necessary for managing the significant environmental/social issues connected to proposed Project activities. The ESMP will be developed specifically to provide flexibility in the nature and exact location of operations, while ensuring all potential impacts are identified and properly mitigated and monitored throughout the later stages of the Project. This ESMP can be used as a stand-alone document during the different phases of the Project by Developer, Contractors, EEA, and other responsible parties.

### 3.8 Assessment of Associated Facilities

The key component related to the associated facilities would be the OHTL which will run from the Project site (from Developer’s onsite substation at point of connection) to the National Grid. As discussed earlier, the design, construction and operation of the OHTL will be responsibility of EETC.

However, at this stage no details were provided on the OHTL to include its route, number of pylons and their location, height, etc. As mentioned in Section 2.3.3, two 220 kV OHLs will be developed to connect Infinity and West Bakr S4, and internal and external 33 kV connections will be fully underground; however, the detailed design and routing remain to be confirmed by EETC. Therefore, the methodology and approach for this ESIA do not assess the baseline conditions and potential impacts associated with the OHTL. These will be addressed through a standalone ESIA once sufficient design information becomes available.

## 4 STAKEHOLDER CONSULTATION AND ENGAGEMENT

This Chapter discusses in detail the stakeholder consultation and engagement plans which were undertaken as part of the ESIA process for the Project and provides an overview of the findings. In addition, this Chapter also discusses the future stakeholder consultation and engagement plans which are to take place at a later stage of the ESIA process as well the Project development.

### 4.1 Introduction

Stakeholder engagement is an integral part of ESIA good practice and is a statutory requirement of the national Environmental Impact Assessment (EIA) legal framework in Egypt and within under good international practice, to include IFC/EBRD/WB requirements. The Developer is committed to a technically and culturally-appropriate approach to consultation and engagement with all stakeholders affected either directly or indirectly by the Project. The consultation program for the Project is based on informed consultation and participation in line with good international practice requirements with affected people, and is designed to be both fair and inclusive. Consultation activities have been an ongoing process since the commencement of the ESIA study in February 2021.

Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively.

Stakeholders may include: (i) locally affected communities or individuals and their formal and informal representatives, (ii) national or local government authorities, politicians, religious leaders, civil society organisations and groups with special interests, (iii) the academic community, or (iv) other businesses.

Stakeholder consultation is an inclusive process for sharing information that enables stakeholders to understand the risks, impacts, and opportunities of a development or project, allowing them to express their views and articulate their perceptions towards it.

### 4.2 Objectives

The objective of stakeholder consultation is to ensure that a participatory approach takes place, which in turn documents concerns of all stakeholder groups and makes sure that such concerns are considered, responded to, and incorporated into the decision-making process of the development. Stakeholder consultation needs to be a two-way communication process that imparts information to stakeholders, but also obtains additional and on-the-ground information from them. Stakeholder consultation and engagement must take place at the inception phase of the ESIA process and implemented all through the study period.

The specific objectives of this chapter are to:

- Summarize national and international legal & policy requirements for stakeholder engagement;
- Describe and identify the stakeholders affected and/or with an interest in the Project;
- Summarize stakeholder engagement and consultation conducted to date. In addition, describe how the views and issues raised have informed and influenced the development of the Project; and
- Outline the future plans and approach to stakeholder engagement.

### 4.3 Requirements for Stakeholder Engagement

#### ***Egyptian Legislation Requirements***

Egyptian legislative requirements for stakeholder engagement are mainly included within the undertaking of the ESIA. The “Environment Law No. 4 of 1994 and subsequent amendments” require that an ESIA study shall be undertaken for projects with significance impacts, including two phases of stakeholder consultation: scoping and public consultation.

The scoping should include targeted stakeholder consultations with key stakeholders as applicable (refer to “Section 4.5” below for additional details). In addition, the public consultation is required to include the following entities (refer to “Section 4.6” below for additional details):

- Representatives of the EEAA
- Related government authorities
- Representatives of the Governorate and local units where the project is located
- Affected local communities including local businesses
- NGOs and civil society groups

#### ***EEAA guidelines methodology***

The articles covering the guidelines on conducting public consultations as part of the ESIA study are as follows:

- Paragraph 6.4.3.1 Scope of Public Consultation
- Paragraph 6.4.3.2 Methodology of Public Consultation
- Paragraph 6.4.3.3 Documentation of the Consultation Results
- Paragraph 7 Requirement and Scope of the Public Disclosure

#### ***Financing Requirements***

The IFIs providing financing for the Project include EBRD, EIB, and AIIB. As such, stakeholder engagement activities undertaken as part of the ESIA meets international best practice requirements, including the relevant environmental and social requirements of IFIs as follows:

- IFC:
  - Performance Standards (PS) (2012) to include PS 1: Assessment and Management of Environmental and Social Risks and Impacts; PS 2: Labour and Working Conditions; and PS 4: Community Health, Safety and Security and their Guidance Notes
  - Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets
  - EHS Guidelines to include: General EHS Guidelines (2007); EHS Guidelines for Wind Energy (2015); and EHS Guidelines for Electric Power Transmission and Distribution (2007)
- European Bank for Reconstruction and Development (EBRD) Environmental and Social Requirements (ESRs) to include:
  - ESR 1: Assessment and Management of Environmental and Social Impacts and Issues; ESR 2: Labour and Working Conditions; ESR 4: Health and Safety; and ESR 10: Information Disclosure and Stakeholder Engagement and their Guidance Notes.

- European Investment Bank Environmental and Social Standards to include:
  - Standard 1: Environmental and Social Assessment and Management; Standard 6: Involuntary Resettlement; Standard 7: Rights and Interests of Vulnerable Groups; Standard 8: Labour Standards, Standard 9: Occupational and Public Health, Safety and Security; Standard 10, Stakeholder Engagement and the EIB Environmental and Social Handbook.

The IFC Performance Standard (PS) 1 *“Assessment and Management of Environmental and Social Risks and Impacts”* addresses Stakeholder Engagement and sets out the following requirements:

- Stakeholder Engagement is an on-going process that may involve: stakeholder analysis & planning, disclosure & dissemination of information, consultation & participation, grievance mechanism, and ongoing reporting to Affected Communities.
- A Stakeholder Engagement Plan (SEP) must be developed and implemented that is scaled to the project risks and impacts and development stage, and be tailored to the characteristics and interests of the Affected Communities.
- Affected Communities will be provided with access to relevant information on: (i) the purpose, nature, and scale of the project; (ii) the duration of proposed project activities; (iii) any risks to and potential impacts on such communities and relevant mitigation measures; (iv) the envisaged stakeholder engagement process; and (v) the grievance mechanism.
- When Affected Communities are subject to identified risks and adverse impacts from a project, a process of consultation will be undertaken in a manner that provides the Affected Communities with opportunities to express their views on project risks, impacts and mitigation measures, and allows the client to consider and respond to them.
- The extent and degree of engagement should be commensurate with the project’s risks and adverse impacts and concerns raised by Affected Communities.
- The consultation process will be tailored to language preferences of Affected Communities, their decision-making process, and the needs of disadvantaged or vulnerable groups.
- For projects with potentially significant adverse impacts, the client will conduct an informed consultation and participation.
- A grievance mechanism will be established to receive and facilitate resolution of Affected Communities’ concerns and grievances about the client’s environmental and social performance.

In addition, the EBRD “ESR 10: Information Disclosure and Stakeholder Engagement” and EIB “ESS10: Stakeholder Engagement” identify similar requirements to those of the IFC as identified above, with the following additional considerations:

- Early stakeholder engagement is required from the initial stages of project development, including during scoping and prior to key project decisions.
- Enhanced disclosure requirements, including the public disclosure of key documents such as the ESIA and Non-Technical Summary (NTS) in a timely and accessible manner.
- Greater emphasis on vulnerable and disadvantaged groups, ensuring tailored engagement approaches to facilitate their effective participation.
- Clear documentation and reporting of stakeholder engagement activities, including how stakeholder feedback has been considered and incorporated into project design and mitigation measures.
- Strengthened grievance mechanism requirements, including clear procedures for submission, tracking, and resolution of grievances.

#### 4.4 Stakeholder Identification and Analysis

The purpose of stakeholder identification is to identify and prioritise Project stakeholders for consultation. Stakeholder identification is an ongoing process, and thus key stakeholders will be identified during different stages of the Project. A systematic approach is used to map the stakeholders based on the Project zone of impacts. In this approach, by mapping the zone of social impacts, stakeholders are identified by the impact area.

As a result of the stakeholder mapping, Project stakeholders are categorised into the following main categories:

1. Interest-based Stakeholders: People and social groups who will be directly or indirectly affected by the project (such as local communities);
2. Participatory Stakeholders: People and social groups who may participate in the implementation of the project (such as investors and lenders); and
3. Influential Stakeholders: People and social groups whom are not affected by the project development per se but may have a possibility to influence and make decisions on implementation of the project and/or may have an interest in the Project.

The main groups of stakeholders identified so far are listed in the table below. The list can be updated and modified in the course of the Project development and as a result of cooperation of the parties.

##### Vulnerable Groups

The stakeholder list also targets vulnerable groups, which are groups that may be disproportionately affected by the project impacts. Vulnerable groups are project specific and depend on a range of issues which must be understood such as project location, socio-economic and demographic context, as well as the nature of the development and type of impacts anticipated.

The vulnerable groups within this context were identified to include women groups of local community. Cultural norms in Egypt and within the local communities in specific, could limit their participation in decision-making in general as well as their employment opportunities over males.

Given the nature and location of the Project there are considered to be no additional vulnerable groups which would require special consideration throughout the consultation process and which could include groups which are expected to be disproportionately affected by the project impacts.

**Table 7: Identified Groups of Stakeholders**

Stakeholder Group	Description	Relevance
<b>Stakeholders who may be directly or indirectly affected by the Project</b>		
Residents of the nearby villages which are administratively under Ras Ghareb District, Red Sea Governorate and Ras Ghareb City	<p>This includes the following groups within the local communities:</p> <ul style="list-style-type: none"> <li>▪ Members of the Local Community: locals who have a vested interest in the project primarily due to potential job opportunities. In addition, locals could be impacted by other potential negative impacts. However, due to the distant location of the Project site such impacts are very limited as discussed throughout this ESIA.</li> <li>▪ Community Leaders: socially active members and known figureheads for community members, who may or may not hold government positions. Community leaders involved in the project are the heads of affected communities</li> <li>▪ Local Businesses (including local subcontractors): such groups have a vested interest in the project due to mainly the</li> </ul>	



Stakeholder Group	Description	Relevance
		potential for procurement opportunities such as subcontracting works (e.g. civil works, provision of food and amenities, etc.)
Workers' Accommodation facilities of the Quarry and Substation		Two workers' accommodation facilities are located in proximity to the Project site. One accommodation is associated with a quarry and is located approximately 400 m to the northeast of the Project site boundary. The second is associated with an EETC substation and is located approximately 750 m to the northwest of the Project site boundary. While no workers live there on a permanent basis, these stakeholders are considered sensitive receptors, particularly in relation to potential noise, shadow flicker, dust, and traffic-related impacts during construction and operation phases.
Women's Groups		Within local communities, such groups have a vested interest in the project primarily due to potential job opportunities. In addition, such groups could be impacted by other potential negative impacts. However, due to the distant location of the Project site such impacts are very limited as discussed throughout this ESIA
Bedouin Groups		The key Bedouin group known in the area are the Tabbna and the Hamadin. Currently, they settle permanently in Zaafarana and Wadi Dara and apply a type of customary ownership within the Project area lands which is known as 'Urfi Contracts' and 'Ghafra System'. Such tribes would be helpful in providing security and protection and could also have a vested interest in employment and procurement opportunities (such as security guards, provision of raw materials, provision of food supplies and water to the workers, etc.). This includes women of Bedouin groups in particular due to reasons mentioned above.
Disabled Groups		Could be considered vulnerable groups mainly due to physical disability which could limit their access to information on the Project as well as participation in the decision-making process in general that is related to the Project.
People living in poverty/underprivileged communities		Could be considered vulnerable as their status could limit their access to information on the Project as well as participation in the decision-making process in general that is related to the Project.
The Elderly		Could be considered vulnerable by limitations of access to participate in the Project related community decision-making process.
The Youth		Could be considered vulnerable due to their young adult, unmarried, non-asset owning status, yet likely to be savvier in 21 <sup>st</sup> century technology than their elders, but may be unable to contribute in Project related community decision-making process, which will affect their generation more than most.
<b>Stakeholders who may Participate in Implementation of the Project</b>		
Investors/Lenders	Entities that will provide financing for the Project development	They have interest in ensuring that the Project is developed and implemented in accordance with their E&S requirements and standards and will monitor the compliance of the Project against such requirements.

Stakeholder Group	Description	Relevance
Regional Center for Renewable Energy and Energy Efficiency (RCREEE)	Works on behalf of the Developer in the preparation, management and implementation of the site-specific environmental and social impact assessment and active turbine management program.	RCREEE is responsible for managing certain aspects of the overall development process on behalf of the Developer. This includes in specific the overall management of the ESIA process with the Consultant. In addition, during the operation phase, RCREEE will be responsible in particular for the implementation of the Active Turbine Management Plan (ATMP).
Project Workers (including contractors)	Individuals engaged in the construction and operation of the Project, including direct workers, contractors and subcontractors	It could entail violations of labour and working conditions and raise grievances. They also have an interest in fair treatment, safe working conditions, and access to grievance mechanisms to raise concerns related to employment and occupational health and safety.
Suppliers	Entities providing goods and services to the Project	It could entail labour and working conditions violations and raise grievances. They are also expected to comply with Project requirements and applicable labour, health and safety, and environmental standards.
<b>Stakeholders who may have a possibility to influence and make decisions on implementation of the project and/or may have an interest in the Project</b>		
<b>National Governmental Ministries</b>		
The Egyptian Environmental Affairs Agency (EEAA)	Entity authorized to regulate environmental management issues.	For this Project it will be responsible for reviewing and approving the ESIA study, issuing the environmental permit for the Project, as well as monitoring the implementation of the ESMP and compliance with other conditions of approval as applicable.
Egyptian Electricity Transmission Company (EETC)	Entity that has signed the PPA with the Developer to be the off taker of electricity.	For this Project, they will also be responsible for designing, building and operating the associated interconnection facilities. This will include the Project's connection to the national grid which includes an Overhead Transmission Line (OHTL) or similar.
New & Renewable Energy Authority (NREA)	Entity that acts as the national focal point for expanding efforts to develop and introduce renewable energy technologies to Egypt.	For this Project, NREA was the entity responsible for allocation of the land for the development of the Project. Also, they are entrusted to plan and implement renewable energy programs in coordination with national and international institutions.
Ministry of Tourism and Antiquities	Entity that is responsible for the preservation and protection of the heritage and ancient history of Egypt, under which operates all inspector offices in the governorates.	For this Project, they are the entity that ensure development activities do not negatively impact cultural heritage sites. In areas near archaeological or historically significant locations, the Ministry is responsible for assessing potential risks, granting necessary approvals, and overseeing measures to preserve and protect antiquities during project implementation.
Ministry of Civil Aviation	Official governmental entity responsible for civil aviation management in Egypt.	They are responsible for issuing permits for projects with specific height requirements and warning signs for future connection of overhead transmission line (s)(OHTLs).
Ministry of Interior	Entity that is responsible for national and local security, as well as approving emergency response and firefighting plans for establishments/projects.	The entity ensures security and public safety throughout the project's lifecycle. This includes protecting the project site, safeguarding equipment, and maintaining order during construction and operation.
General Petroleum Company	National State-owned company engaged in exploration, production and development of hydrocarbons, is responsible for the management of oil and gas exploration and production activities on behalf of the State.	They are one of the subsidiary companies affiliated with the Ministry of Petroleum. They could have right of concession for petroleum exploration in some parts of the Project area and adjacent areas.

Stakeholder Group	Description	Relevance
Armed Forces Operations Authority	Official governmental entity that is responsible for military aviation management in Egypt.	The entity is responsible for issuing permits for projects with specific height requirements (such as wind turbines).
National Telecom Regulatory Authority (NTRA)	Entity that is responsible for the overall regulation and administration of the telecommunication sector in Egypt including interface with telecommunication companies and their infrastructure elements.	The entity is required to provide and approval ensuring that the project does not impact infrastructure elements such as broadcasting towers.
Telecommunication Operators	Could own and operate telecommunication infrastructure within the area. This includes mainly Orange, Etisalat, We and Vodafone.	Approval is required for the project given that it could impact such infrastructure elements.
Radio and Television Unit	Responsible for overall regulation and administration of the radio and television sector in Egypt including infrastructure elements	Approval is required for the project given that it could impact such infrastructure elements.
<b>Local Government Ministries and District Authorities</b>		
Red Sea Governorate	The Governorate's main role is supporting the Project in all aspects as required to include providing required permissions.	<p>They key departments of the Governorate that are related to the Project include the following:</p> <ul style="list-style-type: none"> <li>▪ <u>Environmental Administration</u> that is responsible for monitoring compliance to environmental requirements along with EEAA;</li> <li>▪ <u>Labour Office</u> that is responsible for overall management of the labour force in Red Sea Governorate, monitoring recruitment by development projects within the Governorate, monitor labour grievances and other;</li> <li>▪ <u>Roads Directorate</u>: responsible for services and development of external roads in the governorate and issuing permits for any construction work on the external roads;</li> <li>▪ <u>Public Health Directorate</u>: provide the health services and facilities to the local districts and ensure overall local community health and safety.</li> </ul>
Ras Gharib City Council	The City Council's main role is supporting the Project in all aspects as required to include providing required permissions.	The Council is responsible for administrative oversight as well as supervision and follow-up for monitoring compliance to environmental requirements along with EEAA and Red Sea Governorate. It also holds overall responsibility for solid waste management and disposal within their area of influence. The Council may also have a role in permitting, oversight, and service provision related to offsite workers' accommodation, where applicable.
Red Sea Water and Wastewater Company (RSWWC)	Official entity responsible for water and wastewater management within the Governorate.	The entity that will be responsible for providing the Project's requirements of water as well as disposal of wastewater.
Hazardous Waste Management Unit –	Entity responsible for hazardous waste management within the Governorate	The entity that will be responsible for the disposal of hazardous waste.

Stakeholder Group	Description	Relevance
Red Sea Governorate		
Solid Waste Management – Red Sea Governorate	Entity responsible for solid waste management within the Governorate	The entity that will be responsible for the disposal of solid waste.
NGOs		
Nature Conservation Egypt (NCE)	NCE is the Birdlife International partner in Egypt, and is a member of the International Union for the Conservation of Nature (IUCN). Nature Conservation Egypt (NCE) is an Egyptian NGO working towards conserving Egypt’s natural heritage and the promotion of its sustainable use, for the benefit of present and future generations.	Egypt’s leading experts in the field of nature and biodiversity conservation, NCE is specialized scientific research, advocacy, education and outreach to support species, their habitats, and local communities. NCE works in partnership with local experts and governmental bodies, as well as international organizations and partnerships to ensure efficient collaboration for conservation within and across borders.
Regional Center for Renewable Energy and Energy Efficiency (RCREEE)	RCREEE is an intergovernmental organization serving 17 Arab countries, acting as the regional hub for advancing renewable energy and energy efficiency. RCREEE supports policy development, capacity building, and technical assistance to promote sustainable energy across the Arab region.	RCREEE is responsible for managing certain aspects of the overall development process on behalf of the Developer. This includes in specific the overall management of the ESIA process with the Consultant. In addition, during the operation phase, RCREEE will be responsible in particular for the implementation of the Active Turbine Management Plan (ATMP).
NGOs/ Community Based Organizations (CBOs)		
Orban El-Saharaa		Social Development
Association for the Conservation of the Environment in Red Sea (HEPCA)		Environment protection
Red Sea Ecotourism		Social and cultural services
Environmental protection in the Red Sea		Environment protection
Ababdeh Sons Association in Ras Ghareb		Community Development
Resala Association		Social and family services
Firdous Association		Social and family services
Egyptian Red Crescent		Community Development
Other		
Media (Newspaper, Television, Internet)	Ensuring that Project activities do not impact any of their infrastructure and utility elements within the area.	
Academic and Research Institutions		
Educational Directorate Ras Gharib	Education providers (in particular technical / vocational training institutes): Provides knowledge and skills required for various occupations, including renewables and solar power in specific that is delivered through formal, non-formal and informal learning processes. The education curriculum in undergraduate, postgraduate, or Technical and Vocational Education and Training (TVET) could be reviewed and revised to match the market and workforce requirements.	

#### 4.5 Targeted Consultations

As part of the scoping process of the Project, targeted consultations were undertaken with key stakeholders that are relevant to the Project to include but not limited to: (i) central governmental entities; (ii) local governmental entities; (iii) key Non-Governmental Organizations (NGOs); and other organizations. Additional consultations were conducted in 2026 as part of the ESIA update.

The objective of such consultations was to:

- Introduce project (rationale, objective, location, key components, etc.)
- Explain and discuss overall methodology for ESIA study
- Explain and discuss key anticipated impacts as relevant
- Identify and determine additional requirements or key issues of concern to be taken into account for the ESIA study

Throughout the consultations a handout was prepared and distributed to such stakeholder groups with key information to include but not limited to rationale for Project, Project location and setting, key components and activities of the Project and other points as applicable.

The tables below present summary for the outcomes of the stakeholder consultations undertaken in 2021 and subsequent consultations undertaking during 2026 as part of the ESIA update.

Table 8: Summary of Consultations Undertaken during ESIA Process (2021)

No.	Entity	Objective	Outcomes
1	EEAA	Introduction of project and location, discuss overall methodology for ESIA, key anticipated impacts, and determine any key issues of concern and/or additional requirements to be taken into account as part of the study or the ESIA.	<ul style="list-style-type: none"> <li>Expressed their support to renewable energy projects</li> <li>Adherence to all environmental standards during construction and operation</li> <li>Stressed on the importance of undertaking environmental baseline studies for the site to include in particular a bird study by a specialist given the importance of the area</li> <li>Importance of adhering to community consultation sessions with representation of the local community and project stakeholders, in accordance with the EEAA guidelines for ESIA studies.</li> <li>The impacts of the surrounding environment on the Project should be studied which includes in particular impacts resulting from natural factors such as floods.</li> <li>Impacts resulting from development activities in the area as well as assessing current and previous use of the land of the Project site and its surrounding. It was noted that there is a dumpsite within the Project site belonging to the Ras Ghareb city council that will be removed to another alternative area that is currently being selected.</li> </ul>
2	EETC		<ul style="list-style-type: none"> <li>Expressed their support to the Project</li> <li>ESIA study should include the OHTL of the Project.</li> <li>Indicated the importance of continuous consultation by the Developer with EETC during the various stages of the Project until the completion of ESIA study and up to the operational stage.</li> </ul>
3	NREA		<ul style="list-style-type: none"> <li>Stressed the importance of studying the OHTL</li> <li>ESIA should consider the applicable environmental standards when constructing OHTL, as well as the Project site to include in particular impacts on bird migrating in the area.</li> <li>There should be communication with local communities through stakeholder engagement activities, which provide information about the project to know their expectations and concerns about wind energy projects.</li> </ul>
4	Ministry of Electricity and Energy		<ul style="list-style-type: none"> <li>Explained that the Egyptian government is currently moving towards developing clean energy projects, in a way that does not affect the environment or natural resources.</li> <li>Stressed on importance of ESIA study including consideration of the potential risks to bird migration.</li> <li>Discussed the importance of consulting with stakeholders after preparing the ESIA draft for discussion.</li> </ul>
5	Ministry of Communication	Same as above but with focus on telecommunication and radio/TV infrastructure and broadcasting towers in the area and potential impacts from Project on such facilities.	<ul style="list-style-type: none"> <li>Stated the importance of holding a meeting with officials in the National Telecom Regulatory Authority (NTRA), as the national authority competent to regulate and administer the telecommunications sector. An official letter was sent to conduct a meeting with officials in NTRA.</li> <li>In addition, the consultant has conducted meetings with officials of the telecom companies Vodafone, Etisalat and Orange<sup>2</sup>.</li> <li>Officials in the telecommunications companies explained that the presence of communication towers in the region means that there are other towers at a distance of not less than 5 km. Such towers are connected through microwave connections. Connections need to be empty from any obstacles along with a width of at least 30m to maintain the effectiveness of the network and the continuity of the connection.</li> </ul>

<sup>2</sup> We does not operate any communication towers in the vicinity of the site



			<ul style="list-style-type: none"> <li>The ESIA Consultant is currently followed up with NTRA to identify the official procedures to obtain approval from these entities and/or identify key requirements to be taken into account.</li> <li>However, NTRA's final response was that communication for the Project should be through NREA and not through the Consultant.</li> </ul>
6	Ras Ghareb Radio and TV Unit		<ul style="list-style-type: none"> <li>The radio and television towers connection that are close to the Project site extend from Zafarana to Ras Ghareb to Hurghada, in addition to other towers in the direction of Sheikh Fadl Road. The distance between each tower is about 60 km, depending on the terrain of the area</li> <li>The existing radio and television towers are used for receiving and transmitting the microwave signal, and for radio waves FM, In addition to TV In addition to TV waves, Very High Frequency (VHF) waves,</li> <li>They explained that to determine the impacts on radio and television towers; the Radio and Television Union in Cairo should be contacted.</li> <li>The Radio and Television Union in Cairo provided an official response indicating that they have studied the Project and there will be no impacts on the radio and TV infrastructure in the area.</li> </ul>
7	Ministry of Tourism and Archaeology	Same as 1 above but with focus on archaeology and cultural heritage methodology and impacts for the ESIA and any issues of concern related to that.	<ul style="list-style-type: none"> <li>Explained that there are no sites of archaeological significance close to the Project site. However, a field survey for the Project site should be conducted to ensure that there are no archaeological sites.</li> <li>The archaeological sites closest to the Project site can be identified through the database of the Geographic Information Systems Department at the Ministry of Tourism and Antiquities, as well as through the archaeology departments closest to the project site (the closest antiquities directorate to the project site is in Safaga City).</li> </ul>
8	Key national and local E&S NGOs	Same as 1 above but with focus on biodiversity, birds and bats methodology and impacts for the ESIA and any issues of concern related to that.	<ul style="list-style-type: none"> <li>Explained that positioning the turbines could have a negative effect on birds and therefore there needs to be a balance between risks and benefits and minimize any adverse environmental impacts. This must be taken into account in the design phase of the Project.</li> <li>Discussed the existence of a dumpsite within the Project site which is considered an attraction area for birds. This should be taken into account in choosing an alternative site for the dumpsite. Coordination should be made with the Nature Protection Sector in the Red Sea Governorate to follow up on choosing a suitable site for the dumpsite that takes into account the potential risks to birds in the area.</li> </ul>
9			<ul style="list-style-type: none"> <li>Stressed on the importance of having corridors for migratory birds between the turbines as part of the design of the Project.</li> <li>Stated that wind farms projects are in general environmentally friendly. The establishment of the Project does not conflict with protecting the environment in Red Sea Governorate, as it is definitely better than establishing coal-fired power plant.</li> <li>Pointed out that investment projects in the area should communicate with local communities to support the local development project in Ras Ghareb city (through CSR activities) and should also give priority to youth from the local community for job opportunities.</li> </ul>
10	Ras Ghareb Local Council	Same as 1 above but with focus on land use, infrastructure and	<ul style="list-style-type: none"> <li>Officials welcomed the Project and explained that wind energy projects are the best investment in Ras Ghareb</li> <li>City Council officials confirmed that the dumpsite is located within the Project site and will be relocated to another alternative site that is currently being studied.</li> </ul>

		utilities and socio-economic methodology and impacts and any issues of concern related to that.	<ul style="list-style-type: none"> <li>Clarified that the dumpsite within the Project site is the only dump area in Ras Ghareb. It is leased to a contractor who employs 6 workers to sort and collect garbage; they are the contractor's workers, not the city council workers.</li> <li>Additional updated consultations were undertaken with the officials at a later stage (October 2021) who indicated that a new dump site has been allocated, and its construction works will begin as soon as approvals are obtained (this issue is discussed in further details in "Section 7.9"). In addition, they indicated that Ras Ghareb City Council is still utilizing the current dump site to dispose of the city's municipal waste. Please note that the situation for use of the dumpsite has now changed. Please refer to Section 7.9.6.</li> <li>Officials at the Urban Planning Department confirmed that the Project area does not include any future urban planning, and was not part of any previous urban planning. The area is mainly allocated within exploratory sites belonging to the General Petroleum Company.</li> <li>Officials indicated that there is a dam within the Project site and explained that the dam was established through an advisory committee from the Water Resources Research Institute and the Ground Water Authority, as part of projects to protect Ras Ghareb City from the flood risk.</li> <li>Officials required that: (i) any construction work should be avoided in the areas behind and in front of the dam, because these areas are the most vulnerable to flood risks; and (ii) a minimum distance of 20 m on the right side and the left side of the dam must be avoided for the maintenance works of the dam and its artificial lake.</li> </ul>
11	Red Sea Governorate		<ul style="list-style-type: none"> <li>Officials made it clear that the project area does not fall within the scope of residential projects or any residential or industrial activities, as it is intended for energy projects only, in addition to the areas allocated for the exploration of the General Petroleum Corporation.</li> <li>The importance of the ESIA studying migratory birds and identifying proper mitigation and monitoring requirements.</li> <li>The issue of relocating the dumpsite to another alternative site was discussed where he mentioned that engineering studies are currently being conducted to choose a suitable site for the new landfill.</li> </ul>
12	Red Sea Water and Wastewater Company	Same as above but with focus on water supply and wastewater management for the Project area. and any issues of concern related to that.	<ul style="list-style-type: none"> <li>Explained that the current Project site does not conflict with any existing facilities (water / sanitation).</li> <li>Explained that Ras Ghareb Water Company is able to provide the Project's needs for water and sanitation services, but through contractors; because the company does not have trucks to transport water or sanitary waste.</li> </ul>
13	Petroleum Facilities and companies in the area	Same as above but with focus on land use issues and their key activities undertaken within the area.	<ul style="list-style-type: none"> <li>Indicated that there are exploration wells in the Project land and nearby sites. Exploration wells are currently closed. In order to access more information about the number of exploration wells, and the possibility of re-exploring them again; it will require coordination through the head office in Cairo.</li> <li>The consultant sent an official letter to Chairman of the Board of the General Petroleum Company to arrange for an interview.</li> <li>The company required that the Developer/NREA (and not Consultant) communicate with them to obtain additional details and requirements to be considered during the planning and design phase of the Project.</li> </ul>
14	Ras Ghareb citizens	Same as above but with focus on land use and	The consultant conducted Focus Group Discussion (FGD) and meetings with representatives of the local community in Ras Ghareb. Key local community representatives will be identified through the Ras Ghareb City Administration and key local NGOs in Ras

		socio-economic methodology and impacts. Key local community representatives will be identified through the Ras Ghareb City Administration and key local NGOs in Ras Ghareb.	<p>Ghareb. Community members explained that Ras Ghareb is a small city that lacks many services, in addition to limited job opportunities. They hoped that investment projects as this one would help provide job opportunities for all including in particular youth which would have a direct impact on the local community. No specific concerns were raised by the local community members on the Project development. On the contrary, they made it clear that the Project site is a great distance from the city centre, and they do not foresee any direct negative impact on the local community, whether in the construction or operation stage. Other issues raised include:</p> <ul style="list-style-type: none"> <li>▪ They do not feel a direct economic benefit from investment projects in the field of wind energy to date as they believe Developers in general do not depend on the city of Ras Ghareb for supplies and contracting work despite the availability of construction contractors and supplies.</li> <li>▪ They stated that the City Council has lists of officially registered companies, local contractors and supply companies</li> <li>▪ They suggested that job opportunities can be announced through the city council as well and indicated that the city's labour office also has the available workforce according to different specializations.</li> </ul>
15	Bedouins residing near the project area	Same as above but with focus on land use and socio-economic methodology and impacts. Consultations will be undertaken with head of tribal leader.	<p>Meetings were held with heads of tribal leaders of Bedouin families. The results indicated the following:</p> <ul style="list-style-type: none"> <li>▪ There are no stable Bedouin communities in or near the Project site. The only settled villages in the desert for Bedouin families are in Zaafarana and Wadi Dara Which is at least 50 km away from the Project site,</li> <li>▪ The Project site or the surrounding areas does not have any key land use activities for them such as grazing or farming activities. However, the area in general is subject to their Ghafra System that is divided between two families, the Tabbna and the Hamadin families.</li> </ul>

Table 9: Summary of Consultations Undertaken during ESIA Process (2026)

No.	Entity	Objective	Outcomes
1	EEAA (Nature Conservation Sector)	Introduction of updated ESIA scope, key changes since 2021 assessment, and confirmation of any additional requirements.	<ul style="list-style-type: none"> <li>▪ The Project was confirmed as an already approved development, having obtained EEAA environmental approval in 2022 (updated in 2025) supported by a completed ESIA.</li> <li>▪ The current phase of work does not involve any changes to the Project design or footprint, and focuses on additional biodiversity surveys to meet international financing requirements and strengthen the environmental baseline.</li> <li>▪ The Project area was identified as highly sensitive from a biodiversity perspective, given its location within the Gulf of Suez, which represents a key migratory corridor for birds at both national and regional levels.</li> <li>▪ Bird migration was highlighted as the most critical ecological receptor, requiring detailed assessment, targeted mitigation measures, and continued monitoring.</li> <li>▪ The importance of sharing ongoing survey data with EEAA was emphasized, including methodologies, findings, and proposed mitigation measures, to support regulatory oversight and ensure alignment with national requirements and international best practices.</li> <li>▪ Potential impacts on migratory birds were discussed, including direct and indirect risks associated with wind energy development.</li> </ul>

No.	Entity	Objective	Outcomes
			<ul style="list-style-type: none"> <li>Particular emphasis was placed on cumulative impacts arising from multiple wind energy projects in the Gulf of Suez, as well as the combined effects of turbines and associated transmission lines.</li> <li>The need to assess impacts at a regional (landscape) scale, rather than on a project-by-project basis alone, was highlighted.</li> <li>RCREEE ongoing initiatives were presented, including strategic studies undertaken in coordination with EEAA to assess cumulative impacts, identify ecological sensitivities, and support regional-level planning and mitigation frameworks.</li> <li>It was noted that these initiatives aim to support alignment with international standards, including IFC Performance Standard 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources.</li> <li>The importance of coordination with EEAA and alignment with ongoing strategic initiatives was emphasized to ensure environmental compliance and sustainability.</li> <li>Transparency and continuous data sharing with EEAA were highlighted as key requirements to support adaptive management and effective monitoring of the Project.</li> </ul>
2	EEAA Red Sea Branch		<ul style="list-style-type: none"> <li>The Project was confirmed as already approved by EEAA, with no changes to the approved design, footprint, or technical configuration.</li> <li>Current activities are limited to additional studies, particularly biodiversity surveys, undertaken to meet international financing requirements and further strengthen the environmental baseline.</li> <li>A key discussion point related to the previous location of the Ras Ghareb municipal waste dump, which had been situated in close proximity to the Project site.</li> <li>It was confirmed that the waste dump has been relocated to an alternative site further from the Project area, with Eng. Maher having been involved in and aware of this process.</li> <li>The former dump site was identified as a potential environmental concern, particularly as a bird attractant, posing risks to biodiversity and increasing potential interactions with Project infrastructure.</li> <li>The relocation of the waste dump is considered a positive environmental measure, contributing to the reduction of bird attraction and associated ecological risks in the Project area.</li> <li>It was noted that waste disposal sites can influence bird behaviour and distribution, and therefore such factors should be considered when interpreting baseline conditions, particularly in relation to avian activity.</li> <li>The regional EEAA authority maintains awareness of local environmental conditions and past interventions, supporting continuity in regulatory oversight.</li> <li>The discussion focused on Project updates and contextual environmental considerations and did not cover all technical aspects included in the consultation guide.</li> <li>Further engagement may be required, if necessary, to address detailed expectations related to environmental monitoring, reporting requirements, and any additional site-specific environmental considerations.</li> </ul>
3	EETC		<ul style="list-style-type: none"> <li>The Project configuration was presented, including the requirement for dedicated transmission infrastructure to connect to the national grid.</li> <li>EETC confirmed that preliminary routing has been identified for two OHTLs, which will be fully developed, implemented, and managed by EETC.</li> </ul>

No.	Entity	Objective	Outcomes
			<ul style="list-style-type: none"> <li>It was clarified that EETC retains full responsibility for the design, construction, operation, and maintenance of the OHTLs, including associated environmental and social aspects.</li> <li>The need to undertake ESIA for the transmission lines was highlighted, in line with Egyptian regulatory requirements and applicable international standards (e.g. IFC Performance Standards).</li> <li>EETC emphasized the importance of integrating environmental and social considerations into the planning and implementation of the OHTLs, particularly given the sensitivity of the wider Project area.</li> <li>Coordination between the Project developer and EETC will be required to ensure alignment in environmental management and mitigation approaches.</li> <li>Potential risks to avifauna, particularly bird collision with transmission lines, were discussed given the ecological sensitivity of the region.</li> <li>EETC confirmed that mitigation measures are currently implemented, including the installation of bird flight diverters on transmission lines in accordance with approved standards and practices.</li> <li>It was noted that EETC applies its own technical specifications for avian protection measures, and further coordination may be required to assess alignment with international lender requirements and any project-specific measures.</li> <li>The possibility of enhancing biodiversity protection measures was discussed in principle, subject to further technical assessment and agreement within the relevant institutional frameworks.</li> <li>EETC's role in reviewing and approving grid connection designs, defining technical requirements, and ensuring compatibility with the national grid was reaffirmed.</li> <li>The grid connection process will require ongoing coordination and submission of technical documentation at different stages of Project development.</li> <li>The importance of addressing environmental and safety considerations was highlighted, including compliance with applicable standards, maintaining appropriate clearances, and ensuring safe construction and operation practices.</li> <li>Continuous coordination between EETC and the Project developer will be essential to ensure technical, environmental, and institutional alignment.</li> </ul>
4	NREA		<ul style="list-style-type: none"> <li>The discussion focused on administrative and environmental aspects related to the ongoing Project updates.</li> <li>It was confirmed that the Project has already obtained environmental approval in 2022, and that the current updates do not involve any changes to the approved design, footprint, or technical configuration.</li> <li>It was indicated that no additional environmental approval procedures would be required, provided that the ongoing updates remain limited to additional studies and do not introduce material changes to the Project.</li> <li>Ongoing biodiversity surveys and studies were discussed, with emphasis on the importance of presenting results and proposed mitigation measures to EEAA for review.</li> <li>This was highlighted as important to ensure alignment with regulatory requirements, particularly given the environmental sensitivity of the Project area.</li> <li>Land-related aspects were also addressed, with confirmation that the Project remains within the previously allocated boundaries and that no changes to land use or footprint are currently proposed.</li> <li>Accordingly, no additional procedures related to land allocation or boundary modification were identified at this stage.</li> </ul>

No.	Entity	Objective	Outcomes
4	Ras Ghareb Local Council	To gather stakeholder feedback on potential environmental and social impacts, workforce requirements, accommodation, and local employment opportunities.	<ul style="list-style-type: none"> <li>It was noted that any future changes affecting land use or site extent would require prior coordination with NREA.</li> <li>The ESIA team presented the NIAT 500 MW Wind Farm Project, its preliminary ESIA findings, and confirmed that the assessment covers community health and safety, labour and working conditions, land use and access, socioeconomic impacts, labour influx, and stakeholder engagement.</li> <li>Site visits confirmed that the project land does not conflict with existing agricultural or community land uses and is designated for renewable energy development.</li> <li>Construction may require 1,000–2,000 workers while 25–30 workers are typically needed during operation. Multiple concurrent renewable energy projects in the Gulf of Suez region (2,000–3,000 MW total) may increase cumulative labour demand.</li> <li>The Head of the Local Council raised concerns about housing pressure and rising rental prices in Ras Ghareb City due to incoming project workers. The ESIA team confirmed these issues will be addressed within the socioeconomic impact assessment.</li> <li>Potential worker accommodation solutions were discussed, including the establishment of dedicated worker camps or utilisation of newly constructed residential buildings in Ras Ghareb City to reduce pressure on the local housing market resulting from labour influx.</li> <li>Authorities suggested that there is a need for coordination among renewable energy developers in the Gulf of Suez region to manage cumulative impacts related to workforce numbers, accommodation, and services, and suggested that developers share construction schedules, workforce estimates, and accommodation plans.</li> <li>Stakeholders emphasised the importance of local employment and suggested establishing training programmes and technical training centres to prepare residents for renewable energy jobs. It was recommended that workers be registered through the local labour office.</li> <li>Potential CSR initiatives were discussed, including vocational training, childcare services, community workshops, and local employment initiatives.</li> <li>The former municipal dumpsite within the project area was confirmed officially closed on 30 June 2025 and replaced by a new sanitary landfill. Illegal dumping at the former site is now subject to fines.</li> <li>Local authorities indicated that a coordination meeting with renewable energy developers will be organised to discuss workforce planning, accommodation needs, and mitigation measures.</li> </ul>
5	Ras Ghareb City Council	Discuss solid waste management arrangements relevant to the Project	<ul style="list-style-type: none"> <li>It was confirmed that the Ras Ghareb City Council is responsible for municipal solid waste management within the city, including the operation and oversight of designated disposal sites.</li> <li>A new municipal solid waste disposal site has been recently allocated outside the city boundaries near the Hurghada–Safaga Road, intended to centralize waste disposal activities and replace previous arrangements.</li> <li>It was indicated that the designated disposal site can receive solid waste generated by the Project, subject to coordination with the City Council and compliance with applicable procedures.</li> <li>The transportation of solid waste to the disposal site will be the responsibility of the Project developer or contractor, with all associated costs (including transport and disposal fees) to be borne by the Project.</li> </ul>



No.	Entity	Objective	Outcomes
			<ul style="list-style-type: none"> <li>Hazardous waste management in the Red Sea Governorate is regulated under the Integrated Waste Management System, overseen by the Waste Management Regulatory Authority (WMRA) under the Ministry of Environment.</li> <li>It was noted that there are no approved hazardous waste disposal facilities within the Red Sea Governorate.</li> <li>Accordingly, hazardous waste generated from the Project must be transported to licensed facilities located in other governorates, including Giza (Arab Abu Saed), Beheira, and Alexandria (El-Nasreya landfill).</li> <li>Hazardous waste management is to be undertaken through licensed and authorized contractors responsible for collection, transportation, treatment, and final disposal.</li> <li>This approach ensures that hazardous waste is managed in compliance with applicable national regulations and regulatory requirements.</li> </ul>
6	Red Sea Water and Wastewater Company (RSWWC)	Discussion of water supply and wastewater management arrangements for the Project, particularly during the construction phase	<ul style="list-style-type: none"> <li>It was noted that water demand in Ras Ghareb has increased in recent years, particularly during the summer season, and that Project-related water supply arrangements should be planned to avoid impacts on local community needs.</li> <li>The Project contractor can coordinate directly with the Ras Ghareb Branch to present construction-phase water demand, which will be reviewed to identify appropriate supply arrangements.</li> <li>Given the Project location, water supply to the site will require transportation by tanker trucks, with all associated costs to be borne by the Project developer.</li> <li>It was highlighted that water transport and wastewater collection services should be carried out through contractors approved by the Water and Wastewater Company and the City Council, with all transactions formally documented.</li> <li>The existing wastewater treatment plant serving Ras Ghareb, with an approximate capacity of 10,000 m<sup>3</sup>/day, was identified as the designated facility for wastewater disposal.</li> <li>Wastewater generated during construction will need to be collected and transported by tanker trucks to the treatment plant through approved contractors, with the Project developer responsible for all arrangements and costs.</li> <li>The importance of monitoring contractors was emphasized to ensure proper handling, transport, and disposal of wastewater at authorized facilities, and to prevent improper discharge in desert areas.</li> <li>The Ras Ghareb Branch will act as the main point of coordination for water supply and wastewater services at the local level.</li> <li>The branch can support the Project developer by providing information on available service arrangements and approved contractors for water transport and wastewater management.</li> </ul>
7	General Petroleum Company	To clarify the nature of concrete slab structures observed within the project boundary during the 2021 site survey, confirm whether new exploration activities had been initiated, and determine coordination	<ul style="list-style-type: none"> <li>The ESIA team introduced the NIAT 500 MW Wind Farm Project and its objectives in contributing renewable electricity to Egypt's national grid.</li> <li>The concrete slab structures identified during the 2021 site survey were still present during the February 2026 site visit. Representatives indicated these could represent preparation pads used prior to drilling activities, but noted that no wellhead or central opening was observed, suggesting they may represent temporary preparation works or unused exploration preparations.</li> <li>After reviewing the project coordinates, the General Petroleum Company confirmed that part of the wind farm site overlaps with the existing Kareem petroleum concession area. The approximate overlap area is approximately 327 metres in width and 3,750–3,758 metres in length, totalling approximately 793,001 m<sup>2</sup>.</li> </ul>

No.	Entity	Objective	Outcomes
		requirements for the detailed design phase.	<ul style="list-style-type: none"> <li>Participants reviewed the coordinates using Google Earth to visually verify the overlap and compare the wind farm boundary with the petroleum concession boundary.</li> <li>It was agreed that further coordination between the project developer and the petroleum authority is required to ensure that wind turbines and associated infrastructure do not interfere with existing or planned petroleum exploration activities and to maintain land use compatibility within the concession area.</li> </ul>
8	Ministry of Petroleum and Mineral Resources	Further attempts were made to re-engage; however, it was clarified that formal communication should be undertaken through the competent authority (NREA), rather than directly by the consultant. It was indicated that such coordination can be carried out prior to the commencement of construction activities, in order to identify any required procedures in relation to potential interactions with existing oil and gas infrastructure within or in proximity to the Project area. Accordingly, communication will be facilitated through NREA, in its capacity as the authority responsible for land allocation and coordination with relevant entities, including the Ministry of Petroleum and Mineral Resources.	
9	NTRA	Further attempts were made to re-engage; however, it was clarified that all formal communication should be undertaken through the competent authority (NREA), rather than directly by the consultant. It was also indicated that such coordination can be carried out prior to the commencement of construction activities related to wind turbine installation, in order to identify any required procedures in the event of potential interactions with existing telecommunication towers. Accordingly, communication will be facilitated through NREA, in its capacity as the authority having jurisdiction over the Project area.	
10	Radio and Television Unit – Ras Gharib & Red Sea Governorate	A review of official correspondence from the National Media Authority (NMA) – Radio Engineering Sector confirms that the Project location and activity were previously assessed based on the submitted coordinates and technical specifications, including turbine heights and layout. The assessment concluded that the Project, in its approved configuration, does not result in interference or adverse impacts on existing broadcasting or radio communication infrastructure, particularly with respect to line-of-sight (LoS) considerations. Follow-up communication with the Authority confirmed that, provided there are no changes to the approved Project coordinates or layout, there is no requirement to update or reissue the original approval, as the assessment was based on the Project's defined spatial parameters.	
11	Bedouins residing near the project area	To understand the relationship between Bedouin communities and the Project area, including land use, livelihoods, and cultural considerations and introduce the new project owner.	<ul style="list-style-type: none"> <li>Sheikh Eid Shar'an confirmed that the Al Hamadin tribe is one of the established Bedouin tribes in the Ras Ghareb region, with a geographic area of influence extending from Wadi Al Hawashiya in the north to areas approaching Hurghada in the south.</li> <li>Land use and territorial arrangements among Bedouin tribes are governed by long-standing customary agreements that define zones of influence and are strictly respected to avoid encroachment between tribes.</li> <li>No Bedouin families reside within the Project site, and the area is not used for permanent or temporary settlement.</li> <li>The Project area is not utilised for grazing activities, seasonal migration, or nomadic routes. Bedouin seasonal movements typically occur in mountainous areas located more than 20 km from the site.</li> <li>No Bedouin structures such as tents, animal shelters, or water wells are found within the Project area.</li> <li>No cultural, spiritual, or historically significant sites are found within or in proximity to the Project site.</li> <li>The primary livelihood activity for Bedouin communities in the area is guarding services ("Ghafra"), providing security for infrastructure, industrial facilities, and development projects. Bedouin interaction with project sites is mainly through employment opportunities rather than direct land use or resource dependency.</li> </ul>

No.	Entity	Objective	Outcomes
			<ul style="list-style-type: none"> <li>Existing wind farm projects in the region have had a positive socioeconomic impact by creating job opportunities, particularly in security and guarding roles. The importance of maintaining such employment opportunities was emphasised.</li> <li>Despite the absence of formal land ownership, customary tribal territories should be respected as part of good practice and social considerations.</li> <li>Communication with Bedouin communities is most effective when conducted through recognised tribal leaders (Sheikhs), using direct in-person consultations and respecting local customs and social structures.</li> </ul>
12	Red Sea Governorate	Discussion of the Project in relation to local administrative, environmental, and community considerations at the Red Sea Governorate level.	<ul style="list-style-type: none"> <li>The Project was presented within the context of Egypt's renewable energy strategy, with wind energy developments generally supported at both national and governorate levels, subject to compliance with applicable environmental and regulatory requirements.</li> <li>The Red Sea Governorate highlighted ongoing environmental protection efforts, including measures to reduce unregulated hunting of wildlife and birds, and awareness and enforcement initiatives aimed at promoting a clean and environmentally sustainable environment.</li> <li>The environmental sensitivity of the governorate, including both marine and desert ecosystems, was emphasized, and the importance of aligning new developments with existing environmental protection initiatives was noted.</li> <li>No specific concerns were raised regarding land use or administrative boundaries, with the Project understood to fall within designated renewable energy areas.</li> <li>It was noted that coordination with the NREA remains the primary channel for addressing land-related matters.</li> <li>No specific concerns were identified regarding nearby communities or settlements; however, local authorities indicated their role in facilitating stakeholder communication where required.</li> <li>It was highlighted that stakeholder engagement activities should be conducted in coordination with relevant authorities to ensure appropriate outreach.</li> <li>The importance of prioritizing local employment during Project implementation was emphasized, particularly for workers from the Red Sea Governorate and Ras Ghareb city.</li> <li>Prioritizing local labour was noted as beneficial in reducing pressure on local infrastructure and services associated with the influx of workers from other regions.</li> <li>The need for coordination with the local labour office and city council was highlighted to support workforce organization and encourage formal registration of workers, including those engaged in temporary or informal employment.</li> <li>This approach was considered important to ensure structured, transparent, and efficient workforce management during Project implementation.</li> </ul>
13	Governmental Entity Responsible for Dams	To understand flood risk management measures implemented in Ras Ghareb and the surrounding areas, and the role of the General	<ul style="list-style-type: none"> <li>It was noted that a series of flood risk mitigation interventions have been implemented in Ras Ghareb over the past five years, based on technical studies prepared by the Water Resources Research Institute under the Ministry of Water Resources and Irrigation.</li> <li>The studies included field investigations and hydrological assessments to identify flood-prone areas, particularly natural valleys (wadis), and to define appropriate mitigation measures based on site-specific geological and topographical conditions.</li> </ul>

No.	Entity	Objective	Outcomes
		Administration of Groundwater in the Red Sea Governorate in managing such risks within the Gulf of Suez region.	<ul style="list-style-type: none"> <li>Several valleys in the Ras Ghareb area were identified as presenting varying levels of flood risk, including Wadi El Huwayshiah and Wadi Abu Hadd (high risk), and Wadi El Duhel and Wadi Dara (medium to high risk).</li> <li>These areas were highlighted as requiring consideration in planning and development activities due to their potential to convey floodwaters during heavy rainfall events.</li> <li>A number of structural mitigation measures have been implemented, including the construction of four artificial lakes for water retention, three dams for flow control, two culverts for drainage, and an artificial channel approximately 12 km in length running parallel to the Ras Ghareb–Hurghada road.</li> <li>Additional drainage infrastructure has been implemented in specific locations, including along Sheikh Fadi Road, in coordination with the General Authority for Roads and Bridges.</li> <li>It was emphasized that flood risk management in the area is based on site-specific technical studies and that natural drainage patterns, particularly wadis, represent a key factor in determining appropriate mitigation measures.</li> <li>Accordingly, such features should be taken into account in the planning and design of new developments within the region.</li> </ul>



Figure 11: Consultation Undertaken in February 2026

## 4.6 Public Disclosure Sessions

### 4.6.1 Public Disclosure Session - 2022

A public consultation session was held upon the completion of the Draft ESIA in Ras Ghareb City, Red Sea Governorate at Orchidia Hall on the 18 January 2022.

The objective of the session included the following:

- Introduce the Project to stakeholders to include location, phases, components, involved entities and other;
- Identify the key anticipated impacts from the Project throughout its various phases;
- Present the methodology that was adopted for the ESIA study and overall scope of work;
- Present key outcomes and conclusions; and
- Allow interested stakeholders to comment on the scope of work undertaken, key issues identified and any other issues of concern they might have.

Accordingly, RCREEE in coordination with the Consultant has identified and developed a list of invitees that included: (i) EEAA headquarters and regional branch; (ii) New and Renewable Energy Authority (NREA); (iii) EETC; (iv) local governmental entities in Red Sea Governorate and Ras Ghareb; (v) NGOs; (vi) local community representatives; and others. All invitees were informed of the date and location of the public consultation.

Participants were invited through:

- Invitations along with the executive summary of the ESIA were sent by the Consultant to all stakeholders identified above by hand, fax and e-mails;
- Invitations sent by RCREEE via e-mails; and
- Telephone communication by the Consultant.

The session was targeted on being an 'open' invitation session for all and any stakeholders to attend. Therefore, in addition to the above, an advertisement in an official daily newspaper was issued announcing the session, its date and location two week in advance. The advertisement is presented in the figure below (the announcement was published in Gomhoryia Newspaper on 1 January 2022).

A total of 62 attendees were recorded at the public disclosure session where 64.5% of which were males and 35.5% were females. The table below presents the entities that attended the session and the number of attendees of each entity accordingly. Moreover, A non-technical executive summary of the ESIA was prepared and distributed to the attendees. Sample photos of the session are presented in the figure that follows.

**Table 10: Distribution of Participants**

Entity	No.	Percentage
EEAA	3	5
EEAA - Red Sea	4	6
EETC	2	3
RCREEE	2	3
NREA	2	3
SIEMENS Gamesa Renewable Energy/original Developer	4	6
Red Sea Governorate	2	3
Ras Ghareb City Council	3	5
Local Community	14	23
Academic and research institutions	2	3



Entity	No.	Percentage
Other wind farm developments in the area	4	6
Petroleum Companies	3	5
Local Contractors	4	6
NGOs	8	15
Consultant	5	8
<b>Total</b>	<b>62</b>	<b>100</b>



SIEMENS Gamesa  
RENEWABLE ENERGY

EcoCon Serv RCREEE ECO Consult

تتشرف  
شركة سيمنز جاميسا (Siemens Gamesa NIAT)  
والمرکز الإقليمي للطاقة المتجددة وكفاءة الطاقة (RCREEE)  
بالتعاون مع  
شركة إكو كنسرف للحلول البيئية وشركة إكو كونسلت  
بدعوة سيادتكم لحضور  
جلسة التشاور الخاصة بعرض نتائج دراسة تقييم الأثر البيئي والاجتماعي  
لمشروع محطة توليد طاقة الرياح NIAT 500 ميغاوات في خليج السويس  
يتم عقد جلسة التشاور يوم الثلاثاء الموافق ١٨ يناير ٢٠٢٢ بقاعة أوركيدا  
بجوار نادي العاملين بمدينة رأس غارب بمحافظة البحر الأحمر  
في تمام الساعة العاشرة صباحاً  
الموقع الإلكتروني للمكتب الاستشاري والشركة المنفذة:  
www.ecoconserv.com موقع المكتب الاستشاري - إكو كنسرف  
ولمزيد من الاستفسارات يرجى الاتصال بالمكتب الاستشاري  
تليفون: ٠٢/٢٧٣٦٤٨١٨ - ٠٢/٢٧٣٥٩٠٧٨ فاكس: ٠٢/٢٧٣٦٥٢٩٧  
بريد إلكتروني: genena@ecoconserv.com

Figure 12: Newspaper Advertisement



**Figure 13: Selected Photos of the Session**

The session was moderated by the following key entities: (i) Siemens Gamesa Renewable Energy Representatives (as the original Developer); (ii) RCREEE representative; (iii) EEAA representative and (iv) ESIA consultants (ECO Consult and EcoConServ)

Mr. Mohammad Abdullah (EEAA representative) initiated the session with a welcoming speech that highlighted the importance of renewable energy projects. He then stressed on the importance of the session in providing discussions on the Project's potential impacts throughout its various phases and allowing stakeholders to raise any issues or concerns that should be addressed. Following that, Ms. Iman Ramadan (NREA representative) explained the role of NREA in providing technical support for wind energy projects in Egypt.

The session also included speeches from both Ms. Rasha El Sherbiny (EETC representative) who also explained their role in support for wind energy projects. In addition, Mr. Ali Khazma (RCREEE representative) who reiterated the roles of the concerned authorities on the Project and their keenness to support energy projects in line with preserving the environment, especially bird migration corridors.

Following the above, the detailed presentation started with Mr. Mohamed El Sayed (Original Developer representative) who provided background on the proposed project. In addition to that, the Consultant (ECO Consult & EcoConServ) presented the ESIA study in detail to include: (i) the Project (location, components, phases, etc.; (ii) ESIA methodology and scope of work; (iii) ESIA outcomes and conclusions to include E&S baseline, impacts, ESMP, and key mitigations and monitoring requirements to be implemented.

After the presentations mentioned above, an open discussion took place where the attendees were given the chance to comment on the ESIA and its outcomes, results and conclusions. The table below, presents a summary of the key comments raised during the construction as well as the response on such comments.

**Table 11: Key Outcomes and Responses of the Public Disclosure Session**

Issue	Questions and comments	Responses
<b>Waste Disposal</b>	<p><i>Dr. Ahmed Hisham</i> <i>Professor at the Faculty of Engineering, Ain Shams University.</i></p> <p>Inquired whether a plan been made on the disposal of the damaged turbine blades (especially during decommissioning phase) that is in line with international standards and requirements and asked whether there are designated landfills for that.</p>	<p>It was explained that a waste management plan has to be developed by the Contractor and Project Operator that investigates such issues. In any way all disposals must first investigate the issue of recycling/reuse of such components and as a worst-case disposal in accordance with local requirements and at municipal approved landfills as applicable.</p> <p>The Developer added that from their experience such blades are disposed by a specific contractor who is experienced in such a field and provides a certificate stating that the blades have been disposed of in a manner compatible with the environment.</p>
<b>Emergency Plan / Health and Safety</b>	<p><i>Dr. Ahmed Hisham</i> <i>Professor at the Faculty of Engineering, Ain Shams University.</i></p> <p>Asked whether a firefighting plan been prepared to deal with fire incidents in the turbine that could for example be caused by lightening.</p>	<p>The Consultant clarified that the ESIA requires the Contractor and Operator to prepare an emergency plan throughout the construction and operation phases of the Project that highlights the steps to be followed in case of an accident such as fires, personal injuries and other. Refer to "Section 8.11" for additional details.</p>
<b>Infrastructure and Utilities</b>	<p><i>Eng. Hossam Moussa</i> <i>Resident of Ras Ghareb City</i></p> <p>Asked whether there are potential contamination / pollution issues from the dumpsite that is currently located within the Project site.</p>	<p>The Developer explained that studies and assessments were carried out on the soil on the project area / dumpsite location to verify the potential impacts on the soil as a result of the waste accumulation. The study confirmed that there are no potential impacts. It was reiterated again that the dumpsite is being removed outside of the Project area in coordination with the competent authorities (Ras Ghareb City Council, EEAA, NREA, RCREEE).</p>
<b>Socio-economics</b>	<p>The impact on the Ras Ghareb local community from labour influx, especially if there are construction activities in more than one project site.</p>	<p>The Consultant explained that the ESIA recommends that a management system is developed by the Contractor that includes the development of a labour influx plan to address such issues. The plan should take into account timeline for construction activities of wind farm developments in the area at that time.</p>
	<p><i>Eng. Manal Abdel Wahab</i> <i>Bird watcher/ observer from the local community of Ras Ghareb</i></p> <p>asked about how job opportunities will be disclosed to the local community and whether there will be an assigned person whom can be contacted.</p>	<p>The Consultant explained that the ESIA recommends that the Developer adopts and implements an action plan with the local community that will include a local recruitment process that will identify in detail the number of job opportunities, announcement methods, etc. The Developer indicated their commitment to such an issue and explained that details on this will be announced in a later stage as the project progresses.</p>

	<p><i>Dr. Ahmed Hisham</i> <i>Professor at the Faculty of Engineering, Ain Shams University.</i></p> <p>Suggested submitting a proposal/recommendation to include wind energy as a major in the Technical Secondary School in Ras Ghareb City, in order for graduate specialists to work in the maintenance of wind energy farms.</p>	<p>NREA clarified that the state's plan for technical education included the establishment of specialized technical schools, such as those established in the Benban area in Aswan Governorate, in addition to including wind energy in the school curricula at different educational levels. NREA indicated that the proposal/recommendation will be taken into consideration in the next stage and added that they will communicate with the Ministry of Education regarding the preparation of specialized courses for wind energy.</p>
	<p><i>Eng. Hossam Moussa</i> <i>Resident of Ras Ghareb City</i></p> <p>Emphasized on the previous proposal/recommendation to include wind energy as a major in the technical secondary school in Ras Ghareb, in order to maximize the benefit of wind energy projects on the city's residents, and provide job opportunities for the population in line with the newly developed energy production.</p>	<p>EETC also confirmed that the state is currently working to develop the technical education and establish new technical schools specializing in wind energy.</p> <p>The Developer stated that SIEMENS Gamesa is also working in cooperation with Ain Shams University to train students of the Faculty of Engineering in their factories outside of Egypt. They also praised the idea of supporting/establishing a school for technical education specialized in the field of wind energy.</p>
<b>Avi-fauna</b>	<p><i>Dr. Osama Al Jabali</i> <i>Director of the Migratory Soaring Birds Project, the Ministry of Environment</i></p> <p>The proposed project is not a stand-alone project, as it is among several other wind energy projects in the Gulf of Suez area, which requires studying the potential impacts of the project, especially on the sensitive receptors such as birds. In addition, the cumulative impact of wind energy projects in the area should be taken into consideration.</p> <p>Dr. Osama emphasized that the types and numbers of birds vary from season to season, but the whole area has strategic importance as one of the main passages for bird migration in the Red Sea area. He also stressed that the planning of the turbines' distribution should be arranged in regular rows at the project site so as not to affect the monitoring of birds. Additionally, there should be escape corridors for birds between the turbines as required by SESA and wadi systems within the site should be avoided. He referred to the efforts made by the concerned authorities to move the dumpsite outside the project site and to choose an alternative site away from the bird corridors,</p>	<p>The Consultant stressed that all comments will be considered throughout the avifaunal assessment that are a part of the ESIA study (please refer to "Section 7.5" for additional details). In addition, it was explained that cumulative impacts of wind energy projects in the region have been considered as part of an ongoing Cumulative Effects Assessment (CEA) study that is being undertaken by RCREEE.</p>

	<p>and to establish a dump site according to standards consistent with the environment.</p> <p>He also mentioned the capacity building project that is currently being developed to train the youth to watch/observe birds, especially in areas where there are many energy projects such as Ras Ghareb and Jabal Al-Zayt and explained that a training centre will be open soon.</p> <p>Finally, he referred to the cooperation protocol with EETC regarding placing bird flight diverters on OHTLs to avoid the risk of bird electrocution.</p>	
	<p><i>Eng. Mamdouh Hegazy</i> <i>Environmental Director of Lekela</i></p> <p>stated that there are potential risks of having OHTLs at the project site on birds and asked whether this has been taken into account to include placement of bird diverters on OHTL lines.</p>	<p>The Consultant explained that the ESIA does not include the OHTL given that the route has not been finalized or available as part of the ESIA preparation. However, it was explained that the Developer will coordinate with EETC before construction for inclusion of bird diverters on the OHTL.</p>
<b>Biodiversity</b>	<p><i>Dr. Ayman Hamada</i> <i>Head of the Biodiversity Department - EEAA</i></p> <p>Asked whether a biodiversity survey been conducted for the project area. He also emphasized that due to the presence of a dumpsite it could provide suitable habitat for some species. In addition, he asked whether the survey covered reptiles and insects.</p>	<p>The Consultant emphasized that a biodiversity survey was conducted in the project area and recorded and classified all flora and fauna species onsite as well as key habitats. The survey also covered the dumpsite area in particular. Refer to "Section 7.4".</p>
<b>Associated Facilities</b>	<p><i>Dr. Ayman Hamada</i> <i>Head of the Biodiversity Department - EEAA</i></p> <p>Stated that the OHTL and substation that will be established for the project must also be taken into consideration.</p>	<p>It was explained that the ESIA did not include the OHTL given that key official information was not available or provided at the time of undertaking of the associated surveys and assessments as part of the ESIA (e.g. route, specifications number of towers, etc.). Therefore, a standalone ESIA will be undertaken at a later stage once such required information is available and provided by the relevant entity. However, the Consultant stressed that all comments will be considered.</p>



#### **4.6.2 Public Disclosure Session - 2026**

A public disclosure session will be conducted upon completion of the updated ESIA to present the revised Project details, updated baseline findings, and the outcomes of the impact assessment to relevant stakeholders. The session will provide an opportunity to communicate any changes to the Project design, anticipated impacts, and proposed mitigation measures, as well as to obtain feedback from stakeholders and address any concerns raised. The outcomes of the session will be documented and incorporated, into the final ESIA.

#### **4.7 Disclosure of the ESIA document**

The final ESIA, NTS and the SEP will be disclosed on the Developer's website. Such documents will be disclosed for a minimum of 60 calendar days to allow any stakeholder to review the studies and comment on the scope of work undertaken, key issues identified and any other issues of concern they might have. At the end of the disclosure period, all received comments will be addressed and taken into account and an updated ESIA will be provided.

#### **4.8 Stakeholder Engagement Plan**

Stakeholder engagement is an on-going process that involves: stakeholder analysis & planning, disclosure & dissemination of information, consultation & participation, grievance mechanism, and ongoing reporting to Affected Communities. A Stakeholder Engagement Plan (SEP) is developed and implemented that is scaled to the Project risks and impacts and development stage, and be tailored to the characteristics and interests of the Affected Communities and key stakeholders.

The SEP for the Project describes the planned stakeholder consultation activities and engagement process and include the following:

- Define the Project's approach and future stakeholder engagement
- Identify stakeholders within the area influenced by the Project
- Profile identified stakeholders and understand their priorities
- Propose an action plan for future engagement with identified stakeholders; and
- Set out the grievance/project complaints mechanism.

The Developer is committed to implementing the requirements of the SEP throughout the lifetime of the Project. The SEP is provided as a standalone document.



## 5 REGULATORY AND POLICY FRAMEWORK

This chapter first provides an overview of the environmental clearance process for the Project. The Chapter then discusses the regulatory context which is directly related to environmental compliance which must be adhered to by all parties involved in the Project throughout the planning and construction, operation, and decommissioning. The Chapter goes on to summarise the relevant international agreements and conventions to which Egypt is a signatory.

Finally, as the Project is seeking financing from a set of IFI lenders, this Chapter highlights the environmental and social policies and requirements of the Project Lenders, as well as those of other IFIs which must be adhered to by the Developer.

### 5.1 Egyptian Environmental Institutional Framework

#### EEAA

The EEAA is an authorised state body regulating environmental management issues. Egyptian laws identify three main roles of EEAA:

- A regulatory and coordinating role in most activities, as well as an executive role restricted to the management of natural protectorates and pilot projects.
- The responsibility of formulating the Environmental Management (EM) policy framework, setting the required action plans to protect the environment and follow their execution in coordination with Competent Administrative Authorities (CAAs).
- The responsibility of EEAA in reviewing and approving the ESIA studies for new projects/expansions undertaken, as well as monitoring the implementation of the ESMP.

#### Environmental Management Unit (EMU)

The EMU, at Governorate and district level, is responsible for the environmental performance of all projects/facilities within the Governorate. The Governorate has established EMUs at both Governorate and city/district levels. EMUs are responsible for the environmental protection within the Governorate boundaries. They are mandated to undertake both environmental planning and operation-oriented activities. EMU is mandated to:

- Follow-up the environmental performance of the projects within the Governorate during both construction and operations phases to ensure the project is in compliance with the laws and regulations as well as with the mitigation measures included in its ESIA approval.
- Investigate any environmental complaints filed against projects within the Governorate.
- EMUs are administratively affiliated to the Governorate, yet technically to EEAA. EMUs submit monthly reports to EEAA with their achievements and inspection results.
- The Governorate has a solid waste management unit at Governorate and district level. The units are responsible for the supervision of solid waste management contracts.

#### Competent Administrative Authorities (CAAs)

The CAAs are the entities responsible for issuing licenses for project construction and operation. The ESIA is considered one of the requirements of licensing. The CAA for this project is NREA. NREA is thus responsible for receiving the ESIA studies, checking the information included in the documents concerning the location and for the suitability of the area to the project activity. It is also responsible for ensuring that the activity does not negatively impact the surrounding activities and that the location is in compliance with the ministerial decrees

related to the activity. NREA forwards the documents to EEAA for review and to issue its response in 30 days period. They are the main interface with the project proponents in the ESIA system. The CAA is mandated to:

- Provide technical assistance to Project Proponents
- Ensure the approval of the Project Site
- Receive ESIA Documents and forward it to EEAA
- Follow-up the implementation of the ESIA requirements during post construction field investigation (before the operation license).

**Table 12: Other Related National Government & Permitting Authorities**

Entity	Scope
Egyptian Electricity Transmission Company (EETC)	Purchase of electrical energy produced from power plants, which authorizes local and foreign investors to create, and sell them on the ultra-effort networks. The implementation of projects for the electricity transmission
New & Renewable Energy Authority (NREA)	NREA act as the national focal point for expanding efforts to develop and introduce renewable energy technologies to Egypt on a commercial scale together with implementation of related energy conservation programs. NREA is entrusted to plan and implement renewable energy programs in coordination with other concerned national and international institutions within the framework of its mandate
General Petroleum Company	A national State-owned company engaged in exploration, production and development of hydrocarbons, is responsible for the management of oil and gas exploration and production activities on behalf of the State. It is one of the subsidiary companies affiliated to the Ministry Petroleum has the right of concession for petroleum exploration in some parts of the project area and adjacent areas. Represents the main investment activity in the project area
Ministry of Defense: Army Intelligence force, Border guards	They also provide permissions to get into the desert area. Secure and support the project.
Red Sea Governorate	The main role of the governorate is supporting the project by providing the various permissions needed, and infrastructure maps in case needed.
Ras Gharib City Council	Involved in several requirements to include: (i) provide permits for any construction activities within their area of jurisdiction; (ii) supervision and follow-up from the Environmental Department in Ras Gharib City Council during the construction phase; and (iii) provide services related to solid waste collection and disposal.
Water and wastewater Company in Ras Ghareb	Provide the project needs of water and wastewater disposal during the construction phase; through the construction contractors (In the case of contracting with them).
Public Health: Directorate of Health in Red Sea Governorate, Ras Ghareb General Hospital	They provide health services and facilities to the local districts.
Manpower Directorate: Labour Office in Red Sea Governorate	Data of the labour force in Red Sea Governorate and complaints of workers. Monitor labour recruitment standards during construction.
Roads Directorate in Red Sea Governorate	Services and development of external roads in the governorate. Issuing permits for any construction work on the external roads.
Entity	Scope
Ministry of Interior	MOI is responsible for national and local security, as well as approving emergency response and firefighting plans for establishments/projects.

EEAA	Issues the Environmental approval for the project. Monitors the compliance with the conditions of approval.
Ministry of Electricity and Renewable Energy	The Ministry of Electricity is the responsible entity for the generation, transmission and distribution of electricity in Egypt, under which NREA, Egyptian Electricity Holding company and EETC operate.
Ministry of Environment	The Ministry of Environment is the entity responsible for the formulation of environmental policies. The preparation of necessary plans for environmental protection and environmental development projects and following up on the implementation of all of the above. Under the ministry, the EEAA and the Nature protection bureau operate.
Ministry of petroleum and mineral resources	The Ministry of Petroleum is the entity responsible for the supervision of the exploration, production, marketing and distribution of oil, gas and other natural resources
Ministry of Antiquities	The ministry of antiquities is the entity responsible for the preservation and protection of the heritage and ancient history of Egypt, under which all inspector offices in the governorates operate
Red Sea Governorate antiquities inspector offices	First contact in case of any chance finds during construction. Responsible for protecting and managing antiquities in the area.
Ministry of Civil Aviation	Civil aviation approval might be necessary for large-scale wind farms. The impact of wind turbines on air traffic control systems, radar, and aircraft operations is evaluated by the civil aviation authority.
Ministry of Transportation	Provide the necessary permissions and approvals related to potential traffic disruptions during the construction phase, such as the transportation of blades.

## 5.2 Egyptian Environmental Clearance Process

The ESIA is governed by the Law No. 4 of 1994 and its amendments, the Law on Protection of the Environment and its Executive Regulations 1995 and its amendments (Prime Ministers Decree 338). According to Law 4 of 1994, applications for a license from an individual, company, organization or authority, an assessment of the likely environmental impacts of development projects should be undertaken. An ESIA is required for all electricity generation projects including renewable energy projects.

Based on the categorization of development projects included within the Guidelines for EIA issued by the EEAA in 2009 and EEAA Decree 518 in 2023<sup>3</sup>, wind farm projects are considered under Category C projects (projects with high potential impacts) which require undertaking a full ESIA study.

The involvement of the public and concerned entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process with concerned parties. Consultation is undertaken twice during the EIA process the first in the phase of identifying the scope of the project EIA, and the second is after the preparation of the draft EIA.

Before the public consultation on the draft EIA, the draft non-technical summary in Arabic should be disclosed to all concerned parties. After the EIA process is complete, the EIA report will be stored at EEAA's central library or that of the RBO of the projects region. Moreover, the executive summary of the final EIA will be available at EEAA website. The project proponent should identify in a letter attached to the EIA the parts that he/she does not wish to disclose. These include sections that may have sensitivity related to trade, technology, or security. An individual section in the EIA should be prepared for public consultation including:

- Methodologies used to inform and involve concerned parties in the EIA process

<sup>3</sup> [Egyptian Environmental Affairs Agency \(EEAA\) Decree No. 518 of 2023 – under point 21](#)

- Analysis of the data and information gathered and feedback acquired.
- Table 12 with all aspects that have been discussed during the public consultation meetings and how the project will address or mitigate the aspects
- Methodologies followed by the project proponent to ensure the continuity of the consultation process during the construction and operation phases and until the project reaches the closure phase.
- Commitments of the project owner to improve surrounding environment and support the neighboring community

An Annex in the EIA should be prepared for public consultation including: Documentation of public meetings and meetings including dates, name of attendees as well as agenda and topics of discussion.

The ESIA process is set according to the guidelines issued by the EEAA including: EIA Guidelines (2009), and the Environmental Impact Assessment Guidelines and Monitoring Protocols for Wind Energy Development Projects along the Rift Valley/Red Sea Flyway with a particular reference to wind energy in support of the conservation of Migratory Soaring Birds (MSB) (2013).

The key requirements for a full ESIA as per the requirements above include the following:

- Environmental and Social (E&S) Regulatory and Legal Review
- Project Description
- Description of the Baseline Environment (physical, biological, social)
- Identification and Analysis of Impacts
- Analysis of Alternatives
- Public Consultation (on the draft ESIA)
- Environmental Management Plan (EMP) (mitigation measures, monitoring program, institutional arrangements)
- Upon submission of the ESIA report by the ESIA Practitioner to the CAA in charge of issuing licences, sends the ESIA to EEAA for evaluation. The EEAA shall review the ESIA and provide comments or feedback within 30 days. The CAA in charge of issuing licences in case of wind power projects is the NREA.
- After submission of an ESIA for review, EEAA may request revisions in the ESIA report within 30 days, including additional mitigation measures, before issuing the report approval.

### 5.3 Egyptian E&S Regulatory Context

This section lists those legislations that are directly related to environmental and social compliance that must be adhered to by all parties involved in the Project throughout the planning and construction, operation, and decommissioning phase. These legislations include: (i) those issued by EEAA (laws, regulations and instruction), and (ii) the relevant national legislations issued by other line ministries (laws, regulations, instructions, standards).

The table below lists the key relevant legislation and regulator/entity relevant to each of the environmental and social parameters being studied and assessed within this ESIA. Throughout the following Sections, reference to the requirements set out within those legislations is provided under each relevant parameter.

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**Table 13: Relevant Legislation and Regulations of Environmental and Social Parameters**

Legislation	Relevant Article	Requirements
<b>Land Use</b>		
Electricity Law No. 87/2015	Article 53	<ul style="list-style-type: none"> <li>Stipulates the right of proper compensation for the affected persons due to the establishment of Electricity projects</li> </ul>
	Article 55	<ul style="list-style-type: none"> <li>Identifies the Right of Way that should be avoided for the OHTL and the underground cables: <ul style="list-style-type: none"> <li>25 meters from the center for extremely high voltage OHTL</li> <li>13 meters from the center for the high voltages OHTL</li> <li>5 meters for the medium voltage OHTL</li> <li>5 meters for the high and extremely high voltage cables</li> <li>2 meters for low and medium voltage cables</li> </ul> </li> <li>The Owner of the land should be compensated in case of land acquisition. The right of way stated in article 55 should be abided by</li> </ul>
Law on Expropriation for Public Interest No. 10/1990	No relevant article as the project will not entail any expropriation or acquisition of private land	<ul style="list-style-type: none"> <li>The main site is located on a state-owned land which does not trigger any expropriation activities, according to law no. 10/1990.</li> </ul>
Law on Expropriation of Real Estate Property for Public Interest 577/1954 later amended by Law 252/60 and Law 13/1962	No relevant article as the project will not entail any expropriation or acquisition of private land	<ul style="list-style-type: none"> <li>Establishes the provisions pertaining to the expropriation of real estate property for public benefit and improvement.</li> <li>The project will not entail any land acquisition of private land or expropriation of private property</li> </ul>
Civil code 131/1948	Articles 802-805	<ul style="list-style-type: none"> <li>Recognizes private ownership right. <ul style="list-style-type: none"> <li>Article 802 states that the owner, pursuant to the Law, has the sole right of using and/or disposing their property.</li> <li>Article 803 defines what is meant by land property</li> <li>Article 805 states that no one may be deprived of their property except in cases prescribed by Law and would take place with an equitable compensation.</li> </ul> </li> <li>Land for the Project was allocated by NREA and was not previously owned and thus no compensation would be needed</li> </ul>
Unified Building Law No. 119/ 2008	Article 39	<ul style="list-style-type: none"> <li>Apply and receive the construction permit before start of the implementation</li> </ul>

		<ul style="list-style-type: none"> <li>Ensure that all designs abide by the building codes of Egypt</li> </ul>
<b>Geology, hydrology, hydrogeology</b>		
Law on Environmental Protection No. 4/1994	Article 33 of the Executive regulations of Law 4/1994	<ul style="list-style-type: none"> <li>The owner of the project is responsible to decontaminate the area/soil in case of relocation or decommissioning</li> </ul>
<b>Management of solid waste and hazardous waste generated from the facility during generation, handling, transportation and disposal</b>		
Law No. 4/1994 amended by Law No. 9/2009 and ER 1095/2011 amended by Decree 710/2012)	Articles 28, 29, 33, 37, 39	<ul style="list-style-type: none"> <li>Identification: Using the hazardous waste (HW) lists issued by the competent authority.</li> <li>Minimization: strive to reduce quantitatively and qualitatively the generation of the HW</li> <li>Segregation: HW is to be separated from other types of non-hazardous waste. In addition, the different types of HW must not be mixed together.</li> <li>On site Storage: HW is to be stored in a designated area, and containers must be made of suitable materials and be properly sealed to avoid any leakages or spills into the surroundings.</li> <li>Off-site transportation: HW handling and transportation to be undertaken by authorized HW contractors.</li> </ul>
	Article 22 and Article 17 of the Executive Regulations	<ul style="list-style-type: none"> <li>The establishment should maintain an environmental register in accordance with Annex 3 of the Executive regulations</li> </ul>
	Article 39 and Article 41 of the Executive Regulations	<ul style="list-style-type: none"> <li>Article 39: The establishment should maintain the cleanliness of garbage bins and vehicles. Garbage collection bins shall be tightly covered and waste shall be transported at suitable intervals.</li> <li>Article 41: The establishment shall undertake necessary precautions to secure the safe storage and transportation of waste. These precautions include the following: <ul style="list-style-type: none"> <li>Construction waste storage is to be carried out at site such that it does not obstruct movement of vehicles and personnel.</li> <li>Waste that generates emissions should be covered to avoid air pollution</li> <li>Waste is to be handled and transported by authorized waste contractors and disposed of in licensed facilities</li> </ul> </li> </ul>
	Articles 26, 28 and 29 of the Executive regulations	<ul style="list-style-type: none"> <li>The establishment should maintain a register for the hazardous waste, as well as record for the hazardous substances used</li> </ul>
Law No. 202/2020 on waste management and its executive	Article 10	<ul style="list-style-type: none"> <li>The waste generators or holders shall safely dispose of the wastes of their establishment or their projects or entities after the delivery or initial operation of the new or renovated projects, or after the completion of the works from which wastes are generated, whatever their purpose, within a period not exceeding twenty days starting from the date of delivery or initial operation of the project or works, in the event that these wastes are located outside the boundaries of these establishments. or projects. The generators or possessors of the waste shall also abide by the measures and requirements set out in the appendices attached to this regulation.</li> </ul>



regulation 722/2022	Article 36	<ul style="list-style-type: none"> <li>All entities and individuals, when carrying out demolition and construction works, are obligated to manage safe transportation, recycling and final disposal through entities licensed and authorized to do so.</li> </ul>
	Article 50	<ul style="list-style-type: none"> <li>The owner of the facility or the person in charge of its management whose activity produces hazardous waste, in accordance with the provisions of the law, must keep a paper or electronic record, or both, of these wastes, and how to dispose of them, as well as the parties contracted for any management operations of these wastes, and in the event that the activity of the facility is transferred or suspended, the owner of the facility or the person responsible for its management must clean it and the soil in which this activity was carried out, in accordance with the requirements and standards set out in Appendix No. (8) attached to this regulation.</li> </ul>
<b>Control of the wastewater discharge into the sewage system and public network.</b>		
Ministerial Decree 44/2000, Decree of Law 93/1962	Article 14	<ul style="list-style-type: none"> <li>The law prohibits the disposal of domestic, industrial and commercial wastewater, treated or untreated, in public drainage system without obtaining a prior approval.</li> <li>Article 14 of the executive regulations set the parameters required regarding the quality of the wastewater discharged to the public sewage network.</li> <li>The owner of the project should abide by the limits stated in article 14 of the Executive regulations of Law 93/1962</li> </ul>
<b>Biodiversity, Birds, and Bats</b>		
Law 4 of 1994 amended by Law 9/2009	Article 28, as amended by Law 9 of 2009. Annex 4 of the Executive Regulations of law 4/1994, amended by Prime Minister Decree 1095 of 2011	<ul style="list-style-type: none"> <li>Defines fauna and flora which are prohibited to be hunted or disturbed.</li> <li>Concerned with ensuring that no species are being disturbed and implementing all mitigation measures needed to reduce the impact on any fauna and flora in the vicinity of the project</li> </ul>
Environmental Impact Assessment Guidelines and Monitoring Protocols for Wind Energy Development Projects along the Rift Valley/Red Sea Flyway with a particular reference to wind energy in support of the conservation of Migratory Soaring Birds (MSB)	Section One Guidelines for Environmental Impact Assessment for Wind Energy Development in Egypt 1.5 Description of EIA Study Components for Wind Farm Projects – 0.7 Project Environmental Setting	<ul style="list-style-type: none"> <li>Defines the ecological components of plant, animals and their habitats, including threatened species and areas that have been identified as protected areas or IBAs and requests the review IUCN Red List of Threatened Species.</li> <li>Defines baseline information requirements for birds at Wind Farm Projects.</li> </ul>
	Section Two Guidelines on Mitigation, Monitoring and Training 2.2 Monitoring Protocols	<ul style="list-style-type: none"> <li>Defines standard methods and models to predict risk related to migratory birds.</li> <li>Defines standard methods used in pre- and post-construction studies of Wind Energy Facilities focused on assessing impacts on birds.</li> <li>Defines standard shutdown protocol to be implemented building on results of species recorded and numbers of passage birds recorded during studies.</li> </ul>

Archaeology and cultural heritage		
Law on Antiquities Protection No. 117/1983	Article 1	<ul style="list-style-type: none"> <li>Defines a monument as a building or movable property produced by different civilizations or by art, sciences, literature and religions from the prehistoric era or successive historical eras until a hundred years ago or historical buildings.</li> </ul>
	Article 2	<ul style="list-style-type: none"> <li>States that any building or movable property that has a historical, scientific, religious, artistic or literary value could be considered as a monument whenever the national interest of the country imposes its conservation and maintenance without adherence to the time limit stipulated in the preceding Article no.1</li> </ul>
	Article 5	<ul style="list-style-type: none"> <li>States that the Supreme Council of Antiquities (SCA) is the competent authority responsible for antiquities in Egypt.</li> </ul>
	Article 20	<ul style="list-style-type: none"> <li>States that license of construction in archaeological sites or land is not permitted. It is prohibited to make any installation or landfill or digging channels, construct roads, agricultural land or for public benefits in archaeological sites or land within its approved border lines.</li> <li>The Article additionally, states that a buffer zone around the monument or the site is defined as three kilometres in the uninhabited areas or any distance determined by the SCA to achieve environmental protection of the other parts of the monument in the surroundings (article 20-Ch.1).</li> <li>The provisions of this article (20) apply on land which appears to the SCA - based on conducted studies – that there is a probable existence of monuments in the subsoil.</li> <li>The provisions of this article are also applied to desert and areas where quarrying work is licensed.</li> </ul>
	Article 22	<ul style="list-style-type: none"> <li>States that license of construction in the immediate vicinity of archaeological sites within populated areas could be delivered by the competent authority, after the approval of SCA.</li> <li>The competent authority must state in the license the conditions which the SCA emphasizes to guarantee that the building does not have a negative visual impact on the monument and its direct buffer zone protecting the archaeological and historical surroundings.</li> <li>The SCA has to pronounce its verdict on the license demand within 60 days of the date of submission. Otherwise, the elapsing of this period is regarded as a decision of refusal.</li> </ul>
	Article 23	<ul style="list-style-type: none"> <li>States that the SCA should take the necessary steps to expropriate land that is found in archeological sites and registered according to the rules of this Law. (Article 23- Ch.1). [These rules are defined in the second chapter of the Law 117 – articles 26-30].</li> <li>The SCA must be notified in the event that an unrecorded ruin is found by any person (Article 23).</li> </ul>
	Article 24	<ul style="list-style-type: none"> <li></li> </ul>
Air quality and noise		

Law 4/1994 amended by Law 9/2009 and ER 710/2012	Article 42 of Law 4/1994 amended by Law 9/2009	<ul style="list-style-type: none"> <li>Defines maximum allowable limits for ambient noise intensity and maximum exposure duration</li> </ul>
	Article 44 of ER 710/2012	<ul style="list-style-type: none"> <li>Open burning of garbage and non-hazardous solid waste is strictly prohibited, and garbage and solid waste shall only be dumped or treated in designated areas away from residential, industrial, agricultural and waterways.</li> </ul>
		<ul style="list-style-type: none"> <li>Dumping areas should be bound by a wall, away from obstruction, traffic and pedestrians and take into account the coverage of volatile soil so as not to cause air pollution.</li> <li>Transporting waste and dust resulting from excavation, demolition and construction in special containers or using transport vehicles prepared and licensed for this purpose.               <ul style="list-style-type: none"> <li>The vehicle shall be equipped with a special box or a tight cover that prevents the spread of dust and debris to the air or falling on the road.</li> <li>The vehicle shall be equipped with special equipment for loading and unloading.</li> <li>The car should be in good condition according to the rules of safety, durability and lights and equipped with all safety devices.</li> </ul> </li> </ul>
ERs (amended by Decree 1095/2011 amended by Decree 710/2012)	Annex 5	<ul style="list-style-type: none"> <li>Defines maximum limits of ambient air pollutants</li> </ul>
	Annex 6	<ul style="list-style-type: none"> <li>Defines permissible limits of air pollutants in emissions</li> </ul>
	Annex 8 and Annex 9	<ul style="list-style-type: none"> <li>Defines maximum allowable limits for air emissions, heat stress, ventilation rates within the work environment</li> </ul>
Modified ERs (710/2012) of Law 4/1994	Article 37	<ul style="list-style-type: none"> <li>Defines maximum allowable limits for exhaust gases from machines, engines and vehicles.</li> </ul>
Law 4/1994	Article 36	<ul style="list-style-type: none"> <li>Stipulates that it is prohibited to use machines, engines or vehicles whose exhaust emissions exceed the limits set by the executive regulations of this Law.</li> </ul>
Law 4/1994 and its modified ERs	Article 35 of Law 4/1994 and article 34 of its modified ERs	<ul style="list-style-type: none"> <li>Defines maximum allowable limits for ambient air pollutants, which should be met by the contractors and operator throughout the lifetime of the plant.</li> </ul>
<b>Infrastructure and utilities</b>		
Petroleum pipelines Law No. 4/1988	Decree 292/1988	<ul style="list-style-type: none"> <li>The owner of a property should allow the passing of pipelines transporting liquid or gaseous hydrocarbons beneath the ground surface in accordance with the procedure mentioned in the executive regulations</li> </ul>
	Article 2	<ul style="list-style-type: none"> <li>Specifies that no buildings or trees, other than agricultural land trees, should be constructed or planted at a distance less than 2 m on each side of the pipeline inside urban and 6 m on each side of the pipeline outside the urban areas.</li> <li>If it is necessary to place the pipelines at a closer distance than what is specified in the law, it is allowed through a decision from the chairman of Egyptian General Petroleum Corporation (EGPC); taking into consideration the</li> </ul>

		<p>necessary safety precautions.</p> <ul style="list-style-type: none"> <li>also specifies that if the activities done in accordance to the law will result in damage to the property, the owner has the right to a fair compensation to be decided by a committee formed by a decision from the Minister of Petroleum, and the executive regulations include the guidelines for compensation estimation.</li> </ul>
<b>Occupational health and safety</b>		
Law 4/1994	Articles 43 – 45 of Law 4/1994, which address air quality, noise, heat stress, and the provision of protective measures to workers.	<ul style="list-style-type: none"> <li>The owner of the project should abide by the limits stated in Annex 7 of the Executive regulations</li> <li>In case the limits are exceeded, special protective equipment should be made available (earmuffs, masks...)</li> <li>In case the limits are exceeded, the workers should have rests as specified by the limits (especially for noise and vibration from electric jack hammers or any other ramming equipment)</li> <li>Conduct regular medical check-ups for workers that are facing noise, vibration or heat stress exceeding the limits</li> </ul>
Egyptian Labour Law No. 14 of 2025	Article 252, 254, 258	<ul style="list-style-type: none"> <li>Article 252 requires employers to take all necessary preventive measures to protect workers from hazards associated with working in confined or enclosed spaces, ensuring safe entry procedures and risk control measures.</li> <li>Article 254 newly introduces psychosocial safety obligations, requiring prevention of harassment, bullying, and workplace violence.</li> <li>According to article 258, Occupational health and safety inspectors have the authority to inspect workplaces and verify compliance with safety standards.</li> </ul>
	Minister of Labour Decree 48/1967. Minister of Labour Decree 55/1983. Minister of Industry Decree 91/1985 Minister of Labour Decree 126/2003. Minister of Industry Decree 134/2003	<ul style="list-style-type: none"> <li>The owner of the project is bound with the provision of protective equipment to workers and fire-fighting/emergency response plans. Moreover, the following laws and decrees should be considered:</li> <li>The contractors should have appropriate number of first aid kits in relation to the size of the site and the number of workers on site</li> <li>Work-related accidents, injuries, fatalities and diseases should be notified and bi-annual OHS statistics reporting should be developed.</li> <li>Types of establishments needing to establish OHS services and committees.</li> </ul>
	Article 211 and article 34 of the Decree of the Minister of Labour and Manpower no. 211/2003	<ul style="list-style-type: none"> <li>The establishment should prepare records/reports/register for chemical safety</li> </ul>
Decree 458/2007		<ul style="list-style-type: none"> <li>Egyptian Drinking Water Quality Standards should be met for all water bought and stored on site for the workers' use.</li> </ul>

Decree 162, 2019	Articles 5, 9, 11, 19.	<ul style="list-style-type: none"> <li>Without prejudice to the applicable provisions of the Egyptian Labour Law No. 14 of 2025, all parties, including Government entities and their affiliated bodies, public sector companies, the public business sector, the private sector, trade-union and professional associations and youth employment agencies are prohibited from employing workers subject to this regulation other than via the competent department in the Directorate of Manpower and within whose competence the activity falls.</li> <li>Labour, occupational safety and health inspectors are required in the course of conducting their inspections to monitor the informal workers in the establishments under inspection and to notify employers that they are required to proceed to the competent department of the Directorate to register these workers, regularize their status and take the requisite legal measures as per the provisions of the Labour Act and its implementing ministerial decisions.</li> </ul>
Ministerial Decree No.162, 2019	Articles 5, 9, 11, 19.	<ul style="list-style-type: none"> <li>Without prejudice to the applicable provisions of the Egyptian Labour Law No. 14 of 2025, all parties, including Government entities and their affiliated bodies, public sector companies, the public business sector, the private sector, trade-union and professional associations and youth employment agencies are prohibited from employing workers subject to this regulation other than via the competent department in the Directorate of Manpower and within whose competence the activity falls.</li> <li>Labour, occupational safety and health inspectors are required in the course of conducting their inspections to monitor the informal workers in the establishments under inspection and to notify employers that they are required to proceed to the competent department of the Directorate to register these workers, regularize their status and take the requisite legal measures as per the provisions of the Labour Act and its implementing ministerial decisions.</li> <li>Without prejudice to the social insurance and pensions system in force, the employer shall at his own expense provide first aid to any worker subject to the provisions of this regulation who suffers injury during work and he shall transport him to the requisite provider treatment.</li> <li>Labour, occupational safety and health and employment inspectors shall monitor the employment of workers subject to the provisions of this regulation and the enforcement of the rules for employment set out in this regulation.</li> </ul>
<b>Worker Rights &amp; general Working Conditions</b>		
Labour Law No. 12 of 2003 and its amendments by Labour Law 2021	Working hours	<ul style="list-style-type: none"> <li>According to the new Labour Law 2021, which came into force by the end of 2025, The standard workweek remains 8 hours per day and 48 hours per week, as per Article 90. Employers must provide at least one rest day per week, preferably on Fridays. Breaks: Workers must receive a rest period after every five continuous hours of work (Article 92). Breaks must not be less than one hour per day and are not counted as part of the total working hours.</li> <li>According to the current Labour Law No. 12 of 2003 According to Article 80, the maximum working hours shall not exceed eight hours per day or 48 hours per week, excluding rest periods.</li> <li>Article 81-83 mandates a rest break of at least one hour per working day., and 21 days of annual leave after completing</li> </ul>

		one year of service, increasing to 30 days after ten years or upon reaching the age of fifty (Article 47).
	Worker Protection and Employment Rights	<ul style="list-style-type: none"> <li>▪ According to the new Labour Law 2021, which came into force by the end of 2025,</li> <li>▪ The new labour law explicitly prohibits harassment, bullying, or any form of verbal, physical, or psychological violence against workers, aligning with international agreements and ensuring a safe working environment that meets decent work conditions.</li> <li>▪ Article (4) of the proposed law states that it is prohibited to employ a worker under coercion or forced labour. Additionally, harassment, bullying, or any form of verbal, physical, or psychological violence against workers is strictly forbidden. The internal work regulations and disciplinary sanctions within the establishment shall specify the penalties for such violations.</li> <li>▪ Furthermore, Article (281) stipulates that any violation of Articles (4) and (5) of this law shall be punishable by a fine of no less than 5,000 EGP and no more than 50,000 EGP. The fine shall be multiplied based on the number of workers affected by the offense, and in cases of repeated violations, the fine shall be doubled.</li> <li>▪ As a result, workplace bullying and harassment in the private sector and establishments subject to labour law shall be penalized with fines ranging from 5,000 EGP to 50,000 EGP.</li> <li>▪ According to the current Labour Law No. 12 of 2003</li> <li>▪ Article 92 prohibits discrimination in wages based on gender, ensuring fair treatment.</li> <li>▪ Article 120 establishes strict rules regarding contract termination, requiring justified reasons and severance compensation when applicable.</li> </ul>
	Overtime Pay	<ul style="list-style-type: none"> <li>▪ According to the new Labour Law 2021, which came into force by the end of 2025,</li> <li>▪ Employees required to work overtime must be compensated at a rate of at least 35% higher than their normal wage for daytime overtime and 70% higher for night shifts (Article 95).</li> <li>▪ Work performed on public holidays entitles employees to double their normal wage, plus an additional day off in lieu (Article 98).</li> <li>▪ According to the current Labour Law No. 12 of 2003</li> <li>▪ Overtime Pay: Articles 85 and 88 specify that any overtime work must be compensated at 35% above normal pay for daytime overtime and 70% for nighttime overtime.</li> </ul>



	Other Working Conditions	<ul style="list-style-type: none"> <li>The law prohibits discrimination in employment and wages based on gender, disability, or social status (Article 3) and prohibits discrimination on the basis of sex in hiring, wages, promotions, and termination of employment (Article 35).</li> <li>Maternity leave has been extended to four months instead of three, with full salary benefits (Article 108).</li> <li>Flexible working arrangements are introduced to support women in the workforce.</li> </ul>
	Occupational Health & Safety (OHS) Regulations	<ul style="list-style-type: none"> <li>OHS regulations remain governed under the existing Labour Law No. 12 of 2003 until the new law takes effect. Employers must provide a safe working environment, conduct regular risk assessments, and ensure employee health protection measures are in place.</li> <li>The Egyptian Environmental Law (Law No. 4 of 1994, amended in 2009) also imposes safety and environmental protection obligations in industrial and construction activities.</li> </ul>
Law on Social Protection and Benefits Egyptian Social Insurance No. 148/ 2019, which came into force on January 1, 2020	Social Protection and Benefits Egyptian Social Insurance	<ul style="list-style-type: none"> <li>The Egyptian Social Insurance Law No. 148 of 2019, which came into force on January 1, 2020, continues to regulate job protections, benefits, and social security matters.</li> </ul>
Law on Establishing the National Council for Human Rights No. 94/2003		<ul style="list-style-type: none"> <li>The Law on Establishing the National Council for Human Rights (NCHR) aims to ensure respect, set values, raise awareness and grant observance of human rights.</li> <li>At the forefront of these rights and freedoms are the right to life and security of individuals, freedom of belief and expression, the right to private property, the right to resort to courts of law, and the right to fair investigation and trial when charged with an offence.</li> <li>This Constitution came into force after a public referendum on 11th September 1971 and was amended on 22nd May 1980 to introduce the Shoura Council and the press.</li> </ul>
EEAA EIA guidelines	Paragraph 6.4.3.1 Scope of Public Consultation Paragraph 6.4.3.2 Methodology of Public Consultation Paragraph 6.4.3.3 Documentation of the Consultation Results Paragraph 7 Requirement and Scope of the Public Disclosure	<ul style="list-style-type: none"> <li>Conduct a public consultation as part of the ESIA study according to the EEAA guidelines methodology. The involvement of the public and concerned entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process with concerned parties.</li> <li>Preparation of the Public Consultation Plan before starting the consultation activities in the EIA scoping phase, the project proponent prepares a plan indicating the methodology of the public consultation to be adopted in the two public consultation phases (EIA scoping phase and consultation on the draft EIA). The plan should indicate the concerned parties that will be consulted, method of consultation and other points.</li> <li>An individual section in the EIA will be prepared for public consultation</li> <li>Disclosure of relevant material is an important process and should be undertaken in a timely manner for all Category C projects. This process permits meaningful consultations between the project proponent and project-affected groups</li> </ul>

		<p>and local NGOs is required to take place. Before the public consultation on the draft EIA, the draft technical summary in Arabic should be disclosed to all concerned parties.</p> <ul style="list-style-type: none"> <li>workers in the establishments under inspection and to notify employers that they are required to proceed to the competent department of the Directorate to register these workers, regularize their status and take the requisite legal measures as per the provisions of the Labour Act and its implementing ministerial decisions.</li> </ul>
<b>Socio-economics</b>		
Law No. 94/2003 and EEAA EIA guidelines	<p>Paragraph 6.4.3.1 Scope of Public Consultation</p> <p>Paragraph 6.4.3.2 Methodology of Public Consultation</p> <p>Paragraph 6.4.3.3 Documentation of the Consultation Results</p> <p>Paragraph 7 Requirement and Scope of the Public Disclosure</p>	<ul style="list-style-type: none"> <li>At the forefront of these rights and freedoms are the right to life and security of individuals, freedom of belief and expression, the right to private property, the right to resort to courts of law, and the right to fair investigation and trial when charged with an offence.</li> <li>This Constitution came into force after a public referendum on 11th September 1971 and was amended on 22nd May 1980 to introduce the Shoura Council and the press.</li> <li>Conduct a public consultation as part of the ESIA study according to the EEAA guidelines methodology. The involvement of the public and concerned entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process with concerned parties.</li> <li>Preparation of the Public Consultation Plan before starting the consultation activities in the EIA scoping phase, the project proponent prepares a plan indicating the methodology of the public consultation to be adopted in the two public consultation phases (EIA scoping phase and consultation on the draft EIA). The plan should indicate the concerned parties that will be consulted individual section in the EIA will be prepared for public consultation</li> <li>Disclosure of relevant material is an important process and should be undertaken in a timely manner for all Category C projects. This process permits meaningful consultations between the project proponent and project-affected groups and local NGOs is required to take place. Before the public consultation on the draft EIA, the draft technical summary in Arabic should be disclosed to all concerned parties., method of consultation and other points.</li> </ul>

## 5.4 International Agreements

Egypt has signed and ratified a number of international conventions committing the country to the conservation of environmental resources and protection of workers' health & safety and labour rights. The following Table 14 lists the key conventions, of which are reflected and applied in their respective sections on environmental and social management aspects.

**Table 14: Relevant Egyptian International Conventions and Agreements**

Name of Multilateral Environmental Agreement	Date of ratification	Ratification date by Egypt
<b><i>Biodiversity and Natural Resources</i></b>		
International Plant Protection Convention	1951	September 12, 1954
Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Near East	1965	July 10, 1963.
Convention on Wetlands of International Importance Especially as Water Fowl Habitat (RAMSAR)	1971	October 24, 1982
Convention Concerning the Protection of the World Cultural and Natural Heritage	1972	May 14, 1975
Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	1973	September 30, 1976
Convention on the Conservation of Migratory Species of Wild Animals	1979	April 30, 1980
Protocol to Amend the Convention on Wetlands of International Importance Especially as Water Fowl Habitat	1982	September 25, 2002
Convention on Biological Diversity (CBD)	1992	June 2, 1993
Agreement for the Establishment of the Near East Plant Protection Organization	1993	December 5, 1953
United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa	1994	October 8, 1996
Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean	1995	December 1, 1995
African Convention on the Conservation of Nature and Natural Resources (revised)	2003	November 29, 2006
International Tropical Timber Agreement	2006	February 27, 1995
<b><i>Hazardous Materials and Chemicals</i></b>		
Convention Concerning Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents	1974	May 14, 1979
Convention on the Prohibition of the Development, Production and Stock-Piling of Bacteriological (Biological) and Toxin Weapons, and on their Destruction	1972	September 8, 1972
Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal	1976	March 10, 1997
Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques	1976	June 30, 1981
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	1989	September 24, 1984
Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa	1991	May 26, 1995

Amendment to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	1995	July 15, 1992
Stockholm Convention on Persistent Organic Pollutants (POPs)	2002	May 17, 2005
<b>Atmosphere, Air Pollution and Climate Change</b>		
Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies	1967	January 12, 1984
Vienna Convention for the Protection of the Ozone Layer	1985	April 2, 1988.
Montreal Protocol on Substances that Deplete the Ozone Layer	1987	March 28, 1990
(London) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	1990	September 25, 1990.
United Nations Framework Convention on Climate Change	1992	June 11, 1994
(Copenhagen) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	1992	September 19, 2005
<b>Name of Multilateral Environmental Agreement</b>		
Kyoto Protocol	1997	February 27, 2005
Paris Agreement under the United Nations Framework Convention on Climate Change	2015	November 4, 2016
<b>Health and Worker Safety</b>		
International Labour Organization Core Labour Standards	1936	1957-1967
Convention Concerning the Protection of Workers Against Ionizing Radiation	1960	October 14, 1961.
Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration	1977	June 28, 1976
Occupational Safety and Health Convention	1979	June 28, 1976

## 5.5 Requirements for Project Financing

The Project is seeking financing from International Financing Institutions (IFI), including EBRD, EIB DEG. Therefore, the E&S requirements of such IFIs must be considered throughout the Project development, which require the Project development to adhere to specific E&S requirements which reflect international best practices.

The ESIA is based on the International Finance Corporation (IFC) Performance Standards, as well as the European Bank for Reconstruction and Development (EBRD) Environmental and Social Requirements, and the European Investment Bank's Environmental and Social Standards all of which are discussed below.

### IFC Performance Standards

The IFC Performance Standards are considered the most comprehensive. The IFC and the World Bank provide a range of guidance documents related to the assessment and management of E&S issues in project development. Not only does IFC guidance provide a generally accepted basis for good practice, but it also provides the technical cornerstone for the Equator Principles which set out the E&S requirements of banks for project finance. The IFC Performance Standards have become the *de facto* international E&S performance benchmark for project financing.

Summarized below are the relevant requirements under IFC Policy and Performance Standards.

### IFC Policy on E&S Sustainability (2012)

The IFC policy on E&S Sustainability puts into practice IFC's overall commitments to E&S sustainability. The policy seeks to: (i) enhance the predictability, transparency, and accountability of IFC's actions and decision making; (ii) help clients manage their environmental and social risks and impacts and improve their performance; and (iii) enhance positive development outcomes on the ground. In addition, the Policy identifies IFC's commitments, its roles and responsibilities and others as applicable.

One of the key outputs of the Policy is the E&S Categorization of projects, which are summarized as follows:

- Category A: Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented.
- Category B: Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
- Category C: Business activities with minimal or no adverse environmental or social risks and/or impacts.

The IFC does not provide specific details on what wind farm projects should be classified.

### IFC Performance Standards (2012)

The IFC Performance Standards (PS) on Social and Environmental Sustainability set out a framework for managing and improving project performance from planning and assessment, through construction and operations to closure. The Performance Standards requirements are summarized in the table below.

**Table 15: IFC Performance Standard Requirements**

IFC PS	Key Points
PS1: Assessment and Management of Environmental and Social Risks and Impacts	<p>PS1 underscores the importance of managing social and environmental performance throughout the life of a project by using a dynamic social and environmental management system. Specific objectives of this Performance Standard are:</p> <p>To identify and assess social and environment impacts, both adverse and beneficial, in the project's area of influence;</p> <p>To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment;</p> <p>To ensure that affected communities are appropriately engaged on issues that could potentially affect them; and</p> <p>To promote improved social and environment performance of companies through the effective use of management systems.</p>
PS2: Labour and Working Conditions	<p>The requirements set out in this PS have been in part guided by a number of international conventions negotiated through the International Labour Organization (ILO) and the United Nations (UN). Specific objectives of this Performance Standard are:</p> <p>To establish, maintain and improve the worker-management relationship;</p> <p>To promote the fair treatment, non-discrimination and equal opportunity of workers and compliance with national labour and employment laws;</p> <p>To protect the workforce by addressing child labour and forced labour; and</p> <p>To promote safe and healthy working conditions, and to protect and promote the health of workers.</p>
PS 3: Resource Efficiency and Pollution Prevention	<p>This Performance Standard outlines a project approach to pollution prevention and abatement in line with international available technologies and practices. It promotes the private sector's ability to integrate such technologies and practices as far as their use is technically and financially feasible and cost-effective in the context of a project that relies on commercially available skills and resources. Specific objectives of this Performance Standard are:</p> <p>To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; and</p> <p>To promote the reduction of emissions that contribute to climate change.</p>

IFC PS	Key Points
PS 4: Community Health, Safety and Security	This PS recognizes that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development. However, projects can also increase risks arising from accidents, releases of hazardous materials, exposure to diseases, and the use of security personnel. While acknowledging the public authorities' role in promoting the health, safety and security of the public, this PS addresses the project sponsor's responsibility in respect of community health, safety and security.
PS 5: Land Acquisition and Involuntary Resettlement	Involuntary resettlement refers both to physical and economic displacement as a result of project-related land acquisition. Where involuntary resettlement is unavoidable, appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented.
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	This Performance Standard reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the use of renewable natural resources in a sustainable manner. This Performance Standard addresses how project sponsors can avoid or mitigate threats to biodiversity arising from their operations as well as sustainably manage renewable natural resources. Specific objectives of this Performance Standard are: To protect and conserve biodiversity; and To promote the sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities.
PS 8: Cultural Heritage	Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to protect irreplaceable cultural heritage and to guide project sponsors on protecting cultural heritage in the course of their business operations.

Note: PS 7 (Indigenous Peoples) is not considered to be applicable to this Project. The Indigenous World 2018 Report (IWGIA, 2018) states that Egypt is not classified as a country with indigenous people. In addition, this was confirmed based on previous experiences on E&S assessments with IFIs in Egypt where such standard was not triggered.

#### IFC EHS Guidelines

In addition, to the Performance Standards, the IFC have sector-specific EHS guideline documents. With regards to the project the following are applicable

- IFC General EHS Guidelines (2007): identifies detailed EHS management and technical recommendations which are applicable for all development projects;
- IFC EHS Guidelines for Wind Energy (2015): identifies the key E&S impacts that should be investigated and provides detailed management and technical recommendations with regards to Industry-Best Practice. The IFC EHS Guidelines identifies the following key issues:
  - Landscape and visual
  - Noise
  - Biodiversity (to include birds and bats)
  - Shadow flicker
  - Water quality
  - Occupational health and safety
  - Blade and ice throws
  - Aviation



- Electromagnetic interference
- Public access
- Abnormal load transportation
- IFC EHS Guidelines for Electric Power Transmission and Distribution (2007): this in particular could be applicable for the associated facilities of the Project (i.e. transmission line for connection with the grid). The Guideline identifies the key E&S impacts that should be investigated and provides detailed management and technical recommendations with regards to Industry-Best Practice. The IFC EHS Guidelines identifies the following key issues:
  - Biodiversity (to include birds and bats)
  - Electric and magnetic fields
  - Hazardous materials
  - Occupational health and safety
  - Community health and safety

### EBRD Requirements

EBRD's 2024 Environmental and Social Policy seek to ensure, through its environmental and social appraisal and monitoring processes, that the projects it finances:

- Are socially and environmentally sustainable;
- Respect the rights of affected workers and communities; and
- Are designed and operated in compliance with applicable regulatory requirements and good international practice.

In addition, EBRD's E&S policy identifies large scale wind power projects as 'Category A' which are projects that could result in potentially significant environmental and/or social impacts that require an ESIA.

To translate this objective into successful practical outcomes, EBRD has adopted a comprehensive set of E&S Requirements (ESR) covering key areas of environmental and social impacts and issues. EBRD expects clients to assess and manage the environmental and social issues associated with their projects so that projects meet their E&S Requirements. The E&S Requirements applicable are summarized in the table below.

**Table 16: Overview of Key Points of EBRD Performance Requirements of Relevance to the Project**

EBRD PR	Key Points Relevant to the Project	Applicability
ESR 1: Assessment and Management of E&S Risks and Impacts	This requirement outlines the process of appraising, managing and monitoring environmental and social issues associated with a project to include E&S management systems, E&S assessments, ESMP, organizational capacity, monitoring and reporting, etc.	Applicable and considered for this ESIA

EBRD PR	Key Points Relevant to the Project	Applicability
ESR 2: Labour and Working Conditions	This requirement assures that human resources policies, procedures and standards will meet the following minimum requirements during the life of the Project with regards to labour and working conditions. This includes issues related to management of worker relationships to include HR policies and procedures, conditions of work, migrant workers, workers' organization, forced labour, child labour, non-discrimination and equal opportunity, grievance mechanism, contracted and supply chain workers, etc.	Applicable and considered for this ESIA
ESR 3: Resource Efficiency and Pollution Prevention and Control	This requirement ensures that resources are utilized efficiently, and impacts associated with polluting activities are controlled. This includes issues related to resource efficiency and circular economy, water, waste, pollution prevention and control, greenhouse gas emissions, safe use and management of hazardous substances and materials, pest management, and noise and vibration.	Applicable and considered for this ESIA
ESR 4: Health, Safety and Security	While bringing many positive benefits to local communities, projects can also increase the potential for community exposure to risks and impacts arising from temporary or permanent changes in population; transport of raw and finished materials; construction, operations and decommissioning; accidents, structural failures, and releases of hazardous materials. This performance requirement addresses the Project proponent's responsibility to identify and to avoid or minimize the risks and adverse impacts to community health, safety and security as well as occupational health and safety.	Applicable and considered for this ESIA
ESR 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Involuntary resettlement refers both to physical and economic displacement as a result of project-related land acquisition. Where involuntary resettlement is unavoidable, appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented. The requirement includes issues related to avoidance or minimization of displacement, forced eviction, negotiated settlements, socioeconomic surveys, inventory assessments and cut-off dates, valuations, eligibility and compensations, temporary land use restrictions, stakeholder engagement, grievance mechanism and other.	Applicable and considered for this ESIA
ESR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	EBRD recognizes the need for the protection and conservation of biodiversity in the context of projects in which it invests. In pursuing these aims, this includes requirements related to assessment of risks and impacts, protection and conservation of biodiversity/Priority Biodiversity Features (PBF)/Critical Habitats (CH), legally protected areas, invasive alien species, sustainable management of natural resource, and supply chains.	Applicable and considered for this ESIA
ESR 8: Cultural Heritage	Cultural heritage is important as a source of valuable historical and scientific information, as an asset for economic and social development, and as an integral part of a people's cultural identity, practices, and continuity. EBRD requires the protection of cultural heritage from project activities to include archeological sites, built heritage, cultural landscape with natural features, movable cultural heritage, etc.	Applicable and considered for this ESIA

EBRD PR	Key Points Relevant to the Project	Applicability
ESR 10: Stakeholder Engagement	EBRD considers stakeholder engagement as an essential part of good business practice and corporate citizenship. In particular, effective community engagement is central to the successful management of risks and impacts on communities, as well as central to achieving enhanced community benefits. The requirement entailed identifying people or communities that are or could be affected by the Project, as well as other interested parties; ensure that such stakeholders are appropriately engaged on environmental and social issues that could potentially affect them through a process of information disclosure and meaningful consultation; and maintain a constructive relationship with stake holders on an ongoing basis through meaningful engagement during project implementation.	Applicable and considered for this ESIA

Note: ESR 7 (Indigenous Peoples) is not considered to be applicable to this Project. The Indigenous World 2018 Report (IWGIA, 2018) states that Egypt is not classified as a country with indigenous people. In addition, this was confirmed based on previous experiences on E&S assessments with IFIs in Egypt where such standard was not triggered. In addition, ESR 9 (Financial Intermediaries) is also not considered applicable.

### EIB Requirements

The EIB Environmental and Social Standards (2022) aim to ensure, through its environmental and social appraisal and monitoring processes, that the projects it finances:

- Are environmentally and socially sustainable;
- Respect human rights, including the rights of workers and affected communities; and
- Are designed and operated in compliance with applicable regulatory requirements and Good International Industry Practice (GIIP).

In addition, the EIB classifies projects based on their potential environmental and social risks and impacts. Large-scale wind power projects are typically considered high-risk projects requiring a comprehensive Environmental and Social Impact Assessment (ESIA).

To translate these objectives into practical outcomes, the EIB has developed a comprehensive set of Environmental and Social Standards (ESS) covering key environmental and social aspects. The EIB expects clients to assess and manage environmental and social risks and impacts in accordance with these standards. The relevant EIB Standards applicable to the Project are summarized in the table below.

EBRD PR	Key Points Relevant to the Project	Applicability
ESS 1: Environmental and Social Assessment and Management	Outlines the process for identifying, assessing, managing, and monitoring environmental and social risks and impacts, including ESIA preparation, Environmental and Social Management Plans (ESMPs), organizational capacity, and monitoring and reporting.	Applicable and considered for this ESIA
ESS 2: Prevention and Abatement of Pollution	Requires the application of pollution prevention and control measures, efficient use of resources, and minimization of emissions to air, water, and land, including management of waste, hazardous materials, and noise.	Applicable and considered for this ESIA
ESS 3: Biodiversity and Ecosystems	Focuses on the protection and conservation of biodiversity, including natural habitats, critical habitats, and ecosystem services, and requires mitigation of impacts and application of the mitigation hierarchy.	Applicable and considered for this ESIA

EBRD PR	Key Points Relevant to the Project	Applicability
ESS 4: Climate Action	Requires assessment and consideration of climate change risks and greenhouse gas emissions, including climate resilience and alignment with climate mitigation objectives.	Applicable and considered for this ESIA
ESS 5: Cultural Heritage	Ensures protection of tangible and intangible cultural heritage, including archaeological resources, built heritage, and chance finds procedures.	Applicable and considered for this ESIA
ESS 6: Involuntary Resettlement	Addresses physical and economic displacement resulting from land acquisition or restrictions on land use, including avoidance, minimization, compensation, livelihood restoration, and stakeholder engagement.	Applicable and considered for this ESIA
ESS 7: Rights and Interests of Vulnerable Groups	Requires identification and protection of vulnerable and disadvantaged groups, ensuring inclusive engagement and equitable access to project benefits and mitigation measures.	Applicable and considered for this ESIA
ESS 8: Labour Standards	Covers labour and working conditions, including employment terms, worker rights, non-discrimination, grievance mechanisms, and occupational health and safety.	Applicable and considered for this ESIA

## 6 ANALYSIS OF ALTERNATIVES

### 6.1 Site Selection Alternatives

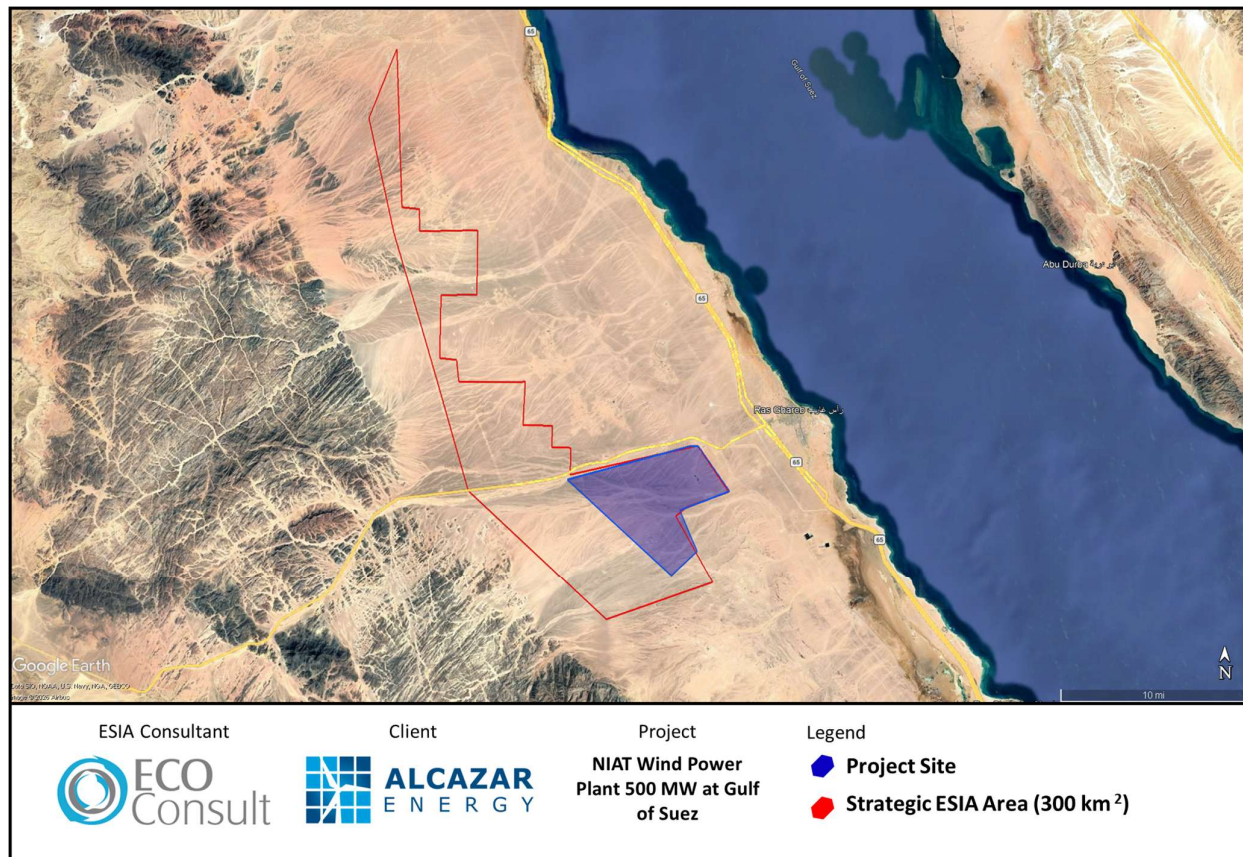
The GoE has allocated to the NREA through Prime Ministerial Decree No. (37/4/15/14) of 2015 land for development of renewable energy projects through usufruct rights.

The area was proposed by the National Centre for Land-use Planning and was approved by the Council of Ministers. In line with the decree, the government assigned about 7,600km<sup>2</sup> in the GoS, east and west of the Nile, Benban and Kom Ombo regions, of which about 5,700km<sup>2</sup> are for wind projects (75% share) and about 1,900 km<sup>2</sup> for solar energy projects (25% share), this includes an area of 1,220 km<sup>2</sup> in the GoS with a total capacity of 3,550 MW for wind power projects (IRENA, 2018).

Of the 1,220 km<sup>2</sup> area in the GoS, currently an area of around 300km<sup>2</sup> is being developed for multiple wind farm projects as noted in the figure below. The key factors taken into account for selection of this area include the following:

- The land area is under governmental ownership and therefore does not require any land acquisition measures
- The area is mostly free from competing uses;
- The area is presumed to be one of the areas in Egypt with the highest wind power potential;
- The area mostly consists of vast desert grounds;
- The geomorphology of the area is favourable for wind power development requiring limited construction and landscape modification measures; and
- The access to the area can be considered to be easy requiring only limited road construction measures

Based on the above, NREA has granted the Developer full access rights to the specific Project for the development of a 500MW Wind Farm Project. Therefore, taking the above into account, there are no site alternatives that were considered by the Developer in this case.



**Figure 14: Project Site as Part of the 300km<sup>2</sup> Area Allocated for Wind Farm Developments**

## 6.2 Technology Alternatives

This section discusses several alternatives besides the development of a wind farm project. This mainly includes other renewable energy alternatives suitable for Egypt, as well as other technological alternatives for power generation such as conventional thermal power plants.

### 6.2.1 Renewable Energy Development Projects

As discussed earlier, the 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 ISES 2015 – 2035, which provides an ambitious plan to increase the contribution of renewable energy to 20% of the electricity generated by the year 2022, through hydro, wind, and solar. This target has since been revised to 42% by 2030, reflecting Egypt's accelerated transition towards renewable energy sources, including hydro, wind, and solar<sup>4</sup>.

Egypt enjoys favourable solar radiation intensity and it is considered one of the most appropriate regions for exploiting solar energy both for electricity generation and thermal heating applications. Similar to the wind power development process, the GoE is developing many solar development projects (to include solar Photovoltaic (PV) and concentrated solar power) through the BOO mechanism and others (such as the Feed-In

<sup>4</sup> IRENA, 2022



Tariff mechanism). Such development projects have been identified within key areas that provide the most favourable potential and conditions for solar development – this includes but is not limited to Kom Ombo, West Nile, Hurghada, Zaafarana, Benban and others.

With regards to hydropower, the main hydro resource in Egypt is the River Nile, with the highest potential in Aswan where a series of power stations are located. Within this context, several projects have been realised and several other hydroelectric plants are being developed.

Taking the above into account, with regards to the Project site in specific it is best utilised for wind power projects. According to Egypt's Wind Atlas (Wind Atlas for Egypt Measurement and Modelling 1991-2005), the country is endowed with abundant wind energy resources, particularly in the GoS area. This is one of the best locations in the world for harnessing wind energy due to its high stable wind speeds that reach on average between 8 and 10 m/s at a height of 100m, along with the availability of large uninhabited desert areas. Check figure below. Therefore, as discussed earlier, the GoE has allocated to the NREA through Prime Ministerial Decree No. (37/4/15/14) of 2015 an area of 1,220km<sup>2</sup> in the GoS for wind development projects.

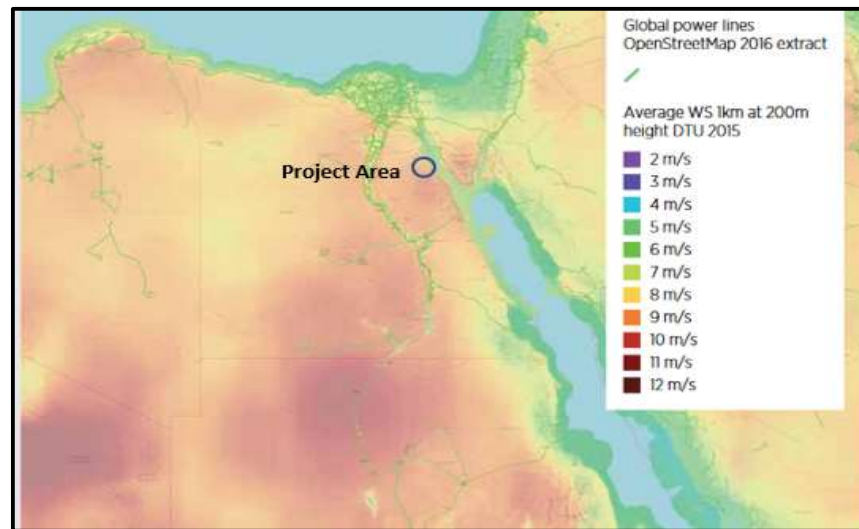


Figure 15: Egypt's Wind Atlas (Source: IRENA, 2018)

### 6.2.2 Thermal Power Plants

Other energy generation alternatives suitable to be built in Egypt include conventional thermal power plants, similar to others already existing in the country. Despite the advantages that a solution of this kind would entail – such as a potentially bigger energy generation capacity or the creation of more jobs during both construction and operation – the disadvantages would be significant; especially those related to environmental impacts. Conventional thermal power plants are well known for their environmental impacts when compared to this Project and could include significantly higher water consumption, generation of air pollutants and greenhouse gas emissions, etc.

More importantly, as noted earlier such developments would not be in line with the Government's ISES 2015 – 2035" which in broad terms advocates for the diversification of energy resources and increasing the share of renewable energy, originally targeting to 20% by 2022 and subsequently revised to 42% by 2030.

## 6.3 Design Alternatives

As discussed earlier, currently an area of around 300km<sup>2</sup> in the GoS is being developed for multiple wind farm projects. NREA has granted the Developer full access rights to the specific Project for the development of a 500MW Wind Farm Project.

A Strategic ESIA was undertaken for the 300km<sup>2</sup> area (was carried out by the Joint Venture (Lahmeyer International GmbH and Ecoda) on behalf of NREA).

One of the objectives of the Strategic ESIA Area was to investigate the cumulative impacts of the wind farm developments and identify constraints to be taken into account by the various developers.

The Strategic ESIA Area investigated key E&S attributes to include biodiversity, particularly birds and bats, land use, archaeology and cultural heritage, etc. In summary, the Strategic ESIA identified some constraints that should be taken into account. In addition, the permit issued by EEAA on the Strategic ESIA also identified additional requirements. Those are detailed below— ***it should be noted that a Project-specific environmental permit is already in place for this Project, and the requirements may be updated or modified accordingly.***

**Table 17: E&S Constraints Identified within the Strategic ESIA and its Permit**

E&S Attribute	Requirement
General	Adherence to all specification and conditions included within the 300km <sup>2</sup> ESIA study
Avifauna  Discussed in further details in Section 7.5.	<ul style="list-style-type: none"> <li>▪ Adhere to a buffer area of 1km from any adjacent wind farms that is parallel to the bird migration pattern</li> <li>▪ The wild dumping site inside the 300km<sup>2</sup> area has to be cleaned from waste (refer to “Section 7.9.6” for additional details);</li> <li>▪ The wild dumping site inside the 300km<sup>2</sup> area has to be cleaned from waste (refer to “Section 7.9.6” for additional details);</li> <li>▪ spacing between wind turbines should not be less than 2.5 times the rotor diameter, and a buffer distance of at least 7 times the rotor diameter should be maintained between turbine rows to provide corridors for bird migration</li> <li>▪ Avoid turbines with lattice towers in order to reduce suitable perching sites;</li> <li>▪ Utilize underground electricity cables. If the use of overhead lines cannot be avoided (e.g. 220 kV Overhead Line (OHL)), such overhead lines should be designed according to the guidelines “Protecting birds from power-lines, Nature and environment No. 140, Council of Europe Publishing”; and</li> <li>▪ Analogous measures should be applied at any substation to be built in that area.</li> </ul>
Biodiversity  Discussed in further details in Section 7.4	<p>Installation of turbines and other technical installation should be avoided in areas utilised by the Egyptian Dabb Lizard.</p> <p>Undertake reconnaissance on Dabb Lizard burrow sites prior to detailed design. Installation of turbines and other construction measures are to be avoided at a distance of 250 m from Dabb Lizard burrows.</p>

In addition, one of the objectives of this ESIA is to build on the outcomes of the Strategic ESIA and investigate/identify any further site-specific E&S constraints to be taken into account by the Project developer throughout the planning and design phase of the Project.

However, as presented throughout the ESIA, no further site-specific constraints have been identified in relation to the Project site. Therefore, there are no additional design alternatives to be considered in relation to E&S issues. However, the ESIA identifies additional E&S requirements which must be taken into account as presented throughout the document.

## 6.4 No-Project Alternative

The ‘no Project’ alternative assumes that the 500MW Project will not be developed. Should this be the case, then the Project site area would remain the same. The land area would remain with its current characteristics – a vast desert grounds with sparse vegetation.

Should the Project not move forward, then the Project-related negative environmental impacts discussed throughout this ESIA would be averted. However, as noted throughout the ESIA, generally such impacts do not pose any key issues of concern and can be adequately controlled and mitigated through the implementation of the ESMP discussed in “Chapter 9”. Nevertheless, should the Project not move forward; the significant and crucial positive economic and environmental benefits would not be realised. Such benefits include the following:

- This development allows for more sustainable development and shows the commitment of the GoE to realizing the energy strategy;
- Contribute to increasing energy security through development of local energy resources and reducing dependency on external energy sources;
- The clean energy produced from renewable energy resources is expected to reduce consumption of alternative fuels for electricity generation, and will thus help in reducing greenhouse gas emissions, as well as air pollutant emissions; and
- The Project is expected during the construction and operation phase to generate local employment and commit to other social responsibilities. As such, this is expected, to a certain extent, to subsequently enhance the socio-economic conditions and standards of living of the local communities.

In conclusion, an ESIA must investigate all potential positive and negative impacts from a project development. In the case of this Project, it is important to weigh the significant positive economic and environmental impacts incurred from the Project development, against the negative environment impacts anticipated at the site-specific level – in which generally this ESIA concludes to be minor in nature and can be adequately controlled. The comparison in this chapter clearly concludes that the ‘no Project’ alternative is not a preferable option.

## 7 EXITING PHYSICAL, BIOLOGICAL AND SOCIAL ENVIRONMENT

### 7.1 Landscape and Visual

This section provides an assessment of baseline conditions within the Project site and surroundings in relation to landscape and visual.

#### 7.1.1 Baseline Assessment Methodology

A site assessment was undertaken to characterize the general landscape and topography characteristics of the Project site. In addition, the site assessment focused on identifying any key critical visual receptors within the Project site and a 2km radius from the area. Moreover, based on desktop review and consultations with relevant stakeholders (to include Ras Ghareb Local Governmental Unit and Red Sea Governorate), any current plans in the area as well as key visual receptors within a 10km radius from the Project site were identified.

Such distance (10km radius) was taken into account, given that based on several European guidelines and regulations, four zones of potential visual impact are identified which can be distinguished as noted in the table below (SESA, 2018). At distances greater than 10km visibility impacts are not relevant and can only be seen as minor elements in the landscape (if seen at all).

**Table 18: Classification of Different Zones of Potential Visual Impact**

Distance	Perception of tall, man-made structures	Impact
Up to 2 km	perceptible, likely to be a prominent feature in the landscape	high impact
2 to 5 km	regularly perceptible, relatively prominent	moderate impact
5 to 10 km	only perceptible in clear visibility, seen as part of the wider landscape	low impact
> 10 km	only occasionally seen in very clear visibility, only minor element in the landscape (if at all)	no relevant impact

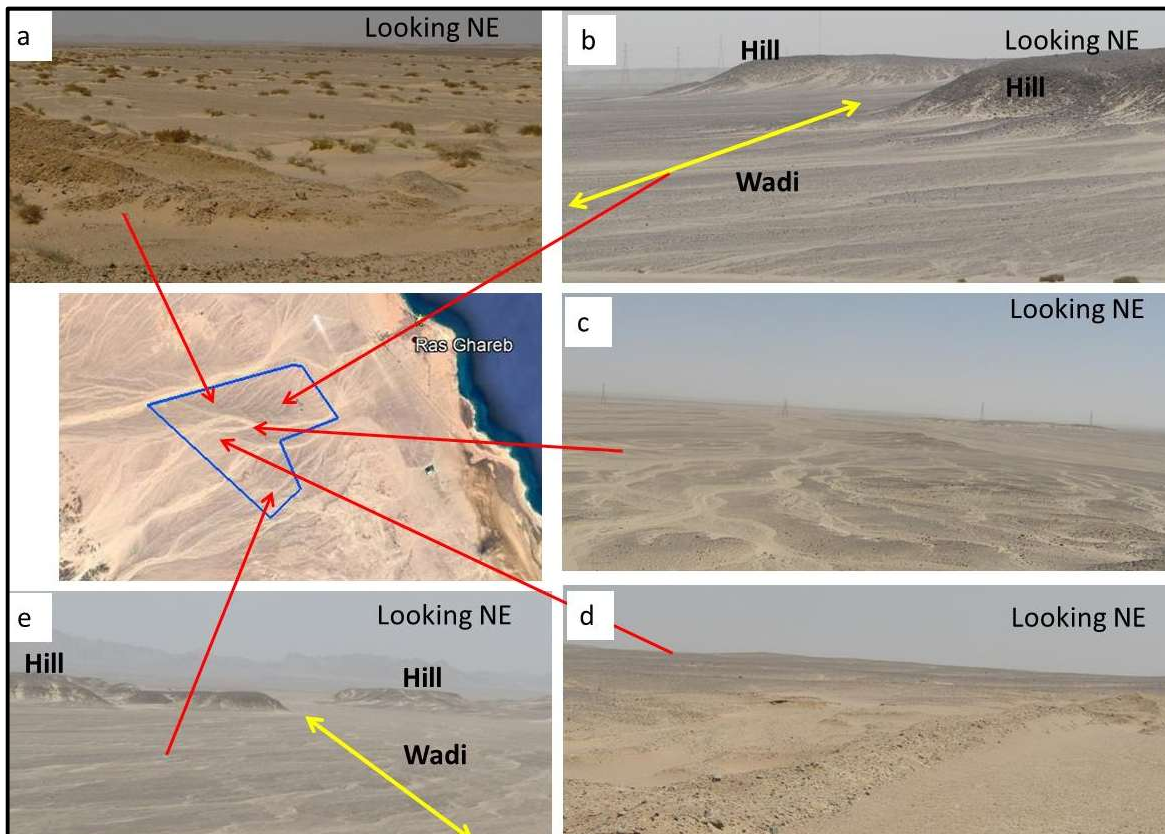
#### 7.1.2 Results

##### Landscape and Topography

Based on the site assessment, the Project site is located within a plain area with a topography that is gently sloped towards the east. However, the eastern parts of the Project site in particular are more irregular when compared to the remaining areas with some hills. The average ground surface elevation of the Project site ranges from around 180 to 315 m above sea level.

The ground surface of the whole Project area is covered by clastic sediments of gravels, pebbles and sometimes boulder of different rock fragments impeded in fine sand and silt.

The figure below presents the general landscape and topography conditions within the various Project areas.



**Figure 16: General Landscape and Topography Characteristics of the Project Site**

### Visual

Critical visual receptors are identified as those normally seen as valuable by the human perception and include recreational activities, environmental reserves, local community settlements, remarkable historical or cultural sites, and other.

Based on the site visit undertaken for the Project area and the 2km radius, no critical visual receptors were identified. In addition, based on the literature review and consultations, no critical visual receptors were identified within the 10km radius with the exception of Ras Ghareb city located 8km to the east. There are several receptors located within the 10km radius as identified throughout this ESIA and which include:

- Worker's accommodations
- Military posts
- Telecommunication towers
- Other operational and planned wind farms mainly to the north, south and west
- Petroleum facilities and operations to include oil wells, storage areas, production units and other. Those are spread throughout the area to include north, south, and eastern areas in particular

The figure below presents the location of the above receptors in relation to the Project site.

Other key visual receptors are located at a distance from the Project area that is more than 20km away. This includes for example the closest key archaeological sites, touristic resorts, and other.



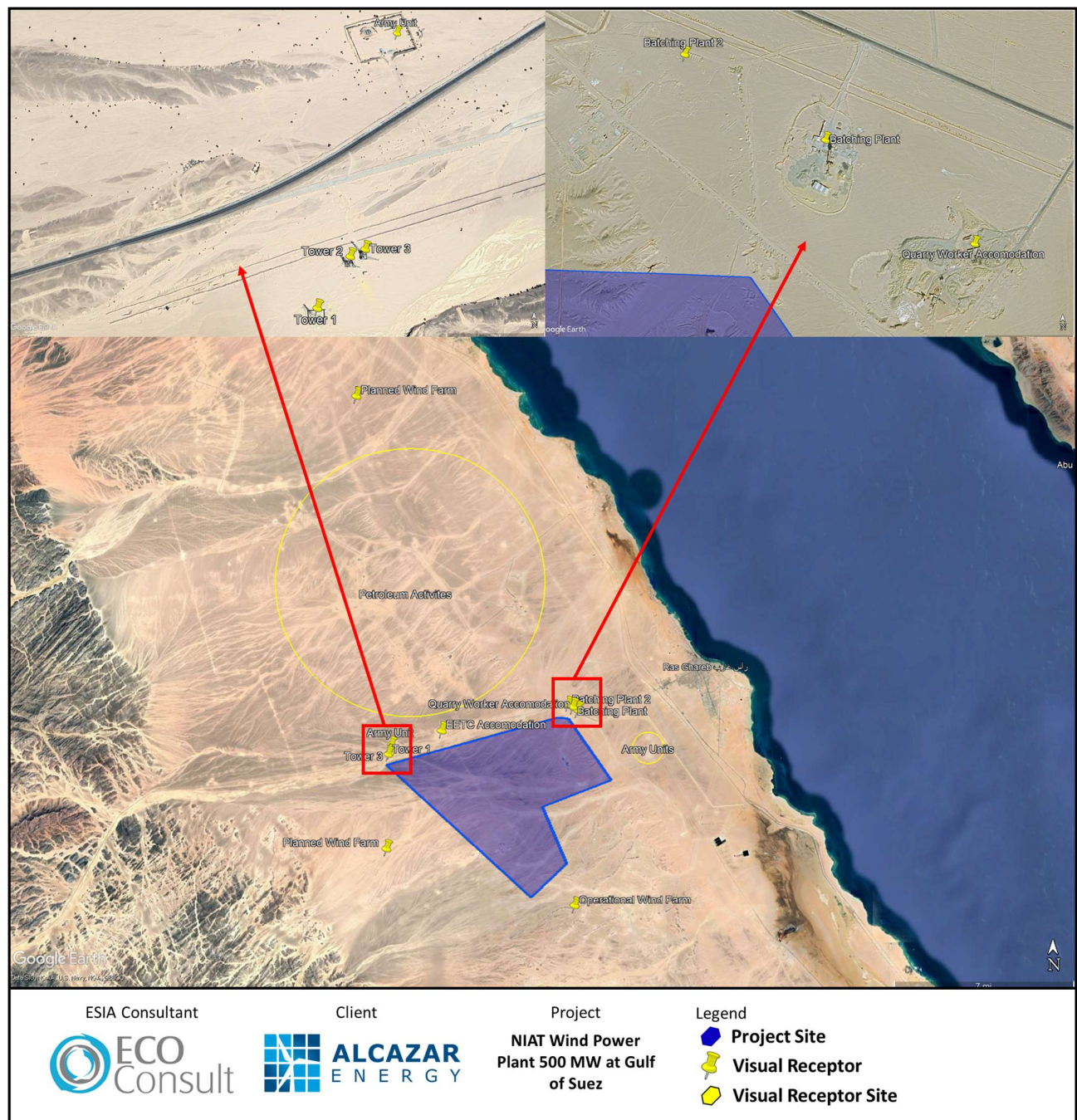


Figure 17: Visual Receptors within the Area

## 7.2 Land Use

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to land use.

### 7.2.1 Baseline Assessment Methodology

The baseline assessment of the 'formal' land use was based on collection of secondary data and plans available from the relevant governmental entities – this includes in particular as related to the ESIA (i) formal land use



planning for Ras Ghareb; and (ii) area of critical environmental concern planning. In addition, the ESIA Team reviewed the different studies undertaken for the area.

Understanding and characterising the informal, customary, or actual land use of the Project site was mainly based on a detailed land use survey for the Project site and a 2km radius to document and understand any informal land use activities undertaken such as physical activities (houses, structures, etc.) or economical activities (such as grazing, agricultural, petroleum activities, etc.). In addition, consultations were undertaken with relevant stakeholders to further understand any informal, customary, or actual land use practices as identified throughout the text below.

## 7.2.2 Formal Land Use

### Strategic Planning

Consultations were undertaken with the Ras Ghareb Local Unit to understand the formal land use plan set for the Project area. According to such consultations, the specified area for the Project is not in the City's plan and based on "Presidential Decree No. 116 of the year 2016", it has been allocated to NREA for the development of wind farm projects. These plots have been allocated to various developers by NREA.

### Land Ownership

The GoE has allocated to the NREA through "Presidential Decree No. 116 of the year 2016", land for development of renewable energy projects through usufruct rights. The area was proposed by the National Centre for Land-use Planning and was approved by the Council of Ministers. In line with the Decree, this includes an area of 1,220 km<sup>2</sup> in the GoS with a total capacity of 3,550 MW for wind power projects in which the Project site is located as noted in the figure below.

Based on the above, NREA has granted the Developer full access rights to the specific Project for the development of a 500MW Wind Farm Project. Therefore, the land is currently under the ownership of NREA.

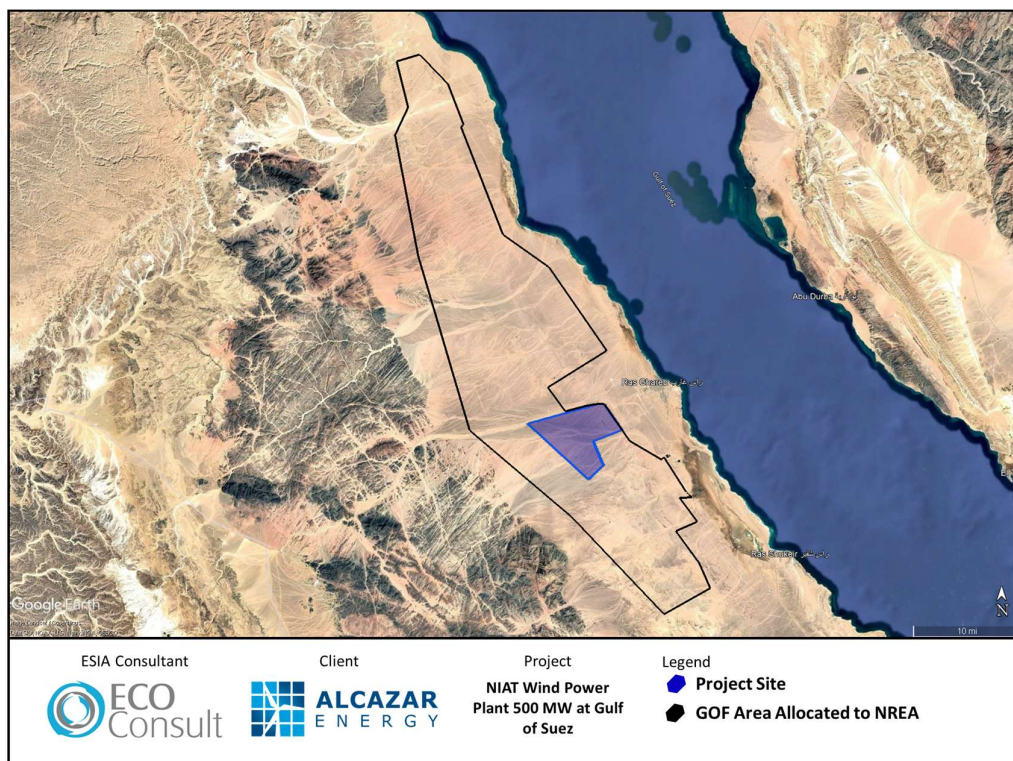


Figure 18: GoE Allocated Area to NREA

### Areas of Critical Environmental Concern

Planning for areas of critical environmental concern is under the responsibility of the EEAA and this includes Important Bird Areas (IBAs) and Protected and Conserved Areas (PCAs). EEAA's nature protection team published in 2013 the locations for all current and future natural protectorates.

The Project location is not located within any existing or proposed natural protectorates, where the closest ones are Malahet Ras Shukeir at 15 km away, Wadi Qena at 30 km, and El-Galala El-Qebalya at 40 km. In addition, Egypt has 34 IBAs and the closest IBA to the Project site is Gabal El Zeit, covering a 100-km strip along the shoreline starting 21 km north of Ras Ghareb reaching its end 50 km north of Hurghada. The Gabal El Zeit IBA is located around 1.5km to the east of the Project site as noted in the figure below<sup>5</sup>.

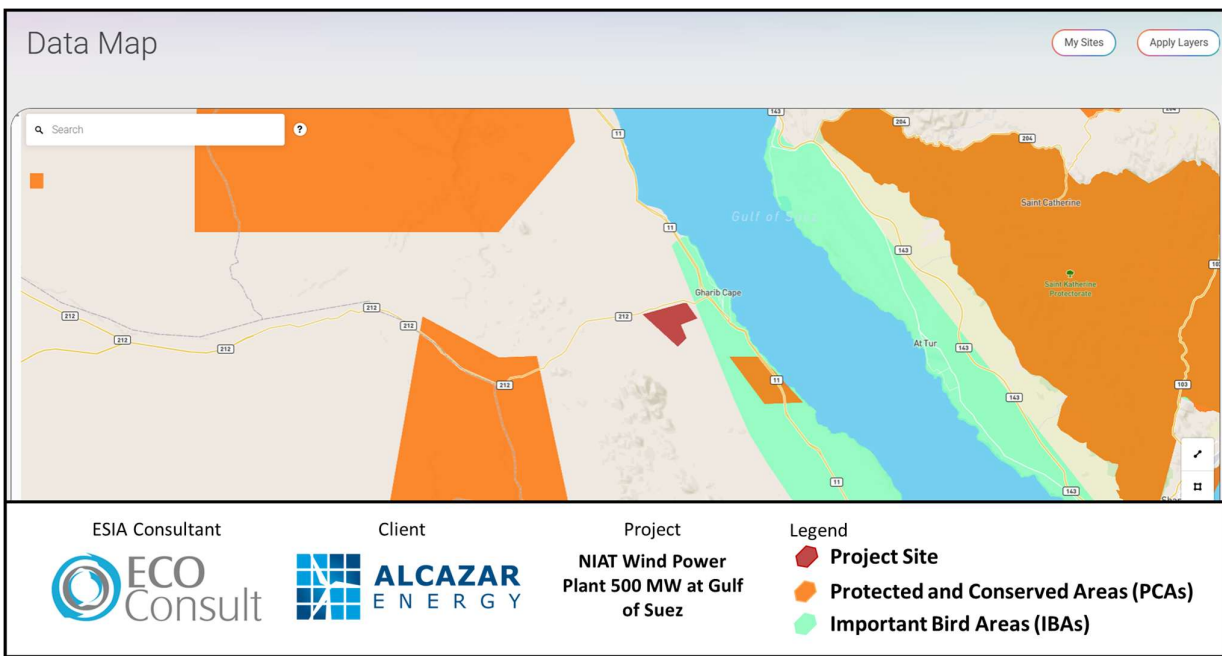
The Gabal El Zeit IBA is recognized as a globally important area for migratory soaring birds within the Rift Valley/Red Sea Flyway (RVRSF). The IBA meets BirdLife International trigger criteria including Criterion A1 for globally threatened species and Criterion A4iv for congregatory migratory species, where the site regularly supports more than 1% of the global population of one or more migratory species. The area is considered a highly important migration corridor for migratory soaring birds, including storks, pelicans, and raptors, with more than 250,000 White Storks reported moving through this section of the Gulf of Suez during migration periods. Existing studies indicate that migratory soaring birds utilize broad migration fronts across the wider Gulf of Suez region, including areas within and surrounding the IBA. Therefore, given the proximity of the Project to the Gabal El Zeit IBA, potential interactions with migratory soaring birds may occur during migration periods, particularly in relation to collision risk and disturbance associated with wind turbines. Regional monitoring and management measures, including bird monitoring and shutdown-on-demand systems implemented across Gulf of Suez wind energy developments, are intended to contribute to the management of potential cumulative impacts on migratory soaring birds.<sup>6</sup>

Taking the above into account, it is important to note that there is no relevant Egyptian legislation which prevents development projects (including wind farms) within or near IBAs or legislations which identify any specific constraints to be taken into account. In addition, the 300km<sup>2</sup> ESIA and environmental permit issued do not identify any specific requirements or considerations to be taken into account in relation to Gabal El Zeit IBA.

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<sup>5</sup> These areas were identified as proposed natural protectorates (some since the late 1990s/early 2000s); however, they have not progressed to formal designation to date.

<sup>6</sup> Migration of Soaring Birds at Gebel El Zeit (IBA) in relation to wind energy developments, Alvaro Camina (2024)



**Figure 19: Location of Closest PCAs & IBAs**

### 7.2.3 Informal Land use

As discussed earlier, a detailed land use survey was undertaken for the Project site to document and understand any informal land use activities undertaken such as physical activities (houses, structures, etc.) or economical activities (such as grazing, agricultural, etc.).

Based on the above, no physical activities or economical activities were recorded within the Project site nor any evidence of such activities. However, various infrastructure elements were recorded within the Project site and which are discussed in further details under “Section 7.9”.

However, a key point to be considered under informal land use is related to Bedouin Groups. The key Bedouin group known in the area is the Tabbna and the Hamadin families. In general, local Bedouin tribes do not abide by the legal process required to own land. Therefore, Bedouins apply a type of customary ownership which is not an official process known as Urfi Contracts and Ghafra System.

Bedouin tribes claim rights of these lands based on their knowledge of the area and the alleged history of their family living there for generations, even though they do not have official documents to support such claims. This practice is followed up by “Urfi” contracts however such documents are not considered by the GoE as official documents and are not considered to be supported legally. Furthermore, aiming at declaring their possession of the lands, separate houses are built and scattered in such lands. The residents construct the houses with no legal license.

Given that Bedouins are the closest and arguably most impacted community, companies involved in development projects over lands claimed by them usually try to they benefit from their projects. In general, developers employ Bedouin groups to provide support in implementing their projects and providing security and protection for an agreed financial compensation. They can also work on various tasks related to the project (such as becoming security guards, provision of raw materials, provision of food supplies and water to the workers, etc.). In terms of engagement, the most important person to engage will be their community leader (i.e. the male head of the family).

Initial consultations were undertaken in 2021 with the head and elders of such Bedouin families. Key outcomes are summarised below:

- There are no stable Bedouin communities in or near the Project site. The only settled villages in the desert for Bedouin families are in Zaafarana and Wadi Dara Which is at least 50km away from the Project site; and
- The Project site or the surrounding areas does not have any key land use activities for them such as grazing or farming activities. However, the area in general is subject to their Ghafra System that is divided between two families, the Tabbna and the Hamadin families as discussed earlier.

Updated consultations were undertaken in February 2026 with Sheikh Eid Shar'an and his son, representing the Al Hamadin tribe, as part of the ESIA update site visit mission. Key outcomes are summarised below:

- The Al Hamadin tribe is one of the established Bedouin tribes in the Ras Ghareb region, with a geographic area of influence extending from Wadi Al Hawashiya in the north to areas approaching Hurghada in the south. Land use and territorial arrangements among Bedouin tribes are governed by long-standing customary agreements that define zones of influence and are strictly respected to avoid encroachment between tribes.
- No Bedouin families reside within the Project site, and the area is not used for permanent or temporary settlement.
- The Project area is not utilized for grazing activities, seasonal migration, or nomadic routes. Bedouin seasonal movements typically occur in mountainous areas located more than 20 km from the site.
- No Bedouin structures such as tents, animal shelters, or water wells were identified within the Project area during the consultation.
- No cultural, spiritual, or historically significant sites — including graves, shrines, or sacred areas — were identified within or in proximity to the Project site that are of importance to the Bedouin community.
- The primary livelihood activity for Bedouin communities in the area is guarding services ("Ghafra"), providing security for infrastructure, industrial facilities, and development projects. The Ghafra system in the area is divided between the Tabbna and Hamadin families as noted in the 2021 consultations. Bedouin interaction with project sites is mainly through employment opportunities rather than direct land use or resource dependency.
- Existing wind farm projects in the region have had a positive socioeconomic impact by creating job opportunities, particularly in security and guarding roles. The importance of maintaining such employment opportunities for local Bedouin communities as part of project development was emphasized.
- Despite the absence of formal land ownership, customary tribal territories should be respected as part of good practice and social considerations.
- Communication with Bedouin communities is most effective when conducted through recognized tribal leaders (Sheikhs), using direct in-person consultations and respecting local customs and social structures.

### 7.3 Geology, Hydrology and Hydrogeology

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to geology, hydrology, and hydrogeology.

### **7.3.1 Baseline Assessment Methodology**

The assessment was based on review of secondary data, including literature review of previous publications and studies related to geology, hydrology and hydrogeology. In addition, a site assessment was undertaken to confirm and verify the outcomes of the literature review and document conditions on the ground.

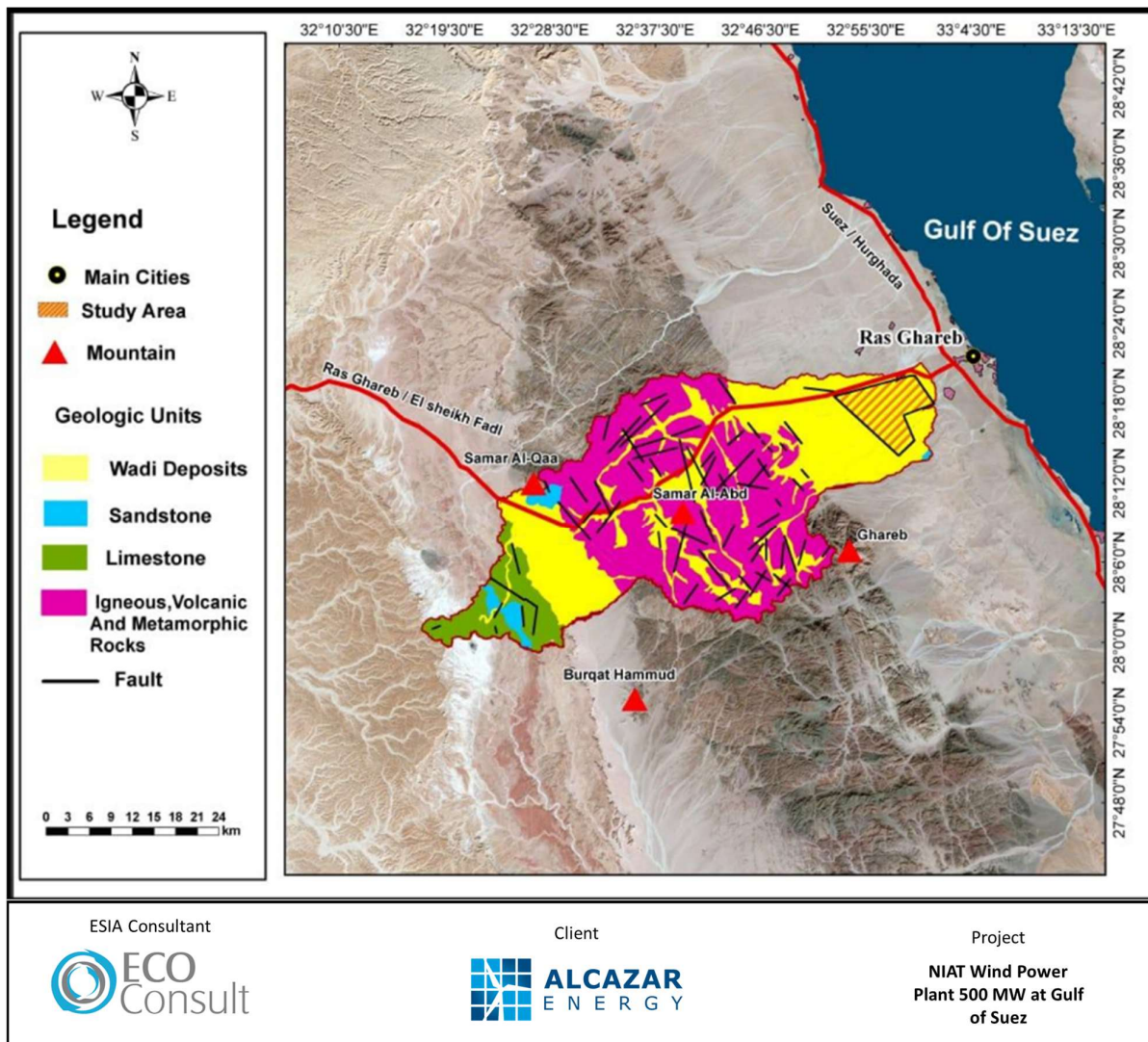
This Chapter is further informed by the Hydrological, Hydraulic and Flood Risk Assessment prepared by Environics for the NIAT and RASGHA Wind Farm (February 2026).

### **7.3.2 Geology**

The Project site is a part of Ghareb plain which extends Northeast (NE)- Southwest (SW) parallel to the Gulf of Suez and is bounded from the west by the higher mountainous range and from the east by western coast of the Gulf of Suez.

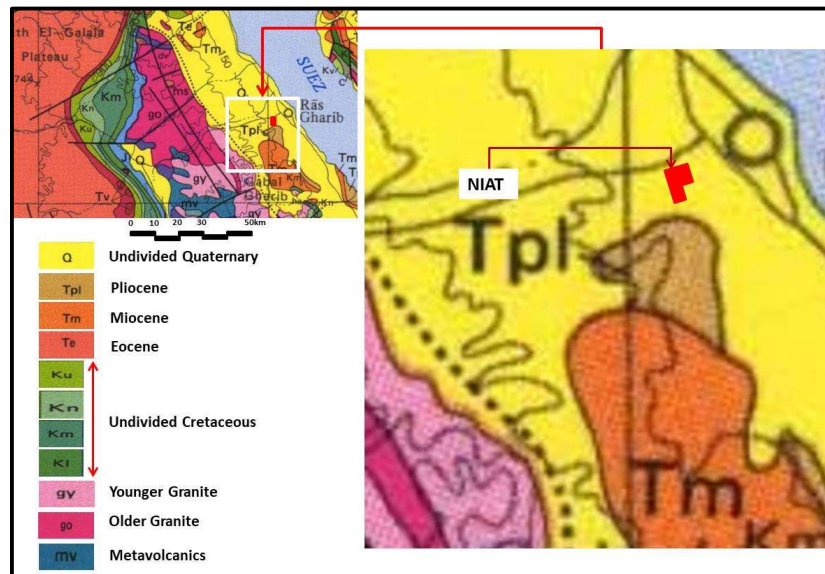
Geologically, the Project site is located in the sedimentary basin called West Bakr that has many productive petroleum wells. The drainage basins affecting the site are covered by two dominant geological formations. At the highlands, represented by Samar Al-Qaa, Samar Al-Abd, and Ghareb Mountains, the terrain is underlain by limestone and igneous, volcanic and metamorphic rocks with very low infiltration capacity, except at localities of surface fissures and major fractures. The project area itself is covered by Wadi Deposits, which exhibit comparatively higher infiltration rates. The geological conditions of the project site were derived from published regional geological maps at a scale of 1:500,000.





**Figure 20: Geological Map for the Drainage Basins Affecting the NIAT Project**

It can be seen that the drainage basins are covered mostly by steep limestone and Igneous volcanic and metamorphic rocks at the highlands represented by Samar Al Qaa, Samar Al Abd, and Ghareb Mountains. Such type of rocks has very low infiltration capacity in general except at the localities of the surface fissures and major fractures. On the other hand, the NIAT and RASGHA project area is covered by Wadi Deposits which exhibit higher infiltration rates compared to the limestone and igneous rocks.



**Figure 21: Geological Formations within Project Site and Surrounding Areas**

During the field survey in 2021, with the help of geological maps and aerial photographs, the different types of soil characteristics and their location in the Project area were investigated. This includes 3 alluvium terraces as noted in the figures and table below.



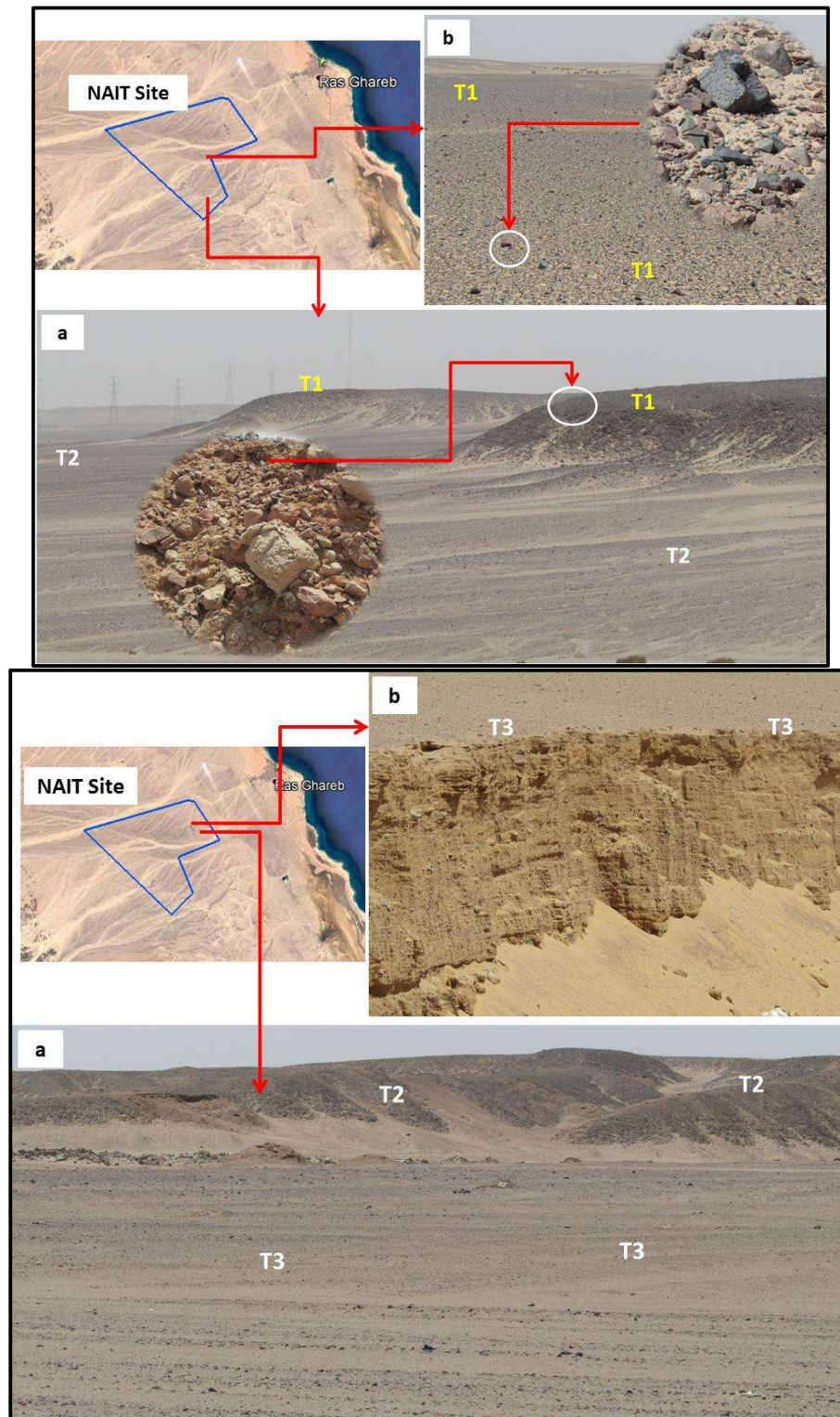


Figure 22: Distribution of Alluvium Terraces

**Table 19: Description of Alluvium Terraces within Project Site**

Type	Description
T1	These terraces represent the top of the elevated land and the longitudinal shallow hills along the whole area of the Project site. These old terraces have been dissected by numerous shallow and wide tributaries drain eastward to the Gulf of Suez. The maximum elevation of the terraces at the northwest part is about 280 m (a.m.s.l.), while it attains about 240 m (a.m.s.l.) at the southwest part. The height of the terrace above the ground level (the level of the following terrace) varies from about 1m to about 2m at the northwest, while it varies from about 1m to about 3m at the southwest. This terrace is composed of very coarse chert nodules, cobbles and boulders of granite, basalt, impeded in fine clay and sand.
T2	These terraces are exposed along the floor of the tributaries cutting through the terrace T1. The height of the terrace T2 above the ground level (the level of the following terrace) varies from about 0.5m to about 1.5 m at the northwest, while it varies from about 0.5m to about 2m at the southwest. This terrace is composed of medium sized chert nodules, fragments igneous rocks impeded in fine clay and sand. The fine clay and sand fraction are bigger than that in the previous terrace (T1).
T3	These terraces are exposed along the floor of the tributaries cutting through the terrace T2. The height of the terrace T3 above the ground level (the level of the following terrace) varies from about <0.5 to about 2m at the northwest, while it varies from about 0.5m to about 1m at the southwest. This terrace is composed of small nodules, fragments of igneous rocks impeded in fine clay and sand. The fine clay and sand fraction is bigger than that in the previous terrace T2.

### 7.3.3 Hydrology

The Project site is located within the drainage catchments of three main wadies: Wadi Abu Had, Wadi El Darb, and Wadi El-Khorim. The project area has a documented history of flash flood events. The most significant recent event occurred in 2016, recording the highest daily rainfall of 51.3 mm at Hurghada station. This event caused devastating flooding which prompted the construction of all existing flood protection infrastructure in the area including the artificial storage lake, diversion barriers, and the culvert under Ras Ghareb–Sheikh Fadl Road.

The NIAT Wind Farm lies on a terrain that is mostly flat to gently undulating. The ground cover at the site consists primarily of sandy and gravelly soil, interspersed with rocky outcrops and sparse desert vegetation such as low shrubs and hardy grasses. Ground elevations across the study area vary between more than 860 metres at the highlands to the southwest and northwest, associated with the Red Sea Mountains (Samar Al-Qaa, Samar Al-Abd, Ghareb, and Burqat Hammud), decreasing gradually to between 60 and 315 metres at the western boundary of the project site, as illustrated in Figure 23.

As shown in Figure 24, the three main basins are further divided into 19 sub-basins (B1–B19), each contributing surface runoff that flows through or adjacent to the project site. Wadi Abu Had, the largest basin with a total area of approximately 1,058.2 km<sup>2</sup>, runs along the northern boundary of the project site. Wadi El Darb, with a total area of approximately 150.7 km<sup>2</sup>, crosses the western boundary of the site. Wadi El-Khorim, with a total area of approximately 252.3 km<sup>2</sup>, influences the southern portion of the project area. In addition, Basin B3, with an area of 23.6 km<sup>2</sup>, originates from within the project site itself and contributes local surface runoff directly across the project area.



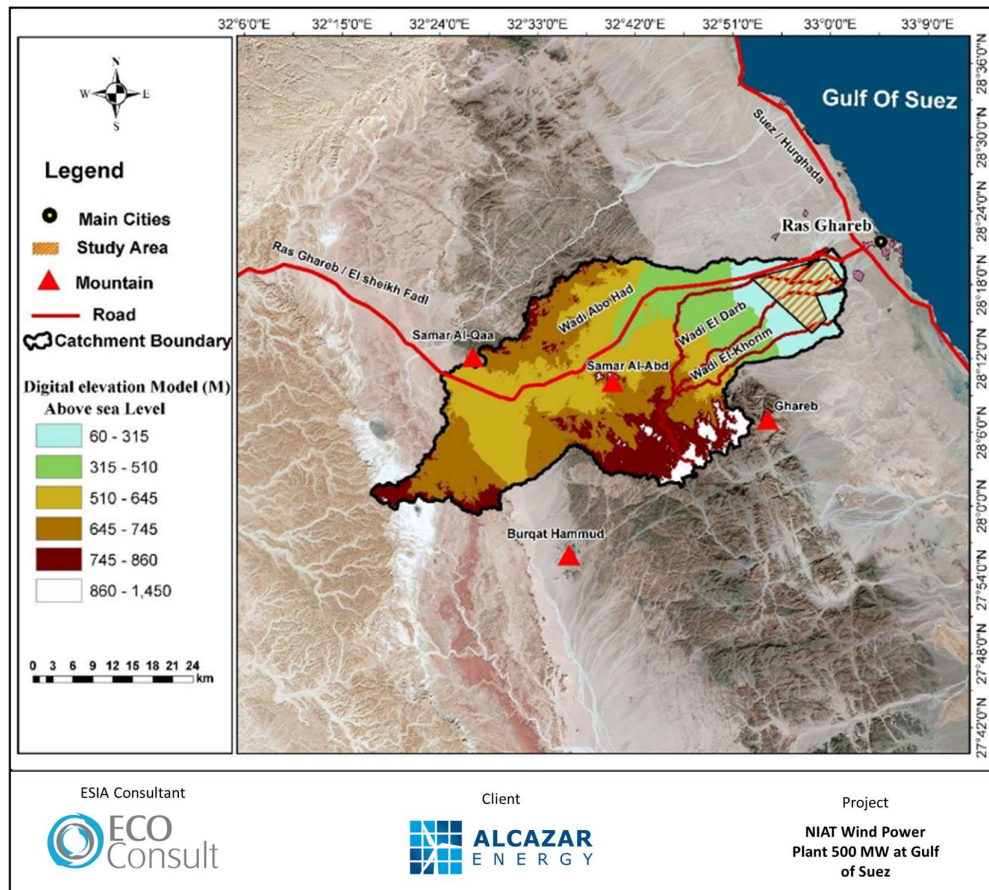


Figure 23: Digital Elevation Model (DEM) and Main Drainage Sub-basins affecting the Project Areas

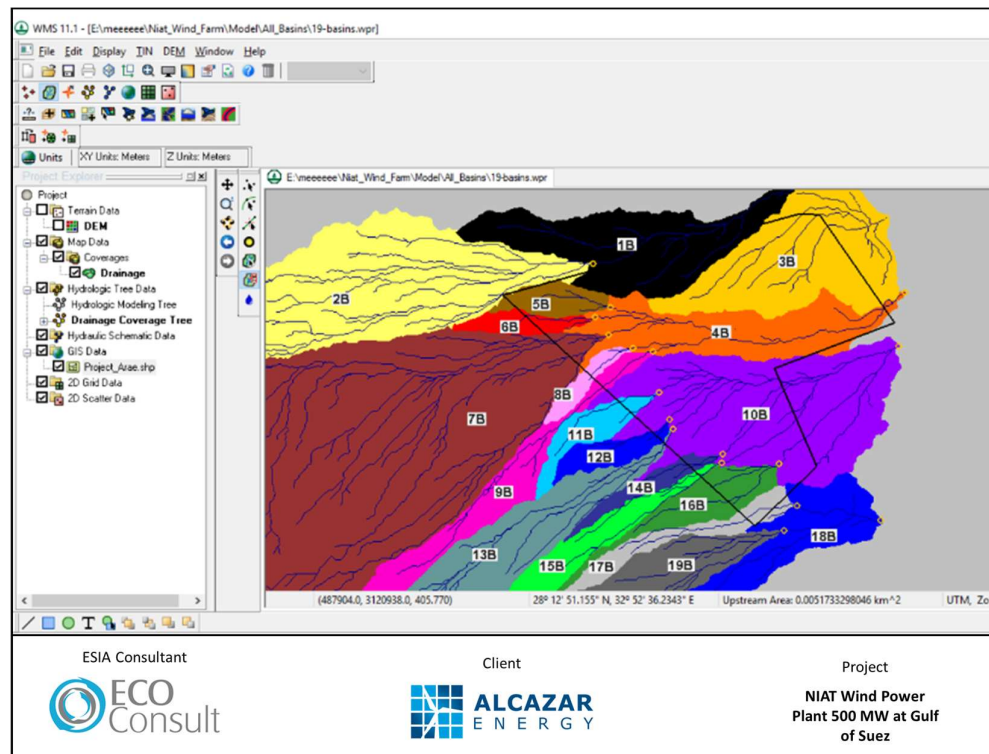


Figure 24: Drainage Basins Affecting the NIAT Project Site

Based on the site visit and hydrological assessment undertaken, the following characteristics of the project site were observed:

- The project site is wide and mostly flat to gently undulating, with numerous straight, shallow, and short tributaries. The gentle ground surface slope reflects the weak intensity of surface runoff, which is insufficient to form deep channels.
- The main trunk streams are shallow and wide, covered by fine sand and coarse-sized gravels of chert and rock fragments, reflecting the weak intensity of flow.
- Variable altitude hills dissected by strong surface water flow are exposed entirely in eastern part of the area at the exit of Wadi El Darb.
- Going to the southeast part of the Project site, shallow and very wide drainage lines have been exposed with multi sized grain deposits and low sinuosity reflect the weakness of the surface flow.
- The small tributaries at the site are very shallow and straight with no wide alluvial fans, reflecting the small volume of water they carry and the slow surface water flow across the southwestern half of the site.
- The great thickness of soil layer with high porosity and permeability as it composed of multi sized chert and rock fragments impeded in sand covered the whole Project area. Therefore, great quantity of rainfall infiltrates the surface reducing the surface flow.
- The rainfall regime in the area is characterised by infrequent but intense storm events, primarily occurring between late August and May. These short high-intensity events generate rapid surface runoff across the upstream catchments, which concentrate and flow through the wadis intersecting the project site. The 2016 flood remains the most severe recorded event in the modern record.
- The main course of Wadi Abu Had passes outside the northern boundary of the project site and is considered one of the most hazardous basins for flash floods in the region. A hydraulic culvert was constructed under the Ras Ghareb–Sheikh Fadl Road to divert floodwater from Wadi Abu Had away from the project site. Despite passing outside the project boundary, Wadi Abu Had has hydraulic influence on the project area. In addition to the three external drainage basins, a small internal drainage basin originates from within the project site itself, collecting surface runoff and directing it eastward toward the Gulf of Suez.
- Wadi El Darb crosses the Project site at the eastern part. Following the devastating floods of 2016, an artificial storage lake with a capacity of up to 1.5 million m<sup>3</sup> and an earthen barrier were constructed within Wadi El Darb to protect the northern entrance of Ras Ghareb City. East of the project site, a concrete diversion barrier further directs floodwater south of Ras Ghareb City along an artificial canal until reaching its final outfall in the Gulf of Suez.

The table below presents the maximum daily rainfall depths estimated for different return periods based on statistical analysis of Hurghada station records.

**Table 20: Maximum Daily Rainfall Depths for Different Return Periods at Hurghada Station**

Return Period (year)	2	5	10	25	50	100	200
Probability of Occurrence (%)	50	20	10	4	2	1	0.5
Rainfall Depth (mm)	3.32	12.8	21.4	33.31	43.7	53.8	64

The morphological analysis of the drainage basins identified three key hydrologic features that govern flood behaviour at the project site: the presence of high mountains upstream generating significant runoff volumes; a relatively steep ground surface slope that accelerates flow toward the project area; and the existence of a main road, hydraulic culvert, retaining structures, and embankments within the drainage basins that modify natural flow paths. Together these features result in distinct wadi channels and tributaries that carry excess rainfall from the highlands to the coastal plain.

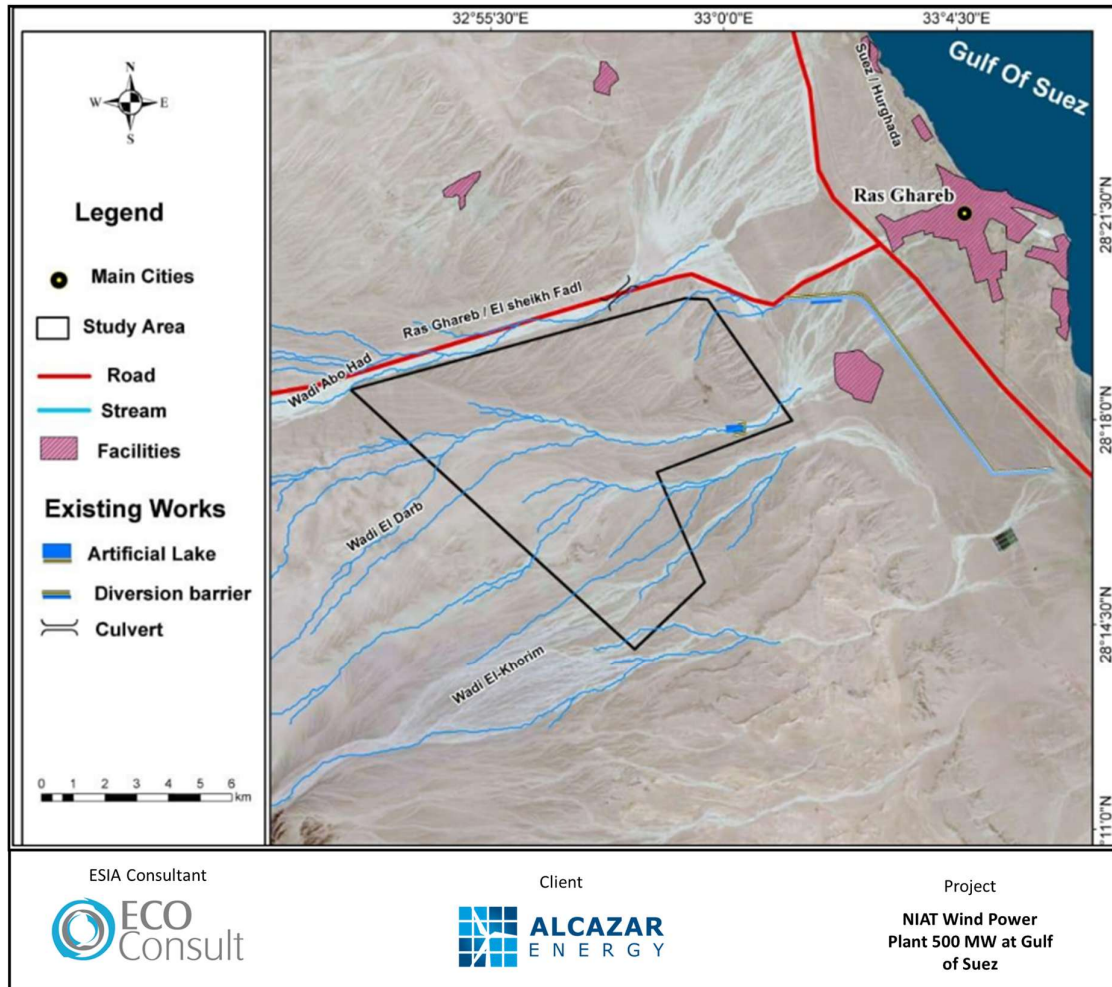
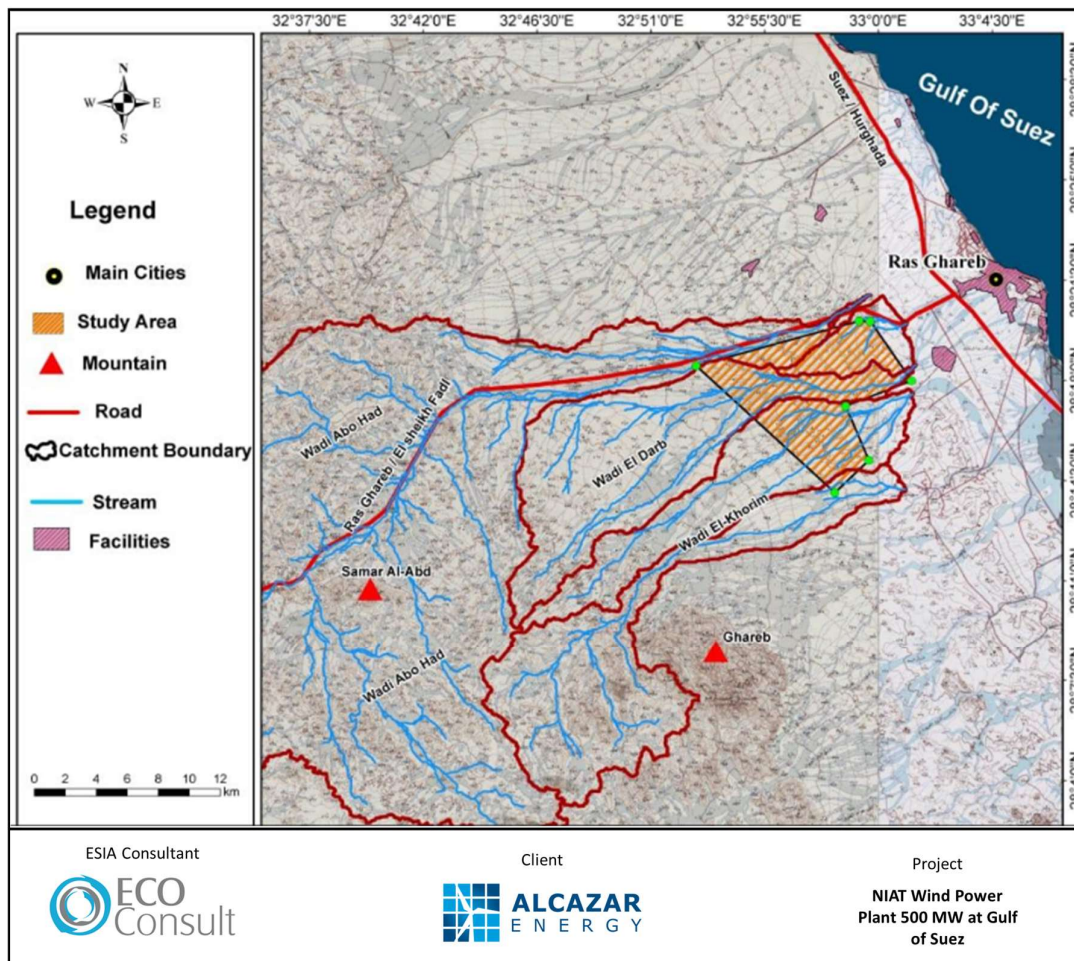


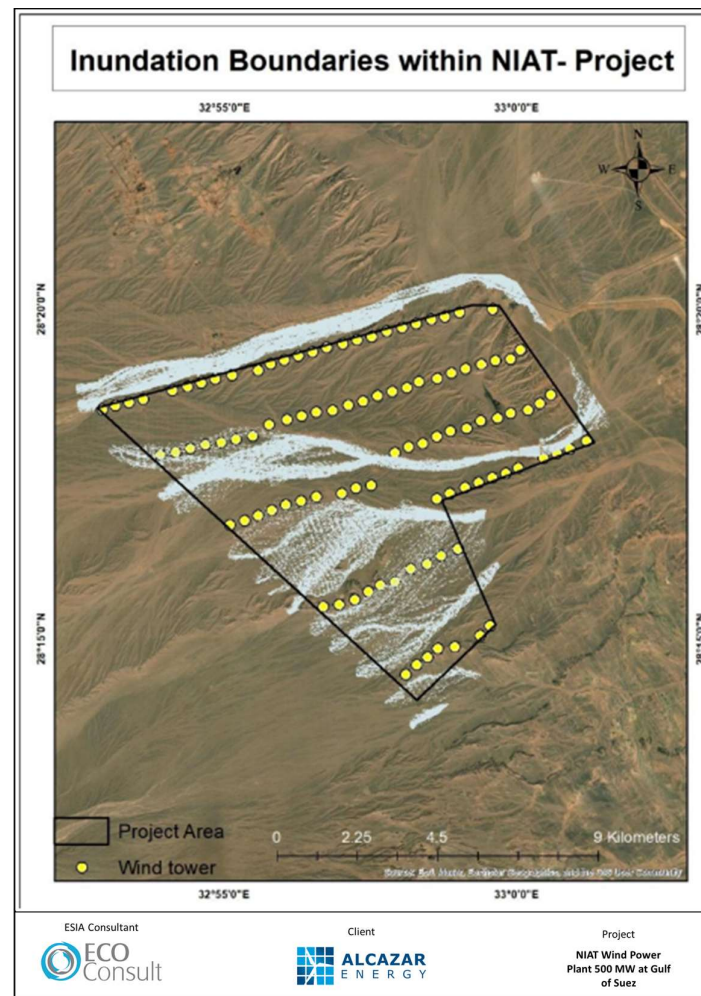
Figure 25: Existing Flood Protection Structure





**Figure 26: Topographic Map of Major Wadies and Tributaries Near the Project Area**

Based on hydrological assessment of the drainage basins, the level of flood hazard affecting the project area varies between moderate and high, driven primarily by the large upstream catchment areas, steep watershed slopes, and the low infiltration capacity of the highland rocks. At the project boundary itself, flood intensity analysis across 14 cross-sections indicates predominantly low risk for all intersecting wadies, with the exception of the main channel of Wadi El Darb sub-basin B7, which presents a medium risk level with a flood intensity of  $1.10 \text{ m}^2/\text{s}$ . The existing flood protection infrastructure reduces but does not eliminate flood risk to the project site. The figure below presents the flood inundation extent for the 100-year return period as modelled using the HEC-RAS 2-D hydraulic model.



**Figure 27: Flood Inundation Map for the 100-Year Return Period**

### 7.3.4 Hydrogeology

The figure below presents the hydrogeological conditions of the Project site and surrounding areas, based on the hydrogeological map of Egypt (RIGW, 1999). As noted, the Project site is located in an area of wadi deposits with moderate to low productive aquifers with insignificant surface recharge and limited sub-surface recharge. This entails that there are no shallow groundwater aquifers with a continuous source of fresh water recharge, and this is due to the lack of rain and large drainage basins to collect rainwater.

There is no utilization of groundwater in the Project site, it could be considered that the fresh groundwater is not an important source of water in the Project area. Moreover, in the wide area surrounding the site, the recent well inventory and available literature show that groundwater wells are concentrated within Wadi Araba, located about 100 km north of Project site. Wadi Araba was considered as a wadi with high groundwater possibility (Aggour, 1990). Rocks belonging to Carboniferous and Lower Cretaceous sandstone represent the main source of water in the Wadi Araba Depression. The water is tapped from springs, shallow wells and occasionally deep wells. The collected information from shallow groundwater wells and springs in Wadi Araba reveals that the water salinity varies between 1025 to parts per million (ppm) and 50,233 ppm.

In the GoS, groundwater is used mainly for touristic and industrial purposes. According to the rates of groundwater withdrawal with respect to water requirements, the Gulf province includes areas into which the groundwater represents 10-40% of the utilized water supplies. The daily discharge ranges from 260 to 3000



m<sup>3</sup>/day at Wadi Araba and El Sukhna-Zafrana localities respectively (Sewidan and Misak, 1992). The continuous use of such water potentially stresses its quantity and quality.

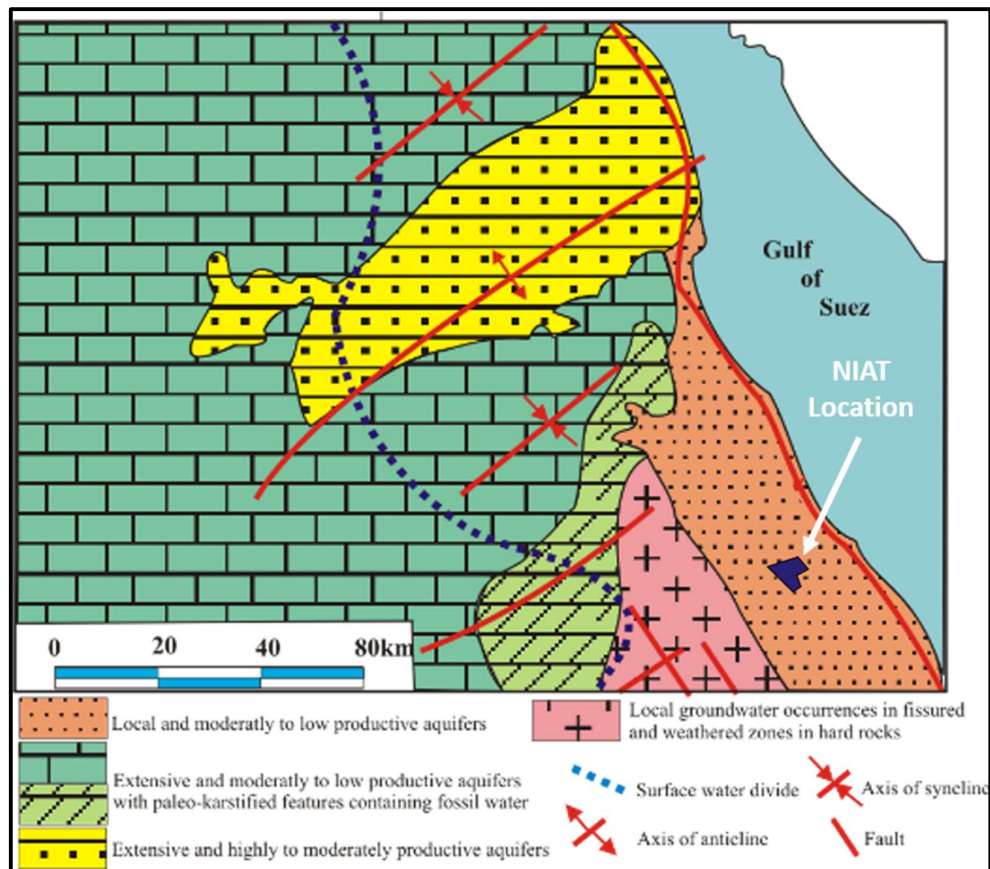


Figure 28: Hydrogeological Map of the Area around the Project Site

## 7.4 Biodiversity

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to biodiversity, as in flora and fauna with exception of birds and bats covered in subsequent sections.

### 7.4.1 Baseline Assessment Methodology

#### (i) Literature Review

The baseline assessment of the Project site was informed on a literature review, that based on previous studies, data, surveys, and records available in published scientific papers, books, and journals on flora and fauna species recorded within the study region in general. It is noteworthy to state that since the available literature on the Project site specifically and its buffer is relatively limited, the literature reviewed included national and international references that have a wider spectrum than the region of the Project. Additionally, a special consideration was given to the “Strategic Environmental and Social Impact Assessment for an area of 300 km<sup>2</sup> of potential wind farms at the Gulf of Suez (2018)”.

#### (ii) Field Survey

The baseline assessment of the Project site was also informed by field surveys. A field survey was undertaken at the Project site during the spring and autumn 2021 as well as spring 2022. In addition, an updated survey for Egyptian Spiny-tailed Lizard (Dabb) in specific was undertaken in spring 2025 due to the importance of this species (as discussed in further details below).

Since the autumn season is not the most favourable season for assessing habitats and floral and faunal elements (as opposed to spring), the focus of the field survey was mainly to identify key habitats and identify any outstanding biodiversity taxa and/or elements that could require specific focus.

The field survey mainly included field observations, where the site was examined carefully for the presence of active animals, animal signs and tracts, active burrows, remains or any other vital signs that indicate the activity of animals. Due to the large size of the Project site, the research team focused on areas of high priorities; mainly wadis since they are believed to be the main corridors that animals would use in moving around the site. The team carried out route-transects along the wadis searching for any of the above-mentioned signs of animal presence. Similar approach was followed for the flora survey where the survey focused on sides of wadis and any areas where vegetation was noticed. In addition, the site was surveyed for occurring plant species which were noted and recorded to include number of species, coverage interception per species, etc.

(iii) *Fauna and Flora Species status*

All species recorded as part of the literature review or on-site during the field survey had their conservation status identified according to International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2019), which provides the global conservation status of evaluated species. Since Egypt does not have national Red Lists for most taxon, the regional assessments of the Mediterranean region and North African region were reviewed for any species that could be of conservation value on the regional level.

The following references were reviewed and consulted as part of the baseline assessment and preparation of this section:

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#### 7.4.2 Results

In accordance with the methodology discussed above, the results below discuss the findings and the outcomes for flora and fauna based on the literature review and field survey.

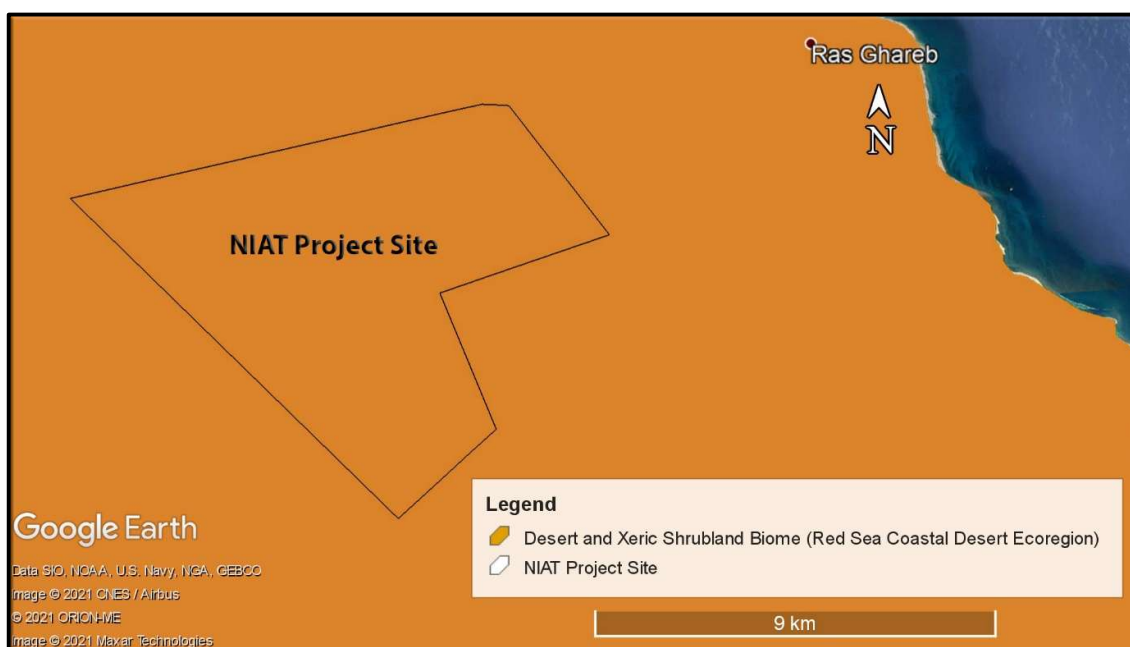
##### (i) Flora

The Project area is located in the Desert and Xeric Shrublands Biome and more specifically in the Ecoregion of the Red Sea Coastal Desert. According to Harhash et al. (2015), the habitats found in the Project area must be attributed to the main habitat system “Desert”. The vast majority of the Project area can be classified as “Hamada Desert” of the Sub-System “Plain Land” which is crossed by wadis of the Sub-System “Low Land”.

Vegetation cover in the Project area was found to be extremely sparse and mostly restricted to main wadis. Vegetation within the Project area generally has low species composition, density and very patchy distribution. The wadis tend to support the most vegetation due to generally higher soil moisture levels. According to Abd El-Ghani et al. (2014), the Project site is located in what is defined as the Eastern Desert of Egypt. More specifically, the Project area is located in the Red Sea Coastal Land.

Eastern desert occupying the eastern part of Egypt extending from the Nile Valley eastward to the Gulf of Suez and the Red Sea which is about 223,000 km<sup>2</sup>, i.e., 21% of the total area of Egypt. It consists essentially of a backbone of high, rugged mountains running parallel to and at a relatively short distance from the Red Sea coast (Zahran and Willis 2009). It is a rocky plateau dissected by several wadis (valleys). Each wadi has the main channel with numerous tributaries which climatically lies within the hyper-arid provinces (Ayyad and Ghabbour, 1986; Ayyad et al., 1993).

The total number of the recorded taxa within Eastern desert varied from one author to another e.g., Hassib (1951) reported that 42% of the Egyptian desert flora hosted in the Eastern desert (324 out of 765 species), Hassan (1987) recorded 433 species are belonging to 64 families, Amer (2002) reported that the total number of taxa in the Eastern desert was 576, while Abd El-Ghani et al (2014) recorded 496 higher plant species representing about 23.1% of the total vascular flora of Egypt. The 496 species were belonging to 296 genera and 66 families. Among those 496 species, a total of 18 endemic and near-endemic species with global significance were recorded (5 endemic and 13 near endemic), as reported by Abd El-Ghani et al (2014); Boulos 2009.



**Figure 29: Location of the Project site in reference to Ecoregions of the World (TEOW)**

According to a literature review of the flora recorded along the coastal desert of the Red Sea, a total of 86 species were recorded in the Project site and its vicinity (Abd El-Ghani et al, 2014), see table below, from which around 30 were recorded during the field surveys. Out of the 86 species recorded in the Project area and its vicinity from the literature review and field survey, only six (6) were found to be included in the global IUCN's Red List of Threatened Species (IUCN, 2021), all of which are evaluated as "Least Concern". All recorded species are common and widespread and no endemic or endangered plant species were recorded or known to be found at the Project site.

**Table 21: List of Plant Species Recorded from Field Survey (highlighted) and Literature Review**

Family	Scientific name	IUCN Red Threatened 2021-1	List of Species	IUCN Red Threatened 2025-2	List of Species
Ephedraceae	<i>Ephedra aphylla</i> Forssk.	Least Concern			
Amaranthaceae	<i>Aerva javanica</i> (Burm. f.) Juss. ex Schult.	Not Evaluated			
	<i>Amaranthus viridis</i> L.	Not Evaluated			
Apocynaceae	<i>Calotropis procera</i> (Aiton) W.T. Aiton	Not Evaluated			
	<i>Leptadenia pyrotechnica</i> (Forssk.) Decne.	Not Evaluated			
	<i>Pergularia tomentosa</i> L.	Not Evaluated			
Asteraceae	<i>Artemisia judaica</i> L.	Not Evaluated			
	<i>Centaurea calcitrapa</i> L.	Not Evaluated			
	<i>Centaurea scoparia</i> Sieber ex Spreng.	Not Evaluated			
	<i>Cotula cinerea</i> Delile	Not Evaluated			
	<i>Echinops spinosus</i> L.	Not Evaluated			
	<i>Ifloga spicata</i> (Forssk.) Sch. Bip.	Not Evaluated		Not Evaluated	
	<i>Ipheion mucronata</i> (Forssk.) Asch. et Schweinf.	Not Evaluated			
	<i>Launaea spinosa</i> (Forssk.) Sch. Bip. ex Kuntze	Not Evaluated			
	<i>Launaea nudicaulis</i> (L.) Hook. F.	Not Evaluated		Not Evaluated	
	<i>Limbarda crithmoides</i> (L.) Dumort.	Not Evaluated			
	<i>Pluchea dioscoridis</i> (L.) DC.	Least Concern			
	<i>Pulicaria incisa</i> (Lam.) DC.	Not Evaluated		Not Evaluated	
	<i>Pulicaria undulata</i> (L.) C.A. Mey.	Not Evaluated			
	<i>Reichardia tingitana</i> (L.) Roth	Not Evaluated			
	<i>Senecio glaucus</i> L.	Not Evaluated		Not Evaluated	

Family	Scientific name	IUCN Red List of Threatened Species 2021-1	IUCN Red List of Threatened Species 2025-2
Boraginaceae	<i>Sonchus oleraceus</i> L.	Not Evaluated	
	<i>Arnebia hispidissima</i> (Lehm.) DC.	Not Evaluated	Not Evaluated
	<i>Heliotropium bacciferum</i> Forssk.	Not Evaluated	
Brassicaceae	<i>Trichodesma africanum</i> (L.) R. Br.	Not Evaluated	Not Evaluated
	<i>Diplotaxis harra</i> (Forssk.) Boiss.	Least Concern (Europe)	
	<i>Farsetia aegyptia</i> Turra	Not Evaluated	
	<i>Matthiola longipetala</i> (Vent.) DC.	Not Evaluated	
	<i>Morettia philaeana</i> (Delile) DC.	Not Evaluated	Not Evaluated
	<i>Zilla spinosa</i> (L.) Prantl	Not Evaluated	Not Evaluated
Capparaceae	<i>Capparis spinosa</i> L.	Not Evaluated	
Plantaginaceae	<i>Misopates orontium</i> (L.) Raf.	Not Evaluated	Not Evaluated
Caryophyllaceae	<i>Polycarpaea robbairea</i> (Kuntze) Greuter & Burdet	Not Evaluated	
	<i>Polycarpaea repens</i> (Forssk.) Asch. & Schweinf.	Not Evaluated	Not Evaluated
	<i>Paronychia capitata</i> (L.) Lam	Not Evaluated	Not Evaluated
Chenopodiaceae	<i>Anabasis articulata</i> (Forssk.) Moq.	Not Evaluated	
	<i>Arthrocnemum macrostachyum</i> (Moric.) K. Koch	Not Evaluated	Not Evaluated
	<i>Atriplex halimus</i> L.	Not Evaluated	
	<i>Chenopodium album</i> L.	Not Evaluated	
	<i>Halocnemum strobilaceum</i> (Pall.) M.Bieb.	Not Evaluated	
	<i>Halopeplis perfoliata</i> (Forssk.) Bunge ex Asch.	Not Evaluated	
	<i>Haloxylon salicornicum</i> (Moq.) Bunge ex Boiss.	Not Evaluated	
	<i>Salsola imbricata</i> Forssk.	Not Evaluated	
	<i>Salsola vermiculata</i> L.	Not Evaluated	Not Evaluated
	<i>Suaeda monoica</i> Forssk. ex J.F. Gmel.	Not Evaluated	
	<i>Traganum nudatum</i> Del.	Not Evaluated	Not Evaluated
Cleomaceae	<i>Cleome amblyocarpa</i> Barratte & Murb.	Not Evaluated	
	<i>Cleome droserifolia</i> (Forssk.) Delile	Not Evaluated	
Convolvulaceae	<i>Convolvulus hystrix</i> Vahl	Not Evaluated	
Neuradaceae	<i>Neurada procumbens</i> L.	Not Evaluated	Not Evaluated
Euphorbiaceae	<i>Ricinus communis</i> L.	Not Evaluated	
Fabaceae	<i>Alhagi graecorum</i> Boiss.	Not Evaluated	
	<i>Astragalus bombycinus</i> Boiss.	Not Evaluated	
	<i>Astragalus vogelii</i> (Webb) Bornm.	Not Evaluated	
	<i>Astragalus corrugatus</i> (Boiss.) Eig.	Not Evaluated	Not Evaluated
	<i>Astragalus eremophilus</i> Boiss.	Not Evaluated	Not Evaluated
	<i>Argyrobium uniflorum</i> (Decne.) Jaub. & Spach	Not Evaluated	Not Evaluated
	<i>Taverniera aegyptiaca</i> Boiss.	Not Evaluated	Not Evaluated
	<i>Vachellia</i> Seyal	Not Evaluated	Not Evaluated
Frankeniaceae	<i>Vachellia tortilis</i>	Not Evaluated	
	<i>Frankenia hirsuta</i> L.	Not Evaluated	
	<i>Frankenia pulverulenta</i> L.	Not Evaluated	Not Evaluated
Geraniaceae	<i>Erodium glaucophyllum</i> (L.) L'Hér.	Not Evaluated	
	<i>Erodium laciniatum</i> (Boiss.) Batt. & Trab.	Not Evaluated	Not Evaluated
	<i>Erodium oxyrhynchum</i> M.Bieb	Not Evaluated	Not Evaluated
Nitrariaceae	<i>Nitraria retusa</i> (Forssk.) Asch.	Not Evaluated	
Orobanchaceae	<i>Cistanche phelypaea</i> (L.) Cout.	Not Evaluated	
Polygonaceae	<i>Calligonum polygonoides</i> L.	Not Evaluated	
Resedaceae	<i>Ochradenus baccatus</i> Delile	Not Evaluated	Not Evaluated

Family	Scientific name	IUCN Red List of Threatened Species 2021-1	IUCN Red List of Threatened Species 2025-2
	<i>Reseda pruinoso</i> Delile	Not Evaluated	
	<i>Reseda muricata</i> C. Presl.	Not Evaluated	Not Evaluated
Solanaceae	<i>Hyoscyamus muticus</i> L.	Not Evaluated	
Tamaricaceae	<i>Reaumuria hirtella</i> Jaub. & Spach	Not Evaluated	
	<i>Tamarix nilotica</i> (Ehrenb.) Bunge	Least Concern	
	<i>Tamarix tetragyna</i> Ehrenb.	Not Evaluated	
Urticaceae	<i>Forsskaolea tenacissima</i> L.	Not Evaluated	
Zygophyllaceae	<i>Zygophyllum arabica</i> L.	Not Evaluated	Not Evaluated
	<i>Zygophyllum bruguieri</i> DC.	Not Evaluated	
	<i>Zygophyllum scabra</i> Forsk.	Not Evaluated	Not Evaluated
	<i>Zygophyllum album</i> L.f.	Not Evaluated	
	<i>Zygophyllum coccineum</i> L.	Not Evaluated	Not Evaluated
	<i>Zygophyllum simplex</i> L.	Not Evaluated	Not Evaluated
Juncaceae	<i>Juncus rigidus</i> Desf.	Not Evaluated	
Poaceae	<i>Pennisetum setaceum</i> (Forssk.) Chiov.	Least Concern	
	<i>Stipagrostis raddiana</i> (Savi)	Not Evaluated	Not Evaluated
		Least Concern	Least Concern

## (ii) Fauna

The specific outcomes of the field survey in relation to faunal species are discussed below covering vertebrate fauna (mammalian fauna and herpetofauna) and invertebrate fauna.

### a) Mammalian Fauna

The project site in particular was studied in detail in previous faunal studies. Mammals' distribution is associated with the distribution and abundance of vegetation cover and therefore most species are found in vegetated wadis, rocky hillsides or mountain slopes. The nearest attraction to mammalian fauna specially foxes and rodents is the garbage dump site which is located in the eastern area of the Project site.

However, literature review has shown that 20 species were recorded in the Project site and its vicinity (Basuony et al., 2010; Hoath, 2009; Osborn and Helmy, 1980), see table below (4 of which were recorded by the field survey). It should be mentioned that some of the species that are listed as their distribution range maps in literature have shown that they are present in the general area of the Project site although no specific studies have confirmed that. Additionally, some of the listed species are known to be present in the highlands to the west of the Project site and therefore are potentially considered to be present in the vicinity of the Project site, even in small numbers.

Out of the species listed, seventeen are listed as "Least Concern" according to IUCN's Red List of Threatened Species, two are evaluated as "Threatened" (both Vulnerable); *Capra nubiana* and *Gazella dorcas*, and the remaining species is evaluated as "Near Threatened"; *Hyaena hyaena*.

The *Capra nubiana* and *Gazella dorcas* have the area of the Project site as part of their distribution range. Regarding the *Capra nubiana*, the species typical habitats include mountainous areas and is expected to be present, if at all, to the far west of the Project site in the mountains. As for *Gazella dorcas*, considering the degraded habitats in the general area of the Project site and human disturbance represented by noticed daily Bedouin car movements across the project site, it is highly unlikely that the species could be present in the general area of the Project site. Also, no tracks, dungs or any other signs of the presence of the species were documented.



In addition, regarding the Striped Hyaena (Near Threatened), the species is known to have a very wide home range reaching up to 60 km. Although the distribution range suggests that it could still be present in the Project site, its numbers generally are believed to be extremely low and would be generally confined to areas with very low human presence.

Finally, it is important to highlight that none of these threatened species were recorded within the Project site, or known to be recorded by locals during the recent past years within or in the vicinity of the Project site.

**Table 22: List of Mammalian Species Recorded from Field Survey (highlighted) and Literature Review**

Family	Scientific name	Common name	IUCN Red List of Threatened Species 2021-1	IUCN Red List of Threatened Species 2025-2
Erinaceidae	<i>Hemiechinus auritus</i>	Long-eared Hedgehog	Least Concern	
Leporidae	<i>Lepus capensis</i>	Cape Hare	Least Concern	
Muridae	<i>Acomys cahirinus</i>	Cairo Spiny Mouse	Least Concern	
	<i>Acomys russatus</i>	Golden Spiny Mouse	Least Concern	
	<i>Dipodillus dasyurus</i>	Wagner's Gerbil	Least Concern	
	<i>Gerbillus gerbillus</i>	Lesser Egyptian Gerbil	Least Concern	Least Concern
	<i>Gerbillus henleyi</i>	Pygmy Gerbil	Least Concern	
	<i>Gerbillus pyramidum</i>	Greater Egyptian Gerbil	Least Concern	
	<i>Gerbillus floweri</i>	Flower's Gerbil	Least Concern	
	<i>Jaculus jaculus</i>	Lesser Egyptian Jerboa	Least Concern	Least Concern
	<i>Meriones crassus</i>	Sundevall's Jird	Least Concern	Least Concern
	<i>Sekeetamys calurus</i>	Bushy-tailed Jird	Least Concern	
Felidae	<i>Felis silvestris</i>	Wild Cat	Least Concern	
	<i>Vulpes rueppellii</i>	Ruppell's Fox	Least Concern	
	<i>Vulpes vulpes</i>	Red Fox	Least Concern	Least Concern
	<i>Canis lupaster</i> / <i>Canis aureus</i>	African Wolf / Golden Jackal	Least Concern	
	<i>Hyaena hyaena</i>	Striped Hyena	Near Threatened	
Procaviidae	<i>Procavia capensis</i>	Rock Hyrax	Least Concern	
Bovidae	<i>Capra nubiana</i>	Nubian Ibex	Vulnerable	
	<i>Gazella dorcas</i>	Dorcas Gazelle	Vulnerable	Vulnerable

#### b) Herpetofauna

Virtually, no previous specific studies on the reptiles and amphibians were conducted within the boundaries of the Project site. Reptiles are the most diverse vertebrate group in the desert habitats like the Project area, and consist entirely of typical desert species. This herpetofauna is composed of lizards and snakes that are adapted to rocky and sandy desert habitats. Additionally, according to Baha El Din (2006), there are 32 species that are documented, or at least expected, to be present in the Project area and its vicinity, see table below. On the other hand, the 32 species listed belong to seven families. Out of all those species, eleven (11) are recorded in the global IUCN Red List of Threatened Species. Ten (10) of these species are evaluated as "Least Concern", while one (1) species is evaluated as "Threatened" (Vulnerable); *Uromastyx aegyptia*.

**Table 23: Reptilian Species Recorded from Field Survey (highlighted) and known to Occur within the Project Study Area**

Family	Scientific name	Common name	IUCN Red List of Threatened Species 2021-1	IUCN Red List of Threatened Species 2025-2
Gekkonidae	<i>Cyrtopodion scabrum</i>	Keeled Rock Gecko	Least Concern	
	<i>Hemidactylus flaviviridis</i>	Yellow-bellied Gecko	Not Evaluated	
	<i>Hemidactylus turcicus</i>	Turkish Gecko	Least Concern	
	<i>Ptyodactylus guttatus</i>	<u>Spotted Fan-toed Gecko</u>	Not Evaluated	

Family	Scientific name	Common name	IUCN Red List of Threatened Species 2021-1	IUCN Red List of Threatened Species 2025-2
Agamidae	<i>Ptyodactylus hasselquistii</i>	Egyptian Fan-toed Gecko	Not Evaluated	
	<i>Ptyodactylus siphonorhina</i>	Saharan Fan-toed Gecko	Not Evaluated	
	<i>Stenodactylus petrii</i>	Sand Gecko	Not Evaluated	
	<i>Stenodactylus stenodasthylus</i>	Elegant Gecko	Not Evaluated	Least Concern
	<i>Tropicolotes steudneri</i>	Steudner's Pigmy Gecko	Not Evaluated	Least Concern
	<i>Agama spinosa</i>	Spiny Agama	Least Concern	
	<i>Pseudotrapelus sinaitus</i>	Sinai Agama	Least Concern	
	<i>Trapelus pallidus</i>	Pallid Agama	Not Evaluated	
	<i>Uromastix aegyptia</i>	Egyptian Dabb Lizard	Vulnerable	Vulnerable
	<i>Acanthodactylus boskianus</i>	Bosc's Lizard	Not Evaluated	Least Concern
Lacertidae	<i>Acanthodactylus scutellatus</i>	Nidua Lizard	Not Evaluated	
	<i>Mesalina guttulata</i>	Small-spotted Lizard	Not Evaluated	
	<i>Mesalina olivieri</i>	Olivier's Lizard	Least Concern	
	<i>Mesalina rubropunctata</i>	Red-spotted Lizard	Not Evaluated	Least Concern
Varanidae	<i>Varanus griseus</i>	Desert Monitor	Not Evaluated	
Scincidae	<i>Chalcides ocellatus</i>	Ocellated Skink	Least Concern	
	<i>Scincus scincus</i>	Sandfish	Not Evaluated	
	<i>Sphenops sepsoides</i>	Audouin's Sand-skink	Least Concern	
Colubridae	<i>Lytrohynchus diadema</i>	Diademed Sand Snake	Least Concern	
	<i>Malpolon moilensis</i>	Moila Snake	Not Evaluated	
	<i>Platycephalus rogersi</i>	Spotted Racer	Least Concern	
	<i>Platycephalus saharicus</i>	Saharan Cliff Racer	Not Evaluated	
	<i>Psammophis aegyptius</i>	Saharan Sand Snake	Not Evaluated	Least Concern
	<i>Psammophis schokari</i>	Schokari Sand Snake	Not Evaluated	
	<i>Spalerosophis diadema</i>	Diadem Snake	Not Evaluated	
Viperidae	<i>Cerastes cerastes</i>	Horned Viper	Least Concern	Least Concern
	<i>Cerastes vipera</i>	Sand Viper	Least Concern	
	<i>Echis coloratus</i>	Burton's Carpet Viper	Not Evaluated	

In particular, the "Vulnerable" Egyptian Dab Lizard individuals were recorded on different occasions within and in the buffer area of the Project site. The coordinates and locations of the records are clarified by the following tables, map and figures. The records were mainly at the suitable habitats related to the vegetated Wadis within and around the project site. Observations of several individuals of the species were documented at different stages of age (Juvenile, subadult and adult) near their burrows or sometimes at the entrance of the burrows.

**Table 24: Egyptian Dabb Lizard Records within and Around the Project Study Area**

Record#	Latitude (N)	Longitude (E)
1st Record	28.282609	32.897001
2nd Record	28.29619	32.870691
3rd Record	28.297667	32.867889
4th Record	28.280828	32.985382
5th Record	28.267234	32.976219
6th Record	28.300459	32.901793
7th Record	28.299162	32.870501

**Table 25: Egyptian Dabb Lizard Recorded Burrows during the Study**

Record#	Latitude (N)	Longitude (E)
Burrow 01	28.300459	32.901793
Burrow 02	28.300367	32.901748
Burrow 03	28.30194	32.887863
Burrow 04	28.301833	32.887683
Burrow 05	28.299855	32.878231
Burrow 06	28.29992	32.877844
Burrow 07	28.299606	32.876653
Burrow 08	28.30026	32.875052
Burrow 09	28.299162	32.870501
Burrow 10	28.299108	32.87149
Burrow 11	28.29648	32.864503
Burrow 12	28.296474	32.862395
Burrow 13	28.294262	32.85214
Burrow 14	28.293727	32.846875
Burrow 15	28.293595	32.847588
Burrow 16	28.29382	32.849335
Burrow 17	28.293476	32.852546
Burrow 18	28.291939	32.86398
Burrow 19	28.291863	32.866786
Burrow 20	28.29269	32.874069
Burrow 21	28.292719	32.876205
Burrow 22	28.292401	32.877752
Burrow 23	28.294273	32.883773
Burrow 24	28.294579	32.893075
Burrow 25	28.299627	32.923776
Burrow 26	28.279897	32.976938
Burrow 27	28.279781	32.976928
Burrow 28	28.286124	32.966638
Burrow 29	28.286921	32.98886
Burrow 30	28.287274	32.988871

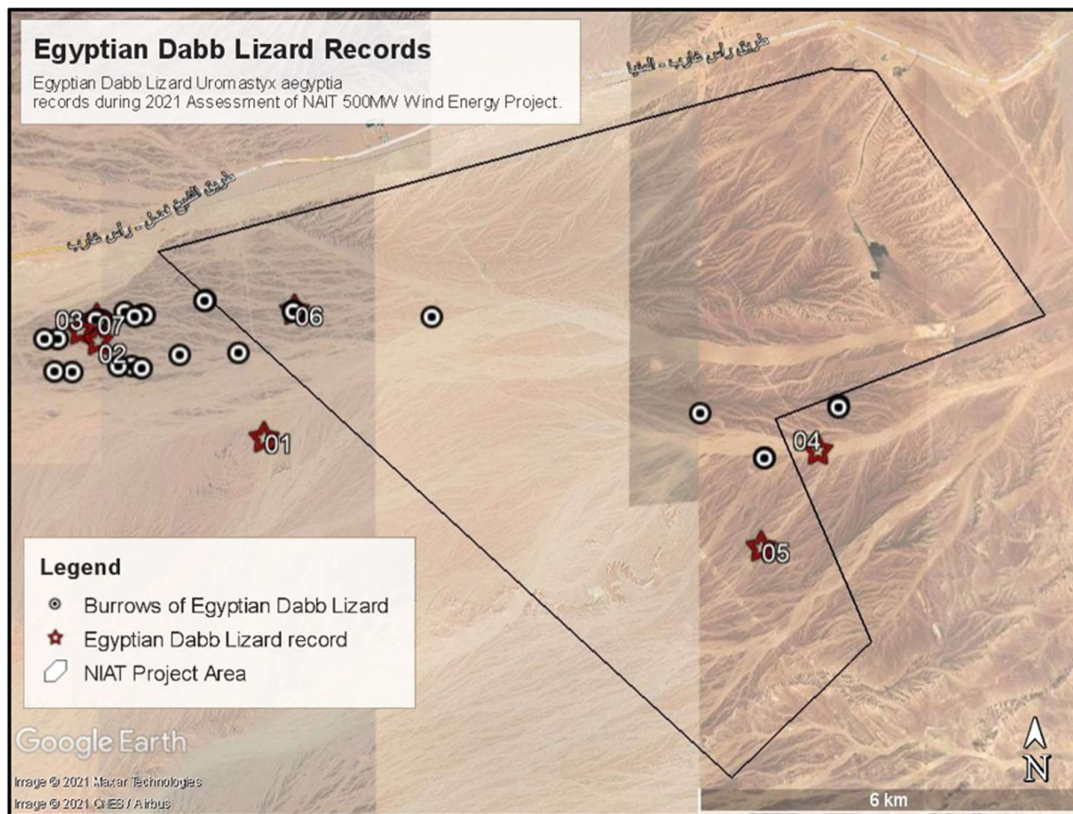


Figure 30: Egyptian Dabb Lizard Records (Red stars) and Burrows (Circles) within and around Project Site





Figure 31: Egyptian Dabb Lizard records within Northwestern Side of the buffer area around Project Site



Figure 32: Sample of Recorded Egyptian Dabb Lizard within and in the Buffer Area around Project Site

### Updated Egyptian Spiny-tailed Lizard (Dabb) Survey in 2026

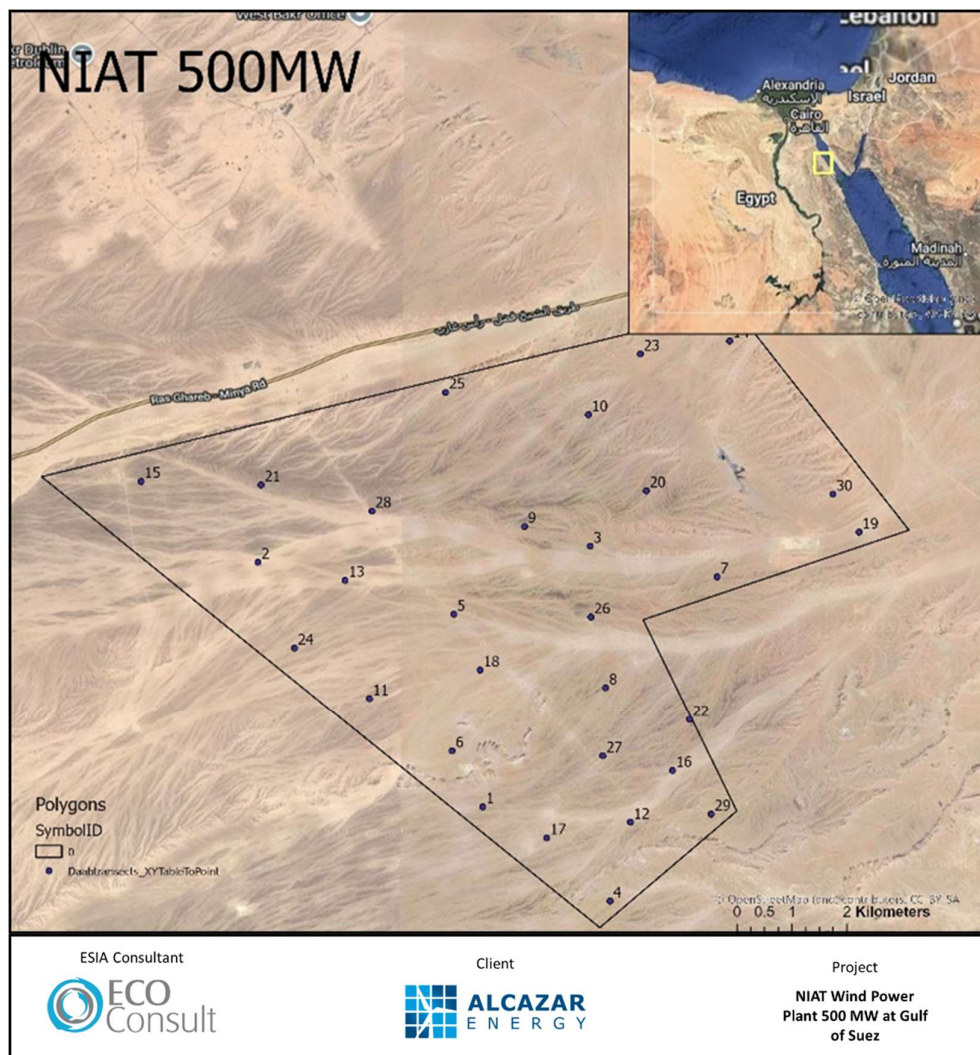
A targeted field survey for the Egyptian Spiny-tailed Lizard (*Uromastyx aegyptia*) was undertaken in 2025 within the Project site. The survey aimed to update the previous survey and identify the presence, distribution, and activity of the species within the study area. A standalone report for the survey is presented in Annex 10.2.

This section outlines the methodology adopted to conduct a targeted survey for the Egyptian Spiny-tailed Lizard (*Uromastyx aegyptia*) within the Project site. Dedicated field surveys were undertaken using a total of 30 transects distributed randomly across the study area. Each transect starting point was selected at an average distance of approximately 1,000 m from adjacent points to ensure representative spatial coverage of the entire study area. Stratification was not applied, as the study area was considered sufficiently homogeneous from both ecological and topographical perspectives.

The survey methodology included the following:

- Active search walks were undertaken over a distance of 1,000 m from each designated sampling point, covering an area within approximately 100 m on either side of the transect line. Transect orientation was aligned parallel to drainage channels, where present, or otherwise followed the general slope of the terrain. These transects were designed to detect reptile species, with a particular focus on the Egyptian Spiny-tailed Lizard (*Uromastyx aegyptia*), which is classified as a Vulnerable species.
- The dumpsite area within the Project site was excluded from survey points, as it is considered unlikely to support the presence of the species due to the high occurrence of stray dogs.
- All potential signs of species presence were recorded, including tracks, tail drags, burrow entrances, and other field indicators.
- Observations were systematically recorded and spatially mapped to assess the density and distribution patterns of presence indicators across the study area.
- The field survey was conducted by two teams, each comprising two specialists, responsible for undertaking daily survey activities.





**Figure 33: Sampling Transects for the Egyptian Spiny-tailed Lizard Survey within the Project Site**

The survey identified approximately 20 indicators of presence for the Egyptian Spiny-tailed Lizard (*Uromastix aegyptia*) within the Project site. These included approximately 8 active burrows and 9 inactive burrows, in addition to other signs such as scats and tracks. This corresponds to an estimated average density of approximately 0.136 burrows/km<sup>2</sup>. The recorded burrows exhibited a generally random spatial distribution across the study area, with no distinct clustering pattern observed. This is likely attributed to the relatively homogeneous nature of the terrain within the Project site, where the distribution of the species is primarily influenced by terrain and soil characteristics. Under such conditions, no clear spatial pattern in species distribution is expected or detectable.

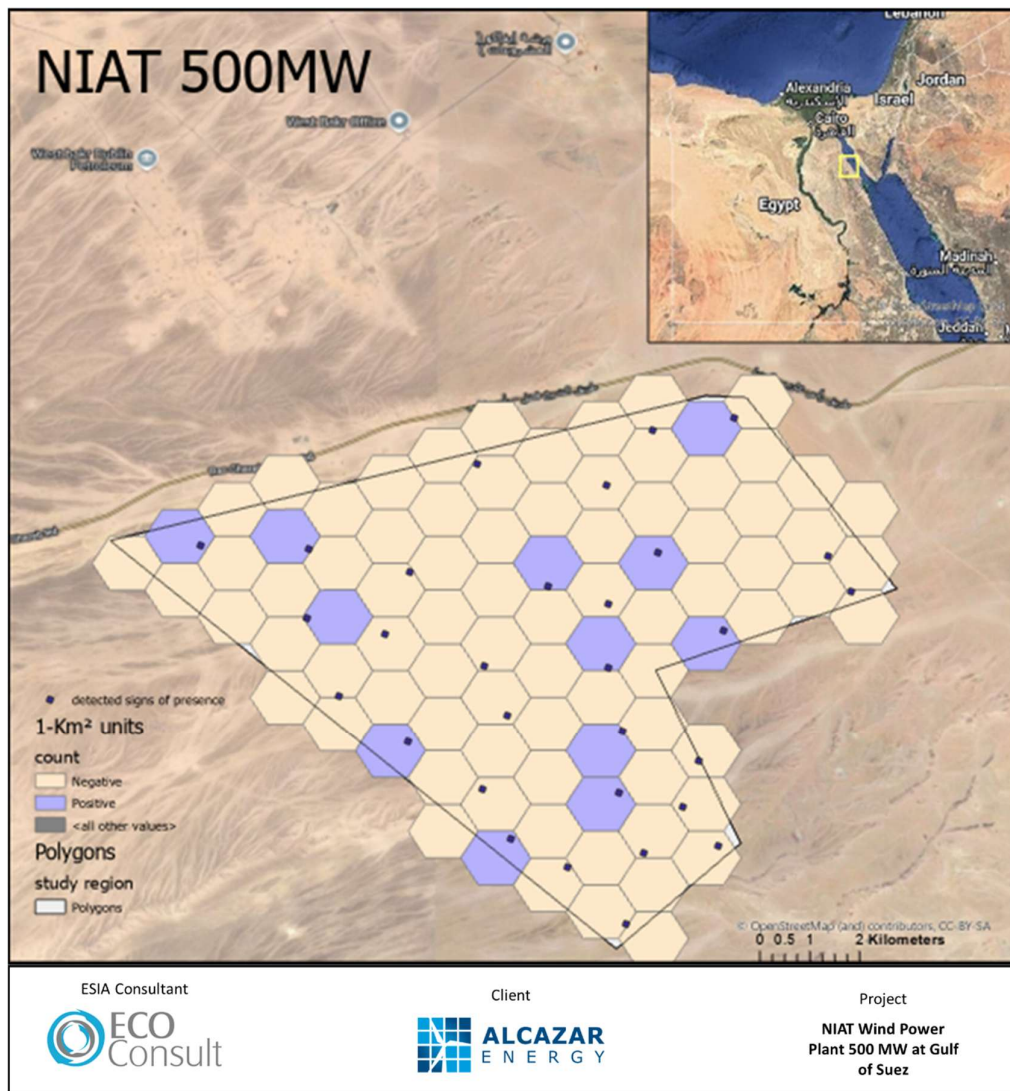


Figure 34: Distribution of Active and Inactive Egyptian Spiny-tailed Lizard Indicators within the Project Site



Figure 35: Field Survey Activities and Recorded Burrow of the Egyptian Spiny-tailed Lizard within the Project Site

#### c) Invertebrate Fauna

During the field survey, the recorded species of terrestrial invertebrates as shown in the following table were found to be common and widespread. The most recorded species are the Desert Ants (*Cataglyphis* spp.) and Flies of family Muscidae. There were some recorded sightings of common species of Desert mantis (*Eremiaphila* spp.), Camel spider, Darkling beetles (Tenebrionidae), Jumping spiders (Salticidae spp.), and Hoverflies (Syrphidae spp.). The Deathstalker scorpion (*Leiurus quinquestriatus*), Egyptian Locust (*Anacridium aegyptium*), the Painted Lady (*Vanessa cardui*), and the eleven-spot ladybird (*Coccinella undecimpunctata*) were also found.

Individuals representing common and widespread invertebrate fauna were rarely recorded within the project area; mainly associated with vegetated areas. Out of all recorded species, two species are recorded in the global IUCN Red List of Threatened Species, and both are evaluated as “Least Concern”.

The following species present the recorded invertebrates seen within and around the project area during the surveys undertaken.

Table 26: Invertebrate Species Recorded within the Project Study Area

Family	Scientific name	Common name	IUCN Red List of Threatened Species 2021-1	IUCN Red List of Threatened Species 2025-2
Nymphalidae	<i>Vanessa cardui</i>	The Painted Lady	Least Concern	
Buthidae	<i>Leiurus quinquestriatus</i>	Death Stalker Scorpion	Not Evaluated	
Coccinellidae	<i>Coccinella undecimpunctata</i>	Eleven-spotted Ladybird	Not Evaluated	
Acrididae	<i>Anacridium aegyptium</i>	Egyptian Locust	Least Concern	
Salticidae	Salticidae spp.	Jumping Spiders	Not Evaluated	
Muscidae	<i>Musca domestica</i>	Common Housefly	Not Evaluated	
Sarcophagidae	<i>Sarcophaga carnaria</i>	Flesh fly	Not Evaluated	
Calliphoridae	Calliphora spp.	Blow Flies	Not Evaluated	
Galeodidae	Galeodes spp.	Camel Spiders	Not Evaluated	
Formicidae	Cataglyphis spp.	Desert Ants	Not Evaluated	



Family	Scientific name	Common name	IUCN Red List of Threatened Species 2021-1	IUCN Red List of Threatened Species 2025-2
Tenebrionidae	Tenebrionidae spp.	Desert Beetles	Not Evaluated	
Syrphidae	Syrphidae spp.	Hoverflies	Not Evaluated	
Eremiaphilidae	Eremiaphila spp.	Desert Mantis	Not Evaluated	

#### d) Summary

In summary, based on the literature review and field survey undertaken, the following could be concluded in terms of the biodiversity of the site:

- The Project site in general is considered of low ecological significance due to its natural setting that is characterized by having low vegetation cover in an arid environment with low level of diversity.
- The vegetation cover is mainly restricted to Wadis, especially the two main wadis crossing the Project site and their tributaries.
- No key or sensitive habitats were recorded within the Project site, and all floral and faunal species recorded were in general considered common and typical to such habitats and generally of least concern except the habitats of Egyptian Dabb Lizard species mainly in the Wadis. Special consideration should be given to this species since the vegetated wadis within and around Project site provides a typical habitat for this species, and its individuals already recorded within the Project site and its buffer area.
- No endemic or near-endemic species were recorded.

#### e) The Dumpsite

The dumpsite of Ras Ghareb City which is located in the eastern side of Project site is acting as a source of attraction to the local and migratory fauna species (refer to “Sections 7.5 and 7.9” below).

For wild vertebrate fauna, mainly mammals and reptiles, the dumpsite’s waste materials are obviously providing suitable feeding habitats for local species. The waste materials itself along with the small mammals (mainly rodents), birds (migratory and resident) and insects attracted to these waste materials are providing feeding grounds to the abundant medium sized wild Canid, the Red Fox *Vulpes vulpes* as well as Feral dogs.

Several packs of feral dogs were recorded regularly within and around the dumpsite during the spring season 2021. These packs of feral dogs are found to be resident within the dumpsite area and showed territorial behaviour around their many widespread dens. It is important to note that these packs were recorded many times roaming through the Project, sometimes in large numbers (the team recorded about 40 individuals together at once). During autumn 2021, where the majority of the dumpsite’s materials were removed and buried, the number of packs and individuals of dogs were notably less.

Generally, observations did reveal that insects were quite abundant in the Project area especially in the eastern part of Project site where the dumpsite is located as well as around vegetation of nearby wadis. Based on the recent Site Visit to the Project site in 2026, waste disposal activities at the former site have significantly decreased. Illegal dumping is now subject to enforcement measures, including municipal fines, according to Ras Ghareb City Council. Further details on its current status are provided in Section 7.9.6.



**Figure 36: Resident Packs of Feral Dogs recorded during spring at the dumpsite within proposed NIAT project site.**

## 7.5 Birds

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to birds.

### 7.5.1 Baseline Assessment Methodology

#### 7.5.1.1 Background

The methodology followed the standard methodology for migratory bird censuses, being implemented using the Vantage Point (VP) (or Observation Points - OPs) technique according to the Scottish Natural Heritage guidance (SNH 2017), and in accordance with the methodology described in Sutherland (1996) that has been broadly used in ornithological wind farm assessments internationally.

In addition, the methodology also followed the Egyptian requirements: (i) “Environmental Impact Assessment Guidelines and Monitoring Protocols for Wind Energy Development Projects along the Rift Valley/Red Sea Flyway (RVRSF)” that is developed by EEAA (EEAA 2013); and (ii) “Strategic and Cumulative Environmental and Social Assessment’s Active Turbine Management Program for Wind Power Projects in the Gulf of Suez (2019)”.

The objective of the survey was to provide an assessment of how migratory and, if present, as well as resident soaring birds utilise the Project site, while providing a detailed analysis of the durations and the elevations at which they are present. This provides an in-depth understanding of the predicted impacts of the Project on bird species.

The information analysed in this section comes from the following databases/periods:

- Bird monitoring during the migratory seasons spring and autumns 2021 and 2022

- Bird monitoring during the autumn 2025 and spring 2026 (for the current version of the ESIA only data from February and March 2026 are available, as the monitoring is still ongoing, pending to be completed by mid-May).
- Strategic Bird Monitoring developed by RCREEE and assigned to Safe Soar in 2024 and 2025. This includes a series of VPs to the north and south of the NIAT and RASGHA Project area. The purpose of using these samples is that they are .

### 7.5.1.2 Monitoring Protocol

The field assessment team was composed of qualified observers with adequate previous experience in avifaunal assessments for wind farms. Each VP was covered by either one or two observers during different time periods throughout daylight hours, covering the migration period, based on previous assessments and scientific knowledge of Migratory Soaring Bird (MSB) migration patterns.

Monitoring from VPs was carried out daily following a rotational system to ensure that the 8 VPs are covered regularly, while also covering the various periods of daylight from dawn to sunset. Observation periods from each VP were conducted for a maximum of 4 hours to ensure that the quality of monitoring does not get affected by the observers' exhaustion. A minimum of a 1-hour break was provided between each observation period. In total, a maximum of 4 VP were covered every day, where each observation period is covered a minimum of 8 hours per day; 4 hours in the morning followed by a minimum of 1-hour break and 4 hours in the afternoon.

Note: although a 1-hour break is provided between each two observation periods, the approach ensured that this does not affect quality of recording. Therefore, a system was adopted in which the 1-hour break is undertaken through an alternate method between observers (i.e. one observer takes the break for example from 1pm-2pm while the second observer keeps watching, then second observer takes the break while first observer goes back to watching, and so on). This ensures that the entire daylight hours are covered and continuous monitoring is undertaken from start to finish throughout the day.

The start and end of observation periods varied depending on the following conditions:

- The season being covered and therefore the duration of daylight hours of the season
- Weather conditions, including visibility
- The records of the previous observation sessions, as this could reflect on the expected bird activity

Data was recorded in datasheet forms, on a daily basis. During the data collection, observers accounted for the zero bird count days (days with no records of migrating birds), which was also annotated. This information allowed a better data analysis, which was developed by Acrenasl Environmental as international ornithological independent and experienced consultants.

Observers at each VP were positioned in a manner intended to minimise disturbance to birds and avoid influencing their natural behavior during the survey. A complete circle of 360 degrees was scanned using a combination of naked eyes and 10x binoculars to a maximum distance of 2 kilometres. Within such distance any target species detected, was followed until it ceased flying or was lost from view. For each observation of a target species, data collected Data collected included the following:

- The time the target species was detected
- The flight duration of the target species to the nearest 15-second interval
- Estimate

of the bird's flight height above ground level at the point of first detection and thereafter at 15-second intervals, where heights to be classified flight based on turbine specifications and to be at least divided into



two classes; at collision risk and above collision risk for better interpretation, especially referred to Collision Risk Modelling (CRM).

- Because of the abovementioned different monitoring periods in 2021, 2022, and 2025-26, the recording of the flying heights (bands) was slightly different:
  - In spring 2021 there were only two flying heights: above/below 120 m
  - In autumn 2021 there were four: 0-120, 120-150, 150-200, and above 200 m
  - In spring there were four 0-120, 120-150, 150-200, and above 200,
  - In autumn 2022 there were five 0-120, 120-150, 150-200, 200-240, and above 240 m.
  - In 2025-26, both in autumn and spring, there have been seven intervals: 0-50, 50-120, 120-180, 180-240, 240-300, 300-500, and above 500 m.

All these seasons and years have been standardized for the CRM analysis as explained later in the appropriate section. The reason of these changes was related to the different turbine sizes which were intended for this project by the time the different monitoring took place. The turbine wind market has evolved quickly over the past years, which led developers to change the turbine models.

As guidance to the observers for orientation, they used pre-defined landmarks showing the main cardinal directions landmarks (N, E, S, and W) for reference in the field, if possible. Observers constantly scanned, using a combination of naked-eye and binoculars, the whole covered buffer of 360 degrees within the 2 km radius around.

Weather conditions (wind intensity and direction, visibility, cloud cover and precipitation) were recorded at start time of monitoring activities, then at every subsequent hour and at the end time of monitoring activities.

It is important to note that complete information on all records including the records detected outside the buffer radius around the VP were collected, including number of birds and distance. Also, the distance between the detected record and the observer were collected and documented within datasheets. Flight direction as well as heights of all records is among the basic information collected.

As shown in the datasheet forms on the next page, it was proposed to have one sheet for targeted species (priority species; MSBs) and another sheet for accidental observations of passerines and non-targeted species.

#### Basic Data Units

- Date (year/month/day)
- Vantage point (OP1 to OP8)
- Observer name (initials)
- Time at the start of the observation period
- Time at the end of the observation period
- Observation time in hours and minutes format (00: 00)
- Species
- Number – number of birds of the same species (mixed species flocks have one line and one key number for each species)

- Sex and Age - Sex: M/F; Age: Juvenile (J), Immature (I), Adult (A) if identifiable.
- Height classes as discussed earlier
- Origin – cardinal/inter-cardinal direction of the point where the bird was first detected in relation to the observer.
- Direction – cardinal/inter-cardinal main direction of the bird(s)'s trajectory
- Other VPs – indication of other VPs known to have also recorded the bird(s)
- Relevant behaviour of flying – Soaring, Gliding, Active flying
- Observation numbers
- Observation distance
- Recorded Inside or Outside the project site
- Any other noteworthy remarks.
- All units were collected for all recorded targeted species inside and outside the project area.
- None targeted species were recorded in a separate accidental datasheet, and mainly basic data of observation time, species, number of individuals, flying direction, etc. was recorded. No trajectories were mapped.

#### Weather Data

- This sheet is only filled by one of the senior observers assigned by the Team Leader.
- The following weather variables are recorded on an hourly basis:
  - Cloud cover (%)
  - Visibility (km)- following predefined categories: 1 = 2.5 km, 2 = 5 km, 3 = 7.5 km, 4 = 10 km
  - Temperature (°C)
  - Wind direction (cardinal/inter-cardinal points)
  - Wind speed (Beaufort)
  - Precipitation: Yes/No. Heavy (H)/Moderate (M)/Light (L)

#### Communication between observers

The team in the field was in contact during the reporting period via mobile phones and a “WhatsApp Group”. This ensured immediate communication to follow up on the migrating flocks and individuals over the Project area, and avoided double counting of same flocks/individuals, while also ensuring full and accurate perception about the record spatial and temporal aspects.

This is considered crucial given that if there was no communication, if more than one flock of the same species (or a flock later divided into smaller groups) are flying simultaneously in different parts of the Project area, the group may be recorded more than once (double count) in different times, or some of the smaller groups may be missed.

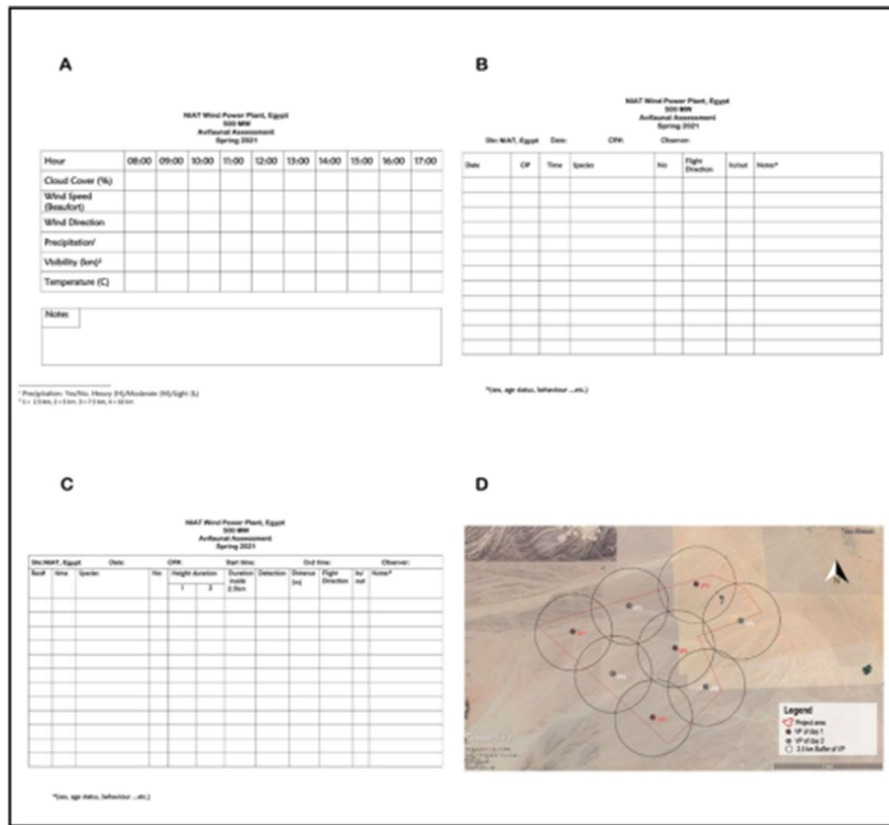


Figure 37: Data Sheets

### 7.5.1.3 Vantage Point Selection

Based on a view-shed analysis, eight (8) VP were considered enough to cover the entire area. The Project was monitored through these VPs to allow a good view of the migratory birds and provided a complete coverage of all turbines. All VPs were located at the top of a hill overlooking the surrounding area in a way that enables the observer to scan as much as possible of the project ground and maintain visual contact between VPs. The location of the VPs is presented in the figure that follows.

The table below presents the coordinates of the VPs.

Table 27: Coordinates of the VPs

Vantage Points	Coordinates	
	Latitude	Longitude
VP 1	28.308154°	32.896304°
VP 2	28.309387°	32.940133°
VP 3	28.321937°	32.976344°
VP 4	28.285994°	32.923485°
VP 5	28.289178°	32.966472°
VP 6	28.295956°	32.999225°
VP 7	28.268039°	32.949214°
VP 8	28.254166°	32.973881°

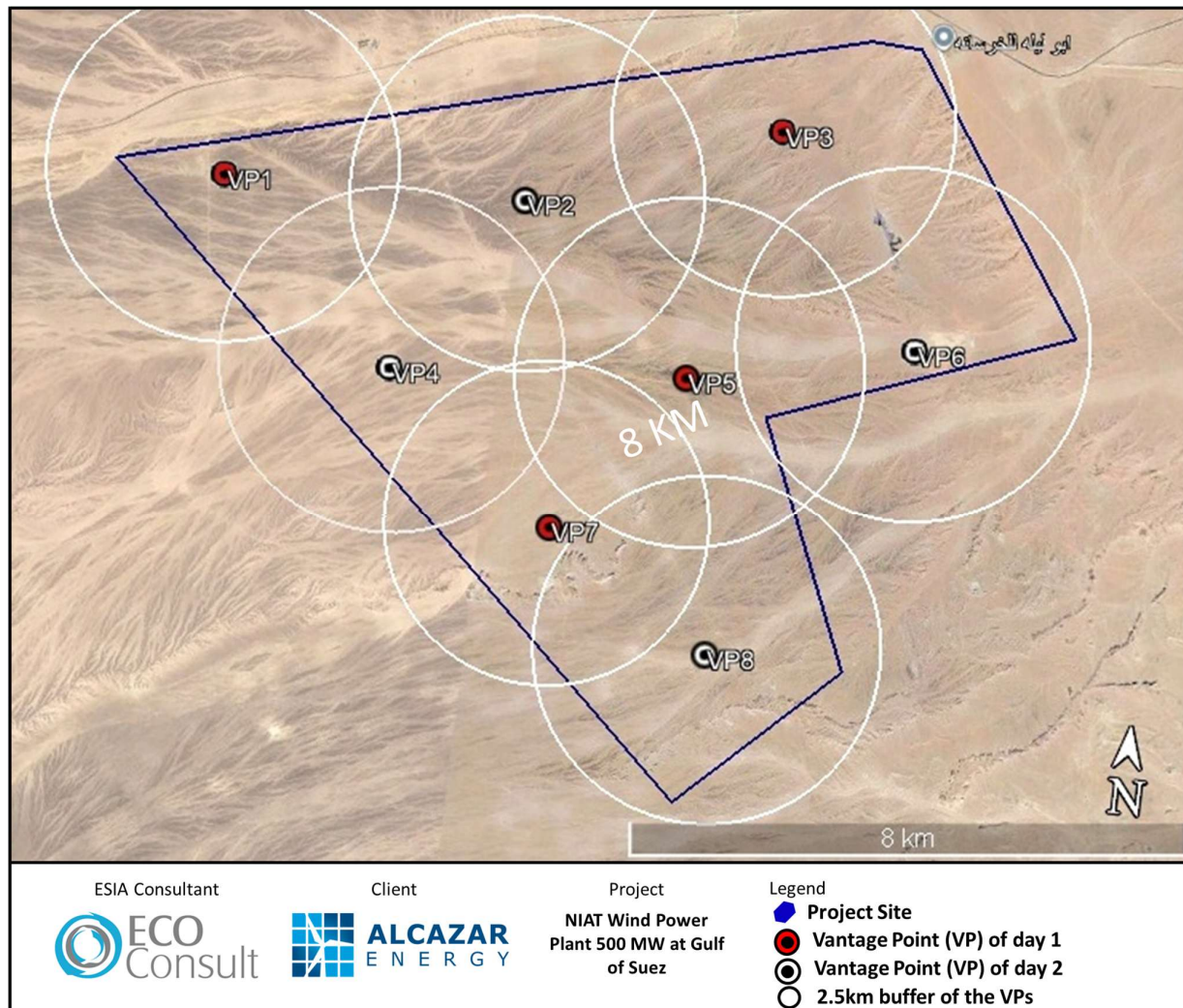


Figure 38: Location of Project VPs

#### 7.5.1.4 Site Specific Constraints

An important point to mention, as discussed earlier, within the Project site there is a domestic waste dumping area that is located within the eastern parts (check figure below)— it is known as Wadi Abu Hadd Dumping Area. It is well known that such dumping areas could be a source of attraction to migratory and resident soaring birds as identified within the BirdLife MSB Guidelines (See Birdlife International 2015<sup>7</sup> ).

Therefore, our methodology particularly focused on assessing the effect of the waste site on the behaviour of the migratory and resident birds. This includes the following: (i) ensuring that the waste site is included in the 2.5 km range of observation points VP3 and VP6 to ensure daily documentation of any effects or behaviours of migratory and resident soaring birds during the entire observation periods of the spring season; and (ii) dumping site was visited regularly, annotating the bird number and species, if any, along with documenting any human

<sup>7</sup>

[https://migratorysoaringbirds.birdlife.org/sites/default/files/waste\\_management\\_and\\_the\\_conservation\\_of\\_migratory\\_soaring\\_birds.pdf](https://migratorysoaringbirds.birdlife.org/sites/default/files/waste_management_and_the_conservation_of_migratory_soaring_birds.pdf)



activity on the site that could influence the presence of birds. Such visits were distributed on a rotational basis in early morning, mid-day, and afternoon to check potential changes in bird's presence and abundances.

Based on the recent Site Visit to the Project site in 2026, waste disposal activities at the former site have significantly decreased. Illegal dumping is now understood to be subject to enforcement measures, including municipal fines, according to Ras Ghareb City Council. Further details on its current status are provided in Section 7.9.6.



**Figure 39: Location of Dumpsite Area**



**Figure 40: View of the Area in 2021**

### 7.5.2 Results

The information analyzed in the sections below is derived from the following datasets:

- Bird monitoring undertaken during the spring and autumn migratory seasons of 2021 and 2022.



- Bird monitoring undertaken during autumn 2025 and spring 2026 (February to 31<sup>st</sup> March) (due to date of submission of this updated ESIA). Note: this ESIA will be updated again once the entire spring 2026 monitoring season is completed by May 2026.
- Bird monitoring developed by RCREEE as part of a strategic assessment for the GoS and implemented by Safe Soar in 2024 and 2025. This includes a series of VPs located to the north and south of the NIAT Project area.

As an initial step, the datasets were reviewed and organised. This included the completion and/or removal of missing data, while taking into account the following key considerations:

- **Comparisons between projects and seasons:** Monitoring effort, including survey duration and the number of VPs, has a strong influence on recorded results; for example, increased survey effort typically results in higher recorded numbers. Therefore, an alternative metric is required to enable meaningful comparison between projects, namely the passing rate (birds per unit of time), as described by Istúriz et al. (2020).
- **Use of total bird numbers:** Total bird counts are not suitable for analysis, as each species has distinct migration timing and strategies (Shirihai et al., 2000). Species migrating in large flocks, such as White Stork, Great White Pelican, Levant Sparrowhawk, and Honey Buzzard, may mask the patterns of species migrating in smaller groups (e.g. Steppe Eagle) or individually, such as Egyptian Vulture. A species-specific assessment is therefore required, which is not typically presented in most reports (e.g. Ecodia, 2007).
- **Species-specific flight characteristics:** Each species has distinct characteristics, including wing loading, shape, and weight, which influence flight behaviour. Species may be obligate or facultative soarers. Obligate soaring species rely on thermals at all times, whereas facultative species may also use flapping flight, providing greater flexibility when crossing large water bodies. In addition, some species, such as Lesser Kestrel, may migrate at night or over extensive sea areas, which means that current counts may underestimate their numbers.

#### 7.5.2.1 Baseline Results

As a general rule of all monitoring censuses, either spring or autumn, the following remarks are necessary:

- The uneven monitoring time per VP, month or years, makes the raw number of birds recorded not directly comparable. A longer monitoring time could result in more birds as well as species recorded. Thus, a standardized value for such comparisons has been calculated as noted throughout this section. This variable, which measures such variations, is the passing rate (#birds/hour of observation), see Bibby et al. 1992, Caughley 1977. Such passing rate will be used throughout the assessment presented in this section.
- In any migratory count, whether related to wind farms assessments or not, there is a chance that not all birds and/or bird flocks are identified properly. Reasons for this may be multiple but could include for example they may only be visible for a short period of time, the background does not allow a proper identification, or as Porter (2006) said: “Counting soaring birds and using the results for monitoring purposes is fraught with problems.” ... “The identification of many species is challenging and requires much training and practice as birds are often at a distance and several species are very similar. Identification of the Aquila eagles (Steppe, Greater Spotted and Lesser Spotted), buzzards and large falcons is especially difficult. Second, the actual counting can be problematic as birds frequently fly over at heights which make them invisible to the naked eye; they can also be in large mixed flocks - thus making both counting and identification difficult.” Thus, it is not surprising to find in all bird monitoring databases several records annotated as “eagle species”, “Buzzard sp.”, “falcon”, “harrier sp.”, etc. For any analysis, these records must be excluded; otherwise they may introduce biases in the overall results.

- Roosting & Resting of Birds: Porter (2006) should be referenced again on the issues related to the concept of roosting/resting of birds in any project proposed in the region and which states the following: “In the case of birds of prey the vast majority will pass overhead and not stop unless to roost as most do not feed on migration. The species that do are mainly those which migrate on a broad front, notably the harriers and falcons (especially Lesser Kestrel and Red-footed Falcon), but these are not known to gather in any concentration at the bottleneck” and “Storks are known to gather to feed on migration if the habitat is suitable; similarly White Pelicans will congregate on lakes where fish are abundant”.

In addition to the above, there is the issue of bird's exhaustion during migration, especially for those species which cross the Red Sea through the open water between the Sinai Peninsula and the coast where projects like NIAT and RASGHA Wind Farm are planned. Birds leave the opposite coast at a time in the day that they consider appropriate for crossing, but these conditions may change over the route, making the crossing difficult. There may be a point of no return. These flocks may arrive to the other side and need to rest for a while, or it is just too late when arriving to continue the migration on such day.

Roosting and resting birds within the Project area or its surroundings were identified through the following:

- The standard methodology of VP monitoring. During the watches, the visible ground area was scanned thoroughly for any birds, allowing quick spotting of roosting birds in and around the project site.
- Recording and mapping any roosting birds in the Project Area, plus the 2 km buffer zone.
- Annotating any roosting bird observation during travelling time within the study area including travel time from-to Project Area and switching between VPs.
- As seen from the existing information from the RVRSF, some species may roost and others not, which is well known for long time now. Roosting is not a site-specific issue, and it may occur wherever within the Red Sea coast and adjacent areas, subject to species and weather-specific conditions.

### **Issues and Limitations**

Survey limitations existed during the bird monitoring undertaken for the Project. Some of the key limitations and issues include the following:

- The survey technique was based on visual observation, which limits the detectability of birds and getting accurate measurements of flight heights and trajectories.
- The wind farm has not yet been constructed. Without a reference, flying heights could entail some degree of error, especially in the very narrow bands at turbine level.
- Poor mobile phones coverage and weak signal causing communication and coordination problems between field observers, especially in coordinating counts during intense migration times when the network connection is lost.

The collision fatality assessment presented (refer to the impact section) did not take into account the potential collision risk posed by met masts and the existing or planned powerlines in the area

### **Monitoring/Sampling effort (Spring seasons 2021, 2022, and 2026)**

The Project was monitored daily during the migratory seasons: from Feb 20<sup>th</sup> to May 20<sup>th</sup> in 2021, and Feb 20<sup>th</sup> to May 18<sup>th</sup> in 2022, and during spring 2026, for which data for February and March are currently available as discussed previously. The start and end times of daily monitoring were adjusted according to daylight duration and temperature in order to provide adequate coverage of the migration season.

**Table 28: Distribution of the Monitoring Times in Spring 2021, 2022 and 2026**

Spring			
Month	2021	2022	2026
February	300 hr. 39 min	301 hr. 39 min	288 hr. 50 min
March	950 hr. 46 min	1,054 hr. 53 min	995 hr. 23 min
April	819 hr. 59 min	879 hr. 39 min	Pending
May	543 hr. 03 min	667 hr. 24 min	Pending
<b>Total</b>	<b>2,614 hr. 27 min</b>	<b>2,903 hr. 25 min</b>	<b>1,284 hr. 13 min</b>

Whilst the VPs, dates, and month of the monitoring remain constant, the times invested in birdwatching differ between seasons and years. For the spring periods, both February of 2021 and 2022, showed a 4-4.5% monitoring increase compared to 2026. In March 2022 this increase reaches a 6%. Despite these differences may appear small, they have influence in the number of birds recorded and species composition.

A total of twenty eight (28) species have been recorded in the three years 2021, 2022, and 2026. Table 29 shows the bird counts for each species and year, together with IUCN classification status. As commonly occurring in the region, there are two (2) “Endangered” species (Egyptian vulture and Steppe eagle) which appear regularly every spring. There are also three “Vulnerable (VU)”, the Eastern Imperial eagle, Greater Spotted eagle, and the Sooty falcon.

The table remains incomplete, as migration monitoring is still ongoing. As a result, certain species, such as the Honey Buzzard, are not yet represented in the dataset. This is because the species primarily migrates in May, a period for which monitoring data is not yet available. Due to differences in migration timing between species, the available dataset remains limited for comparative analysis at this stage. This is the case for species such as the Black Kite, which migrates between March and May (approximately 10 weeks), with peak passage typically occurring between mid-March and mid-April. A similar limitation applies to species that occur irregularly across monitoring years and sites, such as the Black Stork.

Five or six species, depending on the year, accounted for 97-98% of birds recorded which include the Black Kite, White stork, European Honey Buzzard, Steppe Buzzard and Eagle, and the Levant Sparrowhawk. Refer to the table below for additional details.

**Table 29: Total bird numbers for spring (2021, 2022) and partial data (February – March) for 2026**

Species	Scientific name	IUCN Red List	Birds 21	Birds 22	Birds 26
Black Kite	<i>Milvus migrans</i>	LC	8,517	8,867	13,068
Black Stork	<i>Ciconia nigra</i>	LC	1,496	651	23
Bonelli's eagle	<i>Aquila fasciata</i>	LC	-	1	
Booted Eagle	<i>Aquila pennata</i>	LC	154	190	80
Common Crane	<i>Grus grus</i>	LC	2		
Common Kestrel	<i>Falco tinunculus</i>	LC	40	69	51
Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU	137	94	12
Egyptian Vulture	<i>Neophron percnopterus</i>	EN	58	92	62
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	LC	73	35	5
Honey Buzzard	<i>Pernis apivorus</i>	LC	5,353	9,044	pending
Great White Pelican	<i>Pelecanus onocrotalus</i>	LC	616	523	2,800
Greater Spotted Eagle	<i>Clanga clanga</i>	VU	25	97	3
Eurasian Griffon vulture	<i>Gyps fulvus</i>	LC	-	2	1
Hobby	<i>Falco subbuteo</i>	LC	-	1	-
Lanner Falcon	<i>Falco biarmicus</i>	LC	2	1	1
Lesser Kestrel	<i>Falco naumanni</i>	LC	-	3	-

Species	Scientific name	IUCN Red List	Birds 21	Birds 22	Birds 26
Lesser Spotted Eagle	<i>Clanga pomarina</i>	LC	406	263	745
Levant Sparrowhawk	<i>Accipiter brevipes</i>	LC	6,696	-	-
Long-legged Buzzard	<i>Buteo rufinus</i>	LC	343	221	14
Montagu's Harrier	<i>Circus pygargus</i>	LC	16	6	1
Osprey	<i>Pandion haliaetus</i>	LC	11	16	10
Pallid Harrier	<i>Circus macrourus</i>	NT	6	15	6
Short-toed Snake Eagle	<i>Circaetus gallicus</i>	LC	315	485	238
Sooty Falcon	<i>Falco concolor</i>	VU	2	8	1
Steppe Buzzard	<i>Buteo vulpinus</i>	LC	44,742	45,545	27,090
Steppe Eagle	<i>Aquila nipalensis</i>	EN	5,513	9,353	10,805
Western Marsh Harrier	<i>Circus aeruginosus</i>	LC	19	32	15
White Stork	<i>Ciconia ciconia</i>	LC	71,894	115,479	13,622
<b>Subtotal</b>			<b>148,677</b>	<b>191,121</b>	<b>68,653</b>
Eagle sp.			64	2,402	9
Buzzard sp.			-	1,199	
Raptor sp.			2,044	1,287	13
Falcon sp.			1	13	10
Harrier sp.			-	12	2
<b>Total</b>			<b>2,109</b>	<b>4,913</b>	<b>34</b>

In the spring season, and despite the small increase in the monitoring time from 2021 to 2022 (an increase of 11%), the number of birds increased from 148,677 in 2021 to 191,121 in 2022 (an increase of 28%) and the number of records from 6,197 to 4,408; equivalent to a decrease by of 29%. These are the global numbers, without including the unidentified birds, for which their records were deleted for further analyses, for the reasons explained earlier. Using such numbers for comparison provided similar increases from 2021 to 2022.

#### **Migration Patterns in Spring (Monthly and Hourly Intervals)**

Data recorded at hourly intervals allows comparison between years. Because of the still incomplete spring 2026, comparisons for all species are still not possible. However, an approach is feasible for two of the most abundant species which migrate earlier.

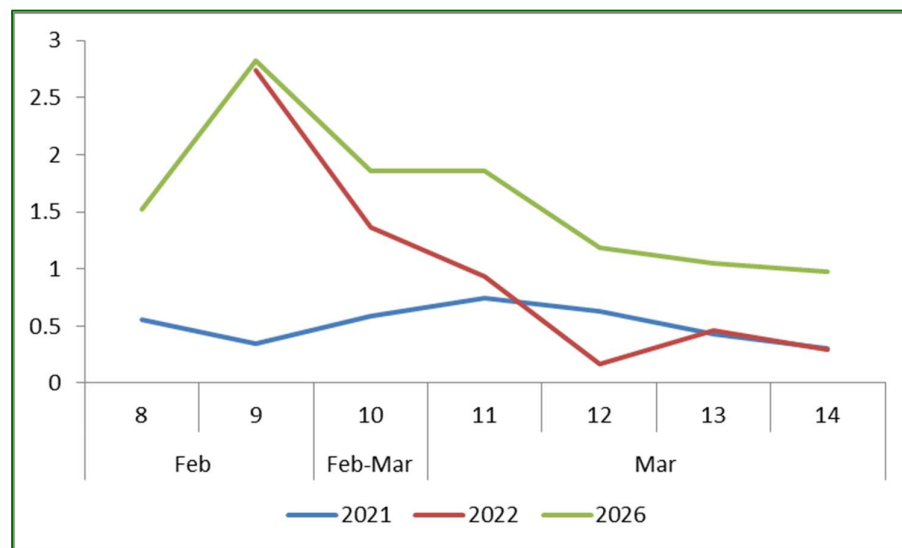
The first species, which shows higher passing rates, is the Black Kite, as presented in Table 30 and Figure 41, with spring 2026 showing much higher rates compared to previous years. The underlying reason for this increase is not yet clear, and there is currently insufficient data from other projects to support a broader comparison. This variation may be related to natural population dynamics or inter-annual variability of the species. It is noted that this pattern is not consistently observed across other species, as discussed in the sections below.



**Figure 41: Passing Rates of the Black Kite according to Hours Intervals and Years**

Figure 42 presents the migration pattern for Steppe Eagle. This species migrates between mid-February and May (approximately 12 weeks), with peak passage generally occurring between mid-March and April. In 2022, higher numbers were recorded in late February, with total counts approximately double those recorded in 2021; a similar pattern is observed in the 2026 dataset to date. According to Shirihai et al. (2000), Steppe Eagle migration typically occurs in two main periods: from late February to mid-March (with a peak in the second week of March), and from the third week of March to early April, with occasional records outside this window (i.e. before February or after 10 May).

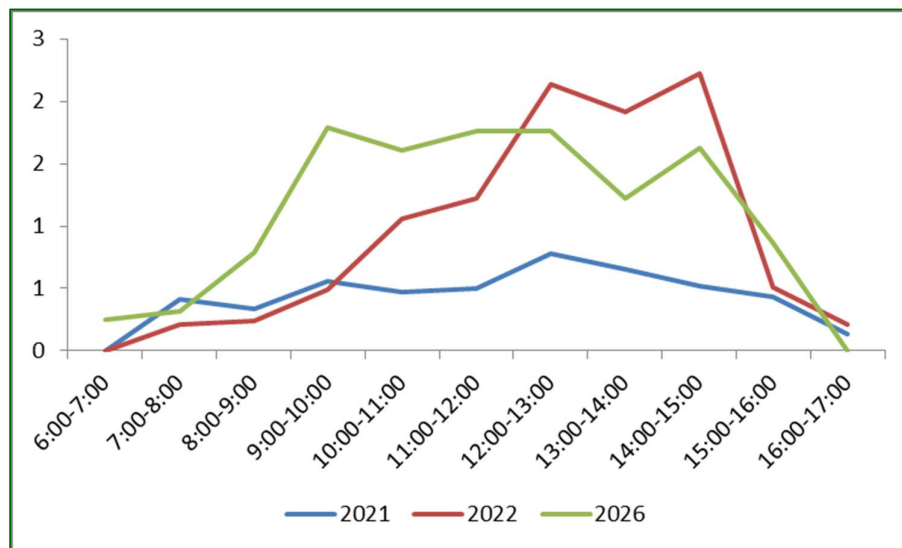
Overall, the data presented in Figure 42 indicate a degree of inter-annual consistency in Steppe Eagle migration patterns, although variability in timing and magnitude is evident between years



**Figure 42: Passing Rate of the Steppe Eagle between February and March 2021, 2022, and 2026**

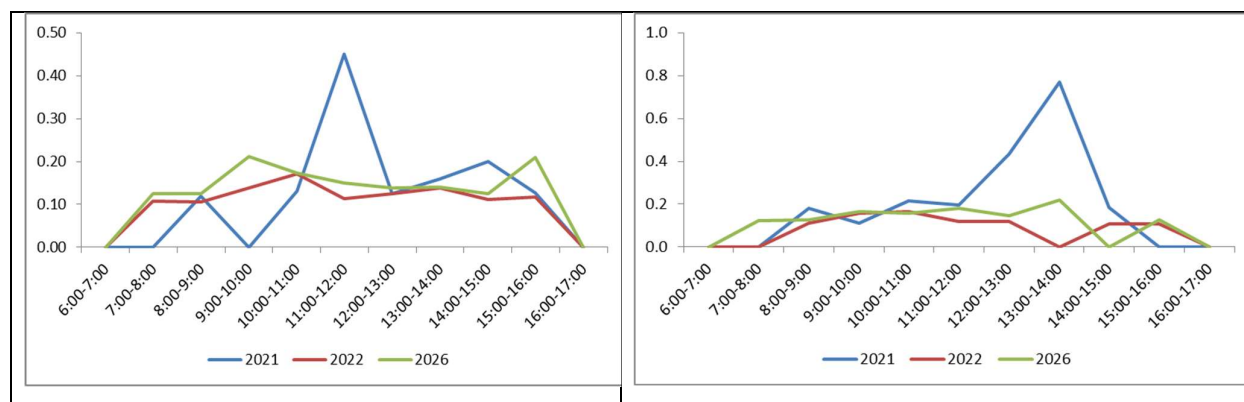
In comparison, Steppe Eagle (Figure 43Error! Reference source not found.) exhibits a combination of the patterns described above. The species shows consistency in hourly passage trends across all monitored years, although higher passing rates were recorded in 2022.





**Figure 43: Passing Rates of the Steppe Eagle according to Hour Intervals and Years**

In contrast to the observed patterns, different temporal trends are evident for species such as Booted Eagle and Egyptian Vulture (Figure 43). Both species exhibit distinct peaks in activity during specific periods of the day; however, these peaks occur at different times. Booted Eagle tends to migrate predominantly during the middle of the day, whereas Egyptian Vulture shows higher activity slightly later. These differences are not considered to be of biological significance, but rather reflect variability in observations across a broader regional context.



**Figure 44: Passing Rates of the Booted Eagle (left) and the Egyptian Vulture (right), according to Hour Intervals and Years**

An important aspect of migratory behavior, linked to the temporal patterns described above, is not only the timing of passage but also flocking behavior (group size). Species differ in their migration strategy, with some migrating individually or in small groups, while others form large or very large flocks. Both factors have implications for impact assessment and mitigation measures, as large flocks may result in a higher number of fatalities in a single event compared to solitary individuals.

Based on observations, species can be broadly grouped according to flock size as follows:

- Species migrating primarily solitary or in very small groups (e.g. Western Marsh Harrier, Pallid Harrier, Short-toed Eagle, Booted Eagle, Osprey, Lesser Spotted Eagle, Greater Spotted Eagle);
- Species migrating in intermediate group sizes (e.g. Steppe Eagle and Black Kite);
- Species forming large groups (e.g. Honey Buzzard and Steppe Buzzard); and
- Species forming very large flocks (e.g. White Stork and Levant Sparrowhawk).

This classification applies irrespective of the frequency of occurrence (i.e. number of days recorded during the monitoring season).

**Table 30: Flocking Behaviour of the Species which have been Recorded in the Spring Seasons in 2021, 2022 and 2026**

Species	2021	2022	2026
Black kite	7.80	9.33	27.80
Black stork	7.77	9.00	2.56
Booted eagle	1.59	1.15	1.27
Common Kestrel	1.08	1.06	1.04
Eastern Imperial Eagle	1.29	1.21	1.00
Egyptian Vulture	2.14	1.24	1.35
Great White Pelican	1.00	22.00	466.67
Greater Spotted Eagle	1.27	2.24	1.00
Lesser Spotted Eagle	1.78	1.76	6.26
Long-legged Buzzard	2.12	1.26	1.00
Marsh Harrier	1.00	1.00	1.07
Osprey	1.00	1.25	1.00
Pallid Harrier	1.00	1.00	1.20
Short-toed Eagle	1.42	1.19	1.34
Sparrowhawk	1.00	1.00	1.00
Steppe Buzzard	23.12	29.88	38.48
Steppe Eagle	4.52	10.62	12.56
White Stork	437.83	261.88	368.16

#### **Monitoring/Sampling effort Autumns Seasons 2021, 2022, and 2025**

The Project footprint was monitored daily from Aug 11<sup>th</sup> to Nov 10<sup>th</sup>. The total monitoring times appear in Table 31.

**Table 31: Monthly and total monitoring times in autumn 2021, 2022 and 2025**

Autumn			
Month	2021	2022	2025
August	745 hr. 01 min	799 hr. 14 min	704 hr. 12 min
September	1,027 hr. 14 min	1,102 hr. 21 min	963 hr. 50 min
October	1,065 hr. 35 min	1,119 hr. 11 min	998 hr. 41 min
November	338 hr. 50 min	361 hr. 16 min	307 hr. 41 min
<b>Total</b>	<b>3,176 hr. 40 min</b>	<b>3,381 hr. 52 min</b>	<b>2,974 hr. 32 min</b>

In autumn twenty-eight (28) species have been recorded globally. They are the same as in any other project in the GoS. Two species (the White Stork and the Honey Buzzard) accounted for 78% of the individuals. Another three (Common Crane, Great White Pelican, Western Marsh Harrier) accounted for 16% of the total numbers of MSBs. These five dominant species comprised 94% of the migratory counts.

According to IUCN Red List of Threatened Species (IUCN, 2021), three (3) are globally threatened. Two (2) species are Endangered – this includes Steppe Eagle and Egyptian Vulture, two (2) are Vulnerable (Imperial eagle and Sooty falcon), while one (1) is Near Threatened – the Pallid Harrier. The remaining species are evaluated as Least Concern. Among the species of conservation concern, the highest was the Steppe Eagle.

Many of the species in the table below (except the kestrels, falcons and the Osprey) are considered as true migratory soaring birds, despite some of them being considered not true soaring birds as they use either flapping or gliding for their displacements (check explanation provided in the spring season for soaring birds). Given the landscape characteristics of the area in general, the entire species pass over the Project area given that the habitat is mostly unsuitable for breeding because of the lack of trees or cliff shelter.

In general, the autumn migration for most of the species is negligible compared to spring.

**Table 32: Species Recorded and Bird Numbers during the Autumn 2021, 2022 and 2025**

Species	Scientific name	IUCN Red List	Birds 21	Birds 22	Birds 25
Black Kite	<i>Milvus migrans</i>	LC	57	75	102
Black Stork	<i>Ciconia nigra</i>	LC	10	-	-
Booted Eagle	<i>Aquila pennata</i>	LC	2	2	-
Common Crane	<i>Grus grus</i>	LC	207	13	66
Common Kestrel	<i>Falco tinunculus</i>	LC	-	30	25
Crested H. buzzard	<i>Pernis Ptilorhynchus</i>	LC			1
Egyptian Vulture	<i>Neophron percnopterus</i>	EN	10	-	-
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	LC	6	11	-
Eastern Imperial eagle	<i>Aquila heliaca</i>	VU			1
European Honey Buzzard	<i>Pernis apivorus</i>	LC	1414	2844	2263
Great White Pelican	<i>Pelecanus onocrotalus</i>	LC	167	305	1570
Eleanora's Falcon	<i>Falco eleonora</i>	LC	2	-	-
Hobby	<i>Falco subbuteo</i>	LC	1	-	-
Lanner Falcon	<i>Falco biarmicus</i>	LC	2	1	-
Lesser Kestrel	<i>Falco naumanni</i>	LC	1	-	-
Lesser Spotted Eagle	<i>Clanga pomarina</i>	LC	4	-	-
Levant Sparrowhawk	<i>Accipiter brevipes</i>	LC	27	37	-
Long-legged Buzzard	<i>Buteo rufinus</i>	LC	10	1	1
Montagu's Harrier	<i>Circus pygargus</i>	LC	10	12	12
Osprey	<i>Pandion haliaetus</i>	LC	-	2	1
Pallid Harrier	<i>Circus macrourus</i>	NT	5	6	11
Short-toed Snake Eagle	<i>Circaetus gallicus</i>	LC	2	-	-
Sooty Falcon	<i>Falco concolor</i>	VU	2	3	3
Steppe Buzzard	<i>Buteo vulpinus</i>	LC	25	35	49
Steppe Eagle	<i>Aquila nipalensis</i>	EN	10	-	6
Western Marsh Harrier	<i>Circus aeruginosus</i>	LC	156	71	37
White Stork	<i>Ciconia ciconia</i>	LC	1274	958	2201
<b>Subtotal</b>			<b>3,404</b>	<b>4,406</b>	<b>6,494</b>
Eagle sp.			-	2	-
Buzzard sp.			-	46	22
Raptor sp.			-	10	96
Falcon sp.			-	4	4
Harrier sp.			-	7	21
<b>Total</b>				<b>69</b>	<b>143</b>

It must be highlighted that two species for which the counts may result in clear underestimations, the Lesser Kestrel and the Common Crane, which has been detected at other sites within the region but not here. Both are also night migrants, when observers are not doing bird counts obviously. In addition, several of the species in

the table above -except the kestrels, falcons and the Osprey- are considered as migratory soaring birds, despite some of them are facultative soaring birds (Panuccio et al. 2021) as they use either flapping or gliding for their displacements.

Finally, the landscape of the Project area is considered to be a bare ground with a plain and undulated area and therefore considered unsuitable features for the different species to roost or breed.

### **Spatial passing per Observation Point**

As previously done for spring, to check if birds used preferably one area or another within the footprint, passing rates were tested to determine if they significantly differ among observation points in 2021 and 2022. The tables below present the mean passing rates per species and VPs. The hypothesis is as follows:

- If there would be preferred passing VPs in the Project area, the highest and lowest passing rates between 2021 and 2022 should be similar or the same at the same VPs.

In autumn not all the species pass through all the VPS. Only three (3) species do this, two (2) in 2021 (Black Kite and Honey Buzzard) and one in 2022 (Honey Buzzard). When comparing the passing rates for these two species between years the following is noted: (i) both had higher passing rates in 2022 compared to 2021, (ii) the OPs with the highest and lowest passing rates are not the same for each species.

**Table 33: Median passing rates (birds/hr) for the species in autumn 2021 (species highlighted in bold are those having significant differences, see text)**

Species	VP1	VP2	VP3	VP4	VP5	VP6	VP7	VP8
Black Kite	0.114	0.152	0.257	0.112	0.237	0.126	0.126	0.181
Black Stork	-	-	0.545	-	-	-	-	-
Booted Eagle	-	0.109	0.110	-	-	-	-	-
Common Crane	19.636	-	3.000	-	-	-	-	-
Eleonora's Falcon	-	-	0.111	0.112	-	-	-	-
Eurasian Hobby	-	-	-	-	0.124	-	-	-
Eurasian Sparrowhawk	0.110	0.110	0.110	-	0.122	-	0.126	-
<b>E. Honey Buzzard</b>	<b>0.733</b>	<b>2.509</b>	<b>1.791</b>	<b>0.844</b>	<b>0.885</b>	<b>0.821</b>	<b>2.671</b>	<b>2.567</b>
Great White Pelican	-	-	11.111	-	-	-	8.553	-
Lanner Falcon	-	-	-	-	0.245	-	-	-
Lesser Kestrel	-	-	-	-	-	0.128	-	-
Lesser spotted Eagle	-	-	0.111	-	-	-	-	0.176
Levant Sparrowhawk	-	-	-	-	-	1.650	-	-
Long-legged Buzzard	0.110	-	0.147	0.140	-	-	-	-
Montagu's Harrier	0.109	-	-	0.110	0.121	0.127	0.128	0.121
Egyptian vulture	-	0.655	0.220	-	-	-	-	-
Pallid Harrier	0.110	0.111	0.111	-	-	-	0.128	-
Short-toed Snake Eagle	-	0.111	0.109	-	-	-	-	-
Sooty Falcon	0.109	0.147	0.110	0.224	0.118	-	0.126	-
Steppe Buzzard	0.150	0.277	0.111	0.224	0.122	0.204	-	-
Steppe Eagle	-	0.110	0.110	-	0.160	0.191	-	-
Western Marsh Harrier	0.109	0.110	7.146	0.110	-	0.127	0.191	0.121
White Stork	-	-	3.715	-	-	1.995	-	-

**Table 34: Median passing rates (birds/hr for autumn 2022 per species and VP.**  
**(Species highlighted in bold are those having significant differences, see text)**

Species	VP1	VP2	VP3	VP4	VP5	VP6	VP7	VP8
Black Kite	0.147	-	-	0.111	0.207	0.293	0.111	0.549
Booted Eagle	0.111	-	-	-	0.111	-	-	-
Common Kestrel	0.129	0.111	0.111	0.111	0.110	0.111	0.111	0.111
Eurasian Crane	1.439	-	-	-	-	-	-	-
Eurasian Sparrowhawk	-	0.139	-	0.111	0.167	0.111	-	-
<b>European Honey Buzzard</b>	<b>1.261</b>	<b>2.832</b>	<b>2.808</b>	<b>1.561</b>	<b>1.072</b>	<b>1.455</b>	<b>1.329</b>	<b>1.772</b>
Falcon Species	0.110	-	0.111	-	0.111	0.111	-	-
Harrier Species	0.107	0.111	0.111	0.111	-	-	-	-
Lanner Falcon	-	-	-	-	-	-	0.111	-
Levant Sparrowhawk	-	-	-	-	4.022	-	-	-
Long-legged Buzzard	-	-	-	0.111	-	-	-	-
Montagu's Harrier	-	-	0.111	-	0.127	0.110	-	-
Osprey	-	-	-	-	-	0.222	-	-
Pallid Harrier	-	-	0.111	0.111	0.111	0.111	-	-
Sooty Falcon	-	-	-	-	0.167	-	-	-
Steppe Buzzard	0.332	0.222	-	0.222	0.167	0.222	-	0.222
Western Marsh-harrier	0.144	0.124	0.108	0.133	0.124	0.135	0.111	0.141
<b>White Pelican</b>	<b>1.882</b>	-	-	-	-	<b>5.840</b>	-	<b>4.217</b>
<b>White Stork</b>		<b>0.220</b>	<b>11.023</b>	<b>18.490</b>	<b>0.111</b>	<b>1.124</b>	-	-

**Table 35: Median passing rates (birds/hr for autumn 2025 per species and VP.(Species highlighted in bold are those having significant differences, see text)**

Species	VP1	VP2	VP3	VP4	VP5	VP6	VP7	VP8
Black Kite	0.175	0.406	1.260	0.249	0.211	-	0.184	0.410
Booted Eagle								
Common Kestrel	0.125	-	0.119	0.136	0.140	0.124	0.156	0.120
Eurasian Crane	-	-	-	-	-	-	-	-
Eurasian Sparrowhawk	-	-	-	-	-	-	-	-
<b>European Honey Buzzard</b>	<b>2.741</b>	<b>2.996</b>	<b>2.045</b>	<b>2.135</b>	<b>2.785</b>	<b>0.708</b>	<b>0.874</b>	<b>2.763</b>
Lanner Falcon	-	-	-	-	-	-	-	-
Levant Sparrowhawk	-	-	-	-	-	-	-	-
Long-legged Buzzard	-	-	-	-	0.125	-	-	-
Montagu's Harrier	-	0.123	0.125	0.127	0.124	0.124	0.123	0.118
Osprey	-	-	-	0.126	-	-	-	-
Pallid Harrier	0.142	0.124	-	0.126	-	0.127	0.125	0.125
Sooty Falcon	0.125	-	-	-	0.124	-	-	-
Steppe Buzzard	0.000	0.125	4.730	0.307	-	0.124	0.125	0.128
Western Marsh-harrier	0.126	0.124	0.124	0.126	0.124	0.124	0.186	0.124
<b>White Pelican</b>	<b>4.642</b>	<b>0.000</b>	<b>17.545</b>	-	<b>5.391</b>	<b>18.634</b>	<b>4.658</b>	<b>24.961</b>
<b>White Stork</b>	<b>37.556</b>	<b>100.00</b>	.	.	<b>12.500</b>	.	<b>87.500</b>	.

From the above analysis that following is concluded:

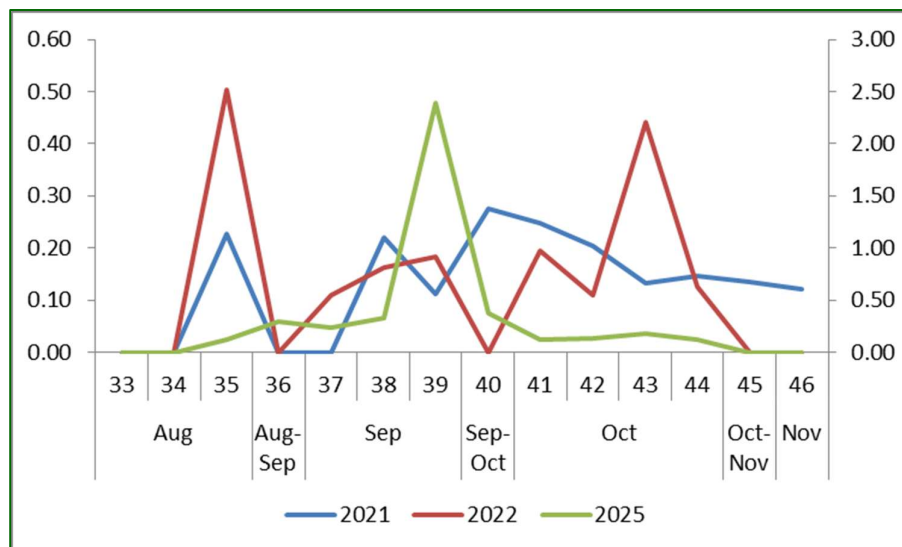


- Not all the species show a passing rate which statistically differs among the VPs. This would mean there is a random passage over the project footprint.
- Birds may pass more frequently (highest passing rate birds/hour of observation) at some VP in one year, but this do not preclude that every single year will be the same.
- The condition above might be reinforced by the gregarious behaviour when flying, e.g. forming large flocks of the Honey Buzzard.
- From the data above, it can be concluded that **the passage of these birds is not the same throughout all years, having different passing rates for each year and VP**. They migrate throughout the site randomly and at least the flock size and year have a major influence on this numbers. These variables would influence the behaviour and migration of a species and thus determine the numbers recorded by the observers at the Project area, but other variables would not be excluded (e.g. weather variables).

### Migration Patterns in Autumn (Weekly and Monthly)

The following figures present representative examples of key migratory species regularly recorded over the Project site during the autumn season, including Black Kite, Honey Buzzard, and White Stork.

Black Kite shows relatively high recorded numbers compared to previous years (e.g. 2021 and 2022). While these higher counts may appear notable, such variation is not unique to the Project site and is consistent with inter-annual variability observed across the region. Although differences are evident between the three years, similar migration patterns are observed between 2022 and 2025.



**Figure 45: Weekly and Monthly Migration (birds/hour) patterns of the Black Kite in 2021, 2022 and 2025**

In contrast, Honey Buzzard and White Stork exhibit more defined and narrower migration windows toward the end of the summer period. Honey Buzzard migration typically occurs between late August and mid-September. White Stork generally migrates earlier within the season; however, a slight delay is observed in 2022 compared to 2025.

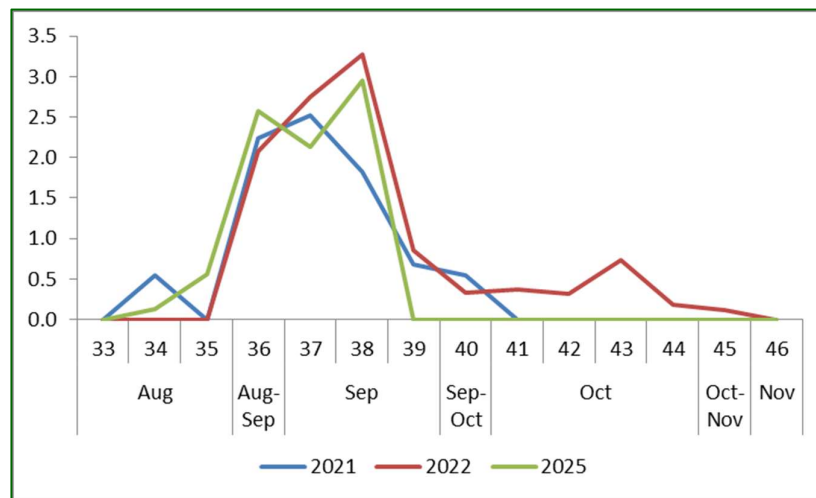


Figure 46: Weekly and Monthly Migration Patterns of the Honey Buzzard in 2021, 2022 and 2025

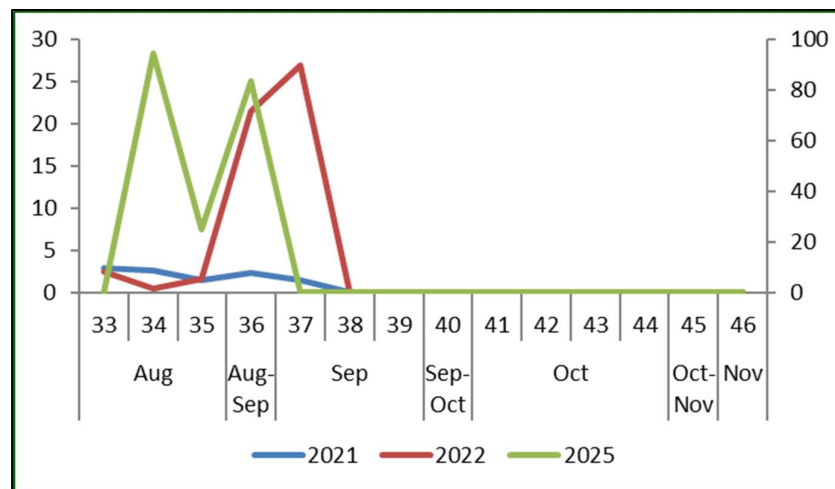
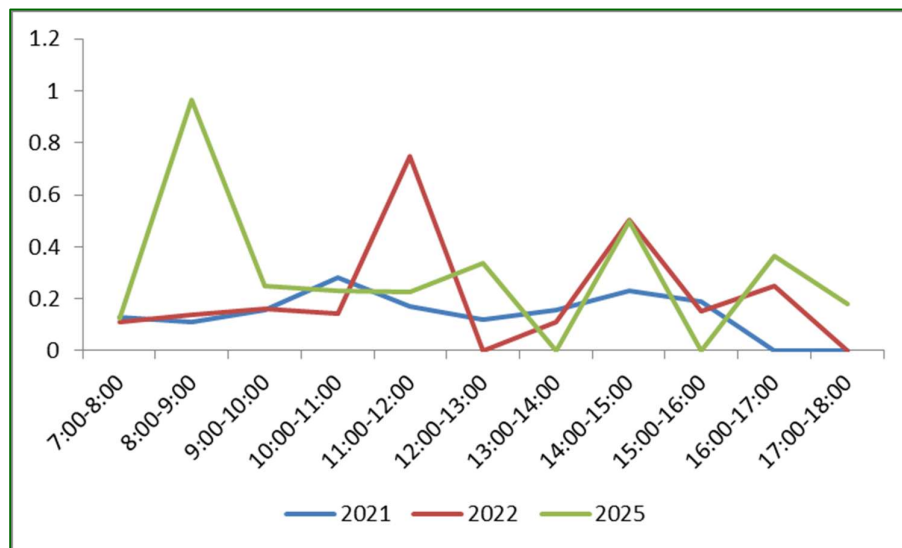


Figure 47: Weekly and Monthly Migration Patterns of the White Stork in 2021, 2022 and 2025

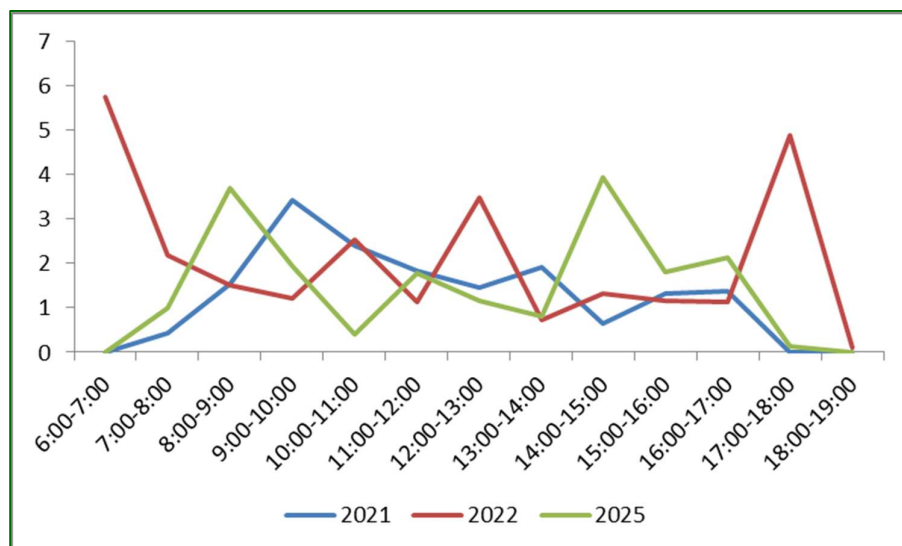
#### Migration Patterns in Autumn (Hourly Intervals)

The migration according to hour intervals differs in trends but extending throughout the day time. There is much inconsistency between years. This irregular passage could be related to the higher fatality rates reported in PCFM reports. The irregular patterns would affect observers when deciding the SDOD, a point which should be subject of further research. Figure 48, Figure 49 and Figure 50 show the trend of the Black kite, the Honey buzzard and the White stork.



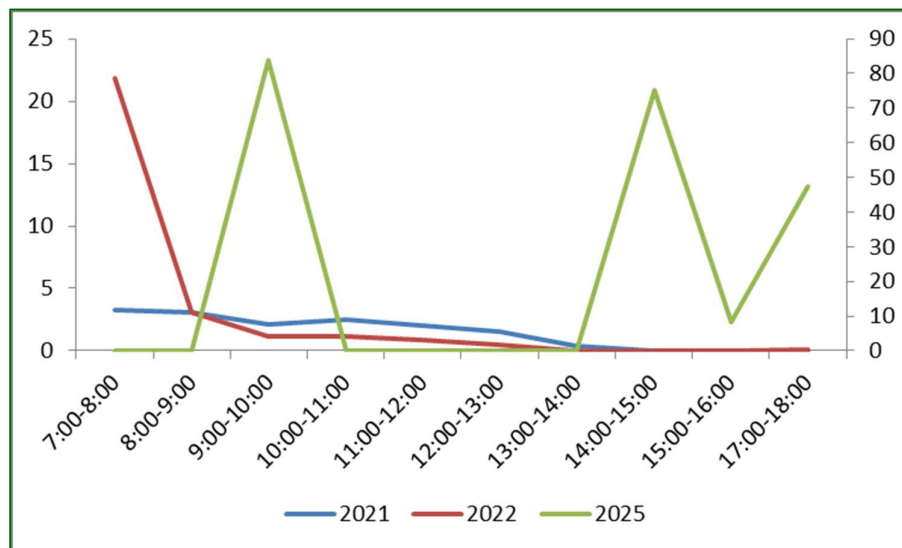
**Figure 48: Hourly Migration Patterns of the Black Kite in 2021, 2022 and 2025**

In 2025, higher numbers of Black Kite were recorded during the early morning, followed by relatively consistent passage throughout the day. A similar, but slightly delayed, trend is observed in 2022, while 2021 shows a more uniform distribution of passage across daylight hours.



**Figure 49: Hourly Migration Patterns of the Honey Buzzard in 2021, 2022 and 2025**

Figure 50 illustrates the migration pattern of White Stork. The observed variability reflects the wide range of flock sizes recorded during the autumn season, combined with a relatively limited number of observations. Records include both small groups and occasional large flocks comprising several thousand individuals, resulting in a high degree of variability in the dataset.



**Figure 50: Hourly Migration Patterns of the White Stork in 2021, 2022 and 2025**

Birds do not change in their ecologies and migration in terms of flocking or preferred flight type. The following groups are identified: species which migrate almost solitary or very small groups (W. Marsh and Pallid harriers, Short-toed and Booted eagles, Osprey, or Lesser Spotted eagles), others with an intermediate group size (Steppe eagle and Black Kite), large groups (Honey and Steppe buzzards), and very large groups (White Stork Levant Sparrowhawk), whatever the frequency of appearance in terms of number of days they are recorded along the monitoring season. The only difference is the route the different species use either in spring or autumn.

Based on the observations, species can be grouped according to flock size as follows:

- Species migrating predominantly solitary or in very small groups (e.g. Western Marsh Harrier, Pallid Harrier, Short-toed Eagle, Booted Eagle, Osprey, Lesser Spotted Eagle);
- Species migrating in intermediate group sizes (e.g. Steppe Eagle and Black Kite);
- Species forming large groups (e.g. Honey Buzzard and Steppe Buzzard); and
- Species forming very large flocks (e.g. White Stork and Levant Sparrowhawk), regardless of their frequency of occurrence during the monitoring season.

**Table 36: Flocking Size for those Species which have been Recorded in the Autumn Season**

Species	2021	2022	2025
Black kite	1.54	2.14	2.68
Great White Pelican	83.50	43.57	82.63
Honey Buzzard	15.20	16.44	18.55
Long-legged Buzzard	1.25	1.00	1.00
Marsh harrier	6.00	1.20	1.06
Montagu's Harrier	1.00	1.09	1.00
Pallid Harrier	1.00	1.00	1.00
Sooty Falcon	1.14	1.50	1.00
Steppe Buzzard	1.47	1.94	4.90
Steppe Eagle	1.25	0.00	1.50
White Stork	15.93	29.03	367.17

### 7.5.2.2 Analysis of the Migration in the Surroundings (Strategic Study 2025 – 2025)

The Strategic Study involved extensive bird monitoring across sixty (60) vantage points (VPs) along the GoS, extending from Hurghada in the south to Zaafarana in the north, and including additional locations along the eastern coast of the GoS. Monitoring was conducted during both the spring and autumn seasons of 2024 and 2025.

For the purpose of comparison with the NIAT and RASGHA Project, a subset of VPs located in the vicinity of the Project site was selected. These include VPs 17, 18, and 19 to the north, and VPs 20, 21, and 22 to the south.

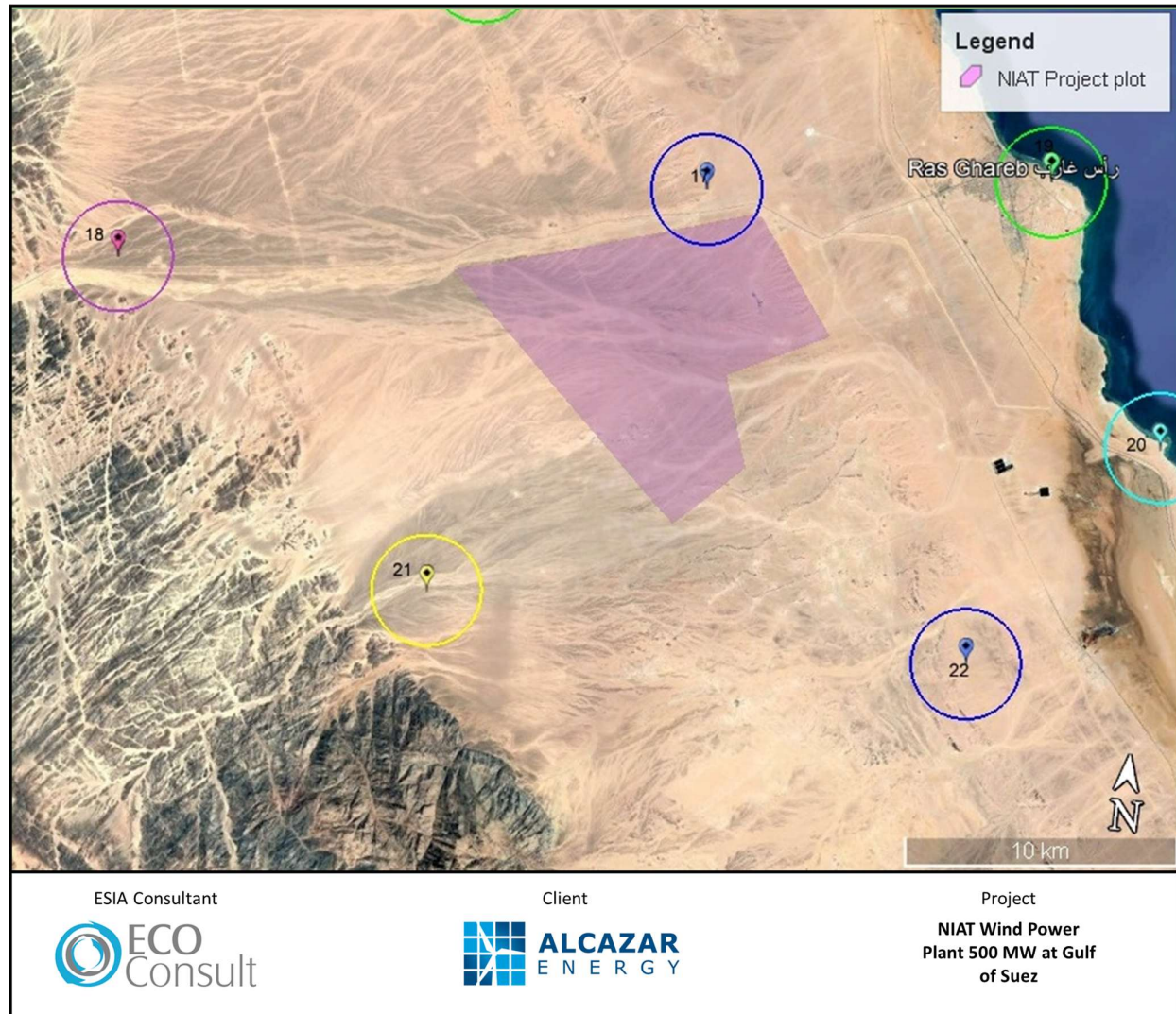


Figure 51: Location of NIAT Project Area in relation to the VPs of the Strategic Study 2024 - 2025

### 7.5.2.3 Baseline Results for Spring (2025)

It is important to note that the distance between the selected VPs, representing different landscape features, is approximately 31 km. These include VPs located close to the mountains (VPs 18 and 21), within the central desert area (VPs 17 and 22), and near the coast (VPs 19 and 20).

Based on previous experience and published evidence on species-specific differences in migration patterns (Camiña et al., 2026), the analysis was stratified into three spatial zones: mountain, central desert, and coastal areas. This approach allows for the assessment of spatial variability in migration behaviour across the wider study area.



Table 37 **Error! Reference source not found.** presents the average passing rates (birds per hour of monitoring), including the associated confidence intervals ( $\pm 95\%$ ), for selected species with sufficient data to enable meaningful comparison between the three zones. The table also identifies whether statistically significant differences exist between these areas. The zone with the highest passing rate for each species during spring 2025 is highlighted.

**Table 37: Average Passing Rates (birds per hour of monitoring) and their respective average intervals  $\pm 95\%$  and Existence of Significant Differences (coloured) among these Areas**

Species	Mountain	Center	Coast	Significant diff.
Black kite	2.52 (1.57-3.45)	1.65 (0.63-2.67)	5.82 (2.52-9.11)	Yes ( $p < 0.05$ )
Steppe buzzard	5.27 (3.57-6.96)	6.20 (4.42-7.97)	14.83 (6.52-23.15)	No ( $p = 0.30$ )
Egyptian vulture	0.30 (0.16-0.43)	0.52 (0.52-0.52)	0.33 (0.00-0.69)	No ( $p = 0.23$ )
White stork	52.13 (0.00-140.65)	70.08 (11.51-128.65)	355.45 (133.59-577.32)	No ( $p = 0.11$ )
E. Sparrowhawk	0.25 (0.24-0.25)	0.25 (0.24-0.26)	0.25 (0.24-0.25)	No ( $p = 0.69$ )
Marsh harrier	0.26 (0.26-0.26)	0.26 (0.11-0.40)	0.25 (0.24-0.25)	No ( $p = 0.34$ )
Booted eagle	0.31 (0.16-0.46)	0.29 (0.20-0.38)	0.28 (0.21-0.35)	No ( $p = 0.57$ )
Short-toed eagle	0.45 (0.30-0.59)	0.56 (0.30-0.86)	0.25 (0.23-0.26)	No ( $p = 0.19$ )
Steppe eagle	1.33 (0.65-43.64)	0.86 (0.65-2.02)	24.91 (6.71-43.64)	Yes ( $p < 0.001$ )
Black stork	0.50 (0.50-0.50)	1.80 (0.65-2.94)	6.61 (0.00-13.72)	No ( $p = 0.46$ )
Great W. pelican	133.33 (133.33)	13.79 (0.65-2.94)	6.61 (0.00-13.72)	No ( $p = 0.44$ )
L-legged buzzard	0.28 (0.23-0.33)	0.32 (0.23-0.40)	0.29 (0.18-0.40)	Yes ( $p < 0.02$ )
Honey buzzard	5.06 (1.68-8.44)	5.12 (0.00-11.56)	14.51 (1.10-27.96)	No ( $p = 0.88$ )
Lesser S. eagle	0.39 (0.26-0.53)	0.42 (0.25-0.60)	0.24 (0.24-0.25)	Yes ( $p < 0.01$ )

The results of the analysis indicate patterns that are consistent with findings reported by Camiña et al. (2026), confirm what has been noted for NIAT. The Steppe eagle shows higher passing rates along the coastal zone, reflecting its migration across the Red Sea in the spring season, particularly in the Ras Gharib–Sinai corridor. In contrast, Long-legged buzzard and the spotted eagles group are more associated with mountainous areas, as supported by satellite tracking data. The species that migrate predominantly individually or in small groups (e.g. Egyptian Vulture, Booted Eagle, Short-toed Eagle, and Marsh Harrier) do not exhibit a clear spatial preference between the three zones. Overall, all the trends through the Strategic study and the flocking behavior is similar to what has been found in the NIAT project.

#### 7.5.2.4 Baseline Results for Autumn 2025

For autumn 2025, concurrent datasets are available from both the Strategic Study and the NIAT and RASGHA monitoring programme, as surveys were undertaken during the same season. **Error! Reference source not found.** Table 38 presents the average passing rates (birds per hour of monitoring), including associated confidence intervals ( $\pm 95\%$ ) and the results of statistical comparisons between spatial zones (mountain, central, and coastal areas) for the Strategic Study.

**Table 38: Average Passing Rates (birds per hour of monitoring) and their Respective Average Intervals  $\pm 95\%$  and Existence of Significant Differences among these Areas**

Species	Mountain	Center	Coast	Significant diff.
Black kite	0.00 (0.00-0.00)	0.50 (0.00- 3.67)	1.58 (0.00- 6.29)	n.a.
Steppe buzzard	0.50 (0.50-0.50)	0.26 (0.50-0.50)	0.34 (0.20-0.50)	No ( $p = 0.29$ )

White stork	0.00 (0.00-0.00)	1282.79 (0.00-17422.5)	174.02 (0.00-371.50)	n.a.
Marsh harrier	0.25 (0.25-0.25)	0.50 (0.00-1.06)	0.33 (0.00 -0.69)	No (p = 0.40)
Great W. pelican	0.00 (0.00-0.00)	64.60 (8.30- 120.92)	127.06 (0.00-343.80)	n.a.
Honey buzzard	0.75 (0.75-0.75)	0.46 (0.00- 0.87)	5.08 (1.90-8.24)	No (p = 0.08)

The Strategic Study recorded a total of fifteen (15) species during autumn 2025, while seventeen (17) species were recorded within the NIAT and RASGHA study area, representing a difference of two species only.

A comparison of passing rates was undertaken for species with sufficient data, as presented in Table 39. **Error! Reference source not found..** This table provides the median passing rates per species for both the Strategic Study and the NIAT and RASGHA site, together with the results of the Mann–Whitney U test. The results indicate that, for five (5) out of the eight (8) species where statistical comparison was possible, higher passing rates were recorded within the NIAT and RASGHA site. In contrast, higher passing rates were recorded in the Strategic Study for Steppe Buzzard and Great White Pelican, while similar passing rates were observed for White Stork across both datasets.

**Table 39: Comparison of Specific Median Passing rates (birds/hour) for those Species with enough data in the Autumn Season.**

Species	Strategic study	Alcazar site	Differences
Marsh harrier	0.258	0.124	Yes (> NIAT)
Black kite	0.750	0.142	Yes (> NIAT)
Honey buzzard	1.750	0.861	Yes (> NIAT)
Montagu's harrier	0.250	0.124	Yes (> NIAT)
Osprey	0.250	0.126	n.a.
Pallid harrier	-	0.125	n.a.
Common kestrel	0.261	0.125	Yes (> NIAT)
Common crane	7.660	2.788	n.a.
Glossy ibis	2.630	-	n.a.
Steppe buzzard	0.261	0.125	Yes (> Strategic)
Great white pelican	38.750	7.500	Yes (> Strategic)
Eleanora's falcon	0.261	-	n.a.
White stork	37.500	50.000	NIAT = Strategic

It is noted that differences in monitoring effort between the two datasets may influence the observed results. The Strategic Study typically involved approximately 122–123 hours of monitoring per VP per season (between August and early November), whereas the NIAT and RASGHA monitoring programme involved substantially higher effort, ranging between approximately 369–373 hours per VP.

In addition, the Strategic Study included breaks between observation periods and a wider spatial distribution of VPs, which may reduce detectability compared to the more continuous and site-focused monitoring approach applied at NIAT and RASGHA. These factors should be considered when interpreting the comparative results, and further evaluation will be undertaken following completion of the spring monitoring dataset.

### 7.5.2.5 The Dumpsite

Dumping sites may pose a threat for bird conservation if not properly managed<sup>8</sup>. Also, if placed near wind farms may increase risk for birds. Because of the presence of the Ras Gharib rubbish dump within the NIAT and RASGHA footprint was selected as a potential attraction site for MSBs during migration. Because of that, a fit for purpose monitoring was developed during 2021 and 2022.

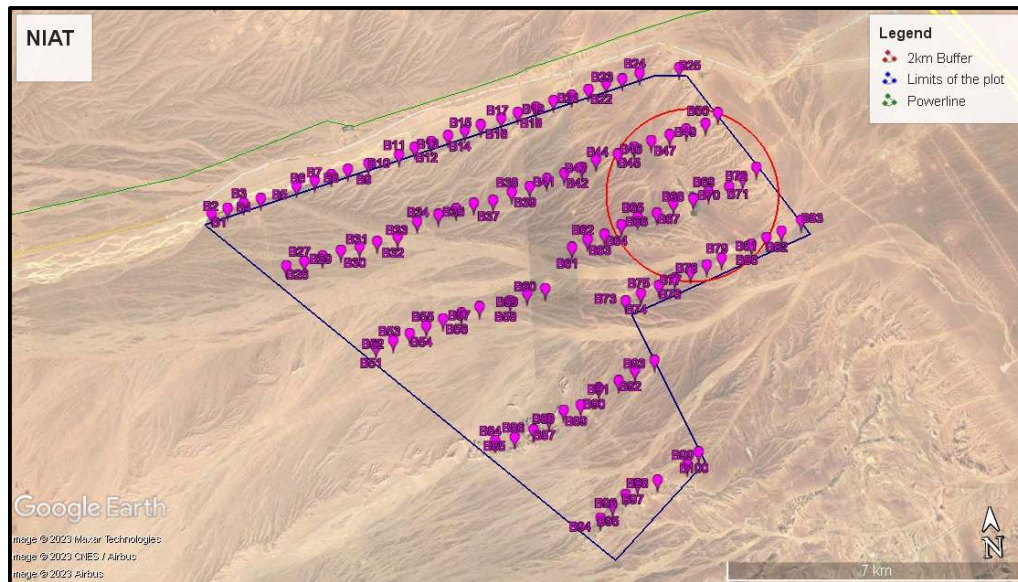


Figure 52: Location of the landfill within the project footprint and wind turbines

### Results

Due to this, as noted earlier, regular visits were made in 2022 as part of the methodology to the dumpsite. Total counts for every species were made and included in a database—this is separate from those taken at VPs. The maximum number of individuals per species was considered each week during the migratory season. Overall, the dumpsite was used by eight (8) species and 2,723 individuals, with the Steppe Eagle and the White Stork being the most abundant, accounting for 81.5% and 16.5% of the observed birds, respectively.

Results here belong to the year 2022. We have to take into account that VP3 and VP6 are within the observation radius of the dumpsite. Other species were recorded, but in very low numbers, including Black Kite, Common Kestrel, Western Marsh Harrier, Steppe and European Honey Buzzard, and Osprey. The figures below show the trend of migratory counts of Steppe Eagle and White Stork at the OPs compared to counts at the dumpsite.

The site clearly acts as a stopover site for these species. The pattern is exactly the same for the Steppe Eagle (9 to 54 eagles recorded at the dumpsite), and slightly different for the White Stork (1 to 382 birds). It seems that storks may stay longer than eagles, using the dumpsite for an extended period.

As demonstrated in several studies, interaction between dumpsites and wind energy may increase collision risk for certain species. Given the close proximity of this site to the turbines, relocation of the rubbish dump is highly recommended (this is discussed in further detail in Section 7.9.6).

<sup>8</sup> Martín, J., Garrido, J.R., Camiña, A, 2015. Best Waste Management practices for preserving MSBs across the RVRSF. Prepared for Birdlife International.

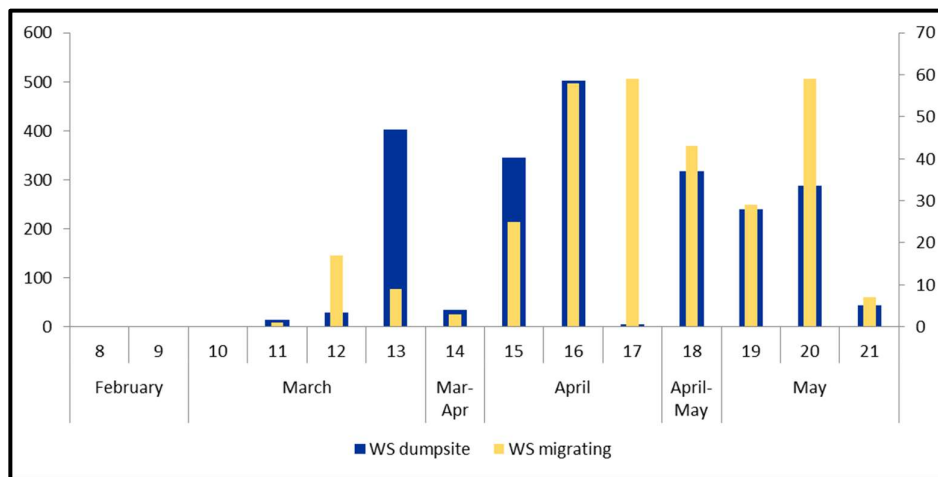


Figure 53: Pattern of White Stork Numbers Migrating through VPs (left axis) and Birds at Dumpsite (DS)

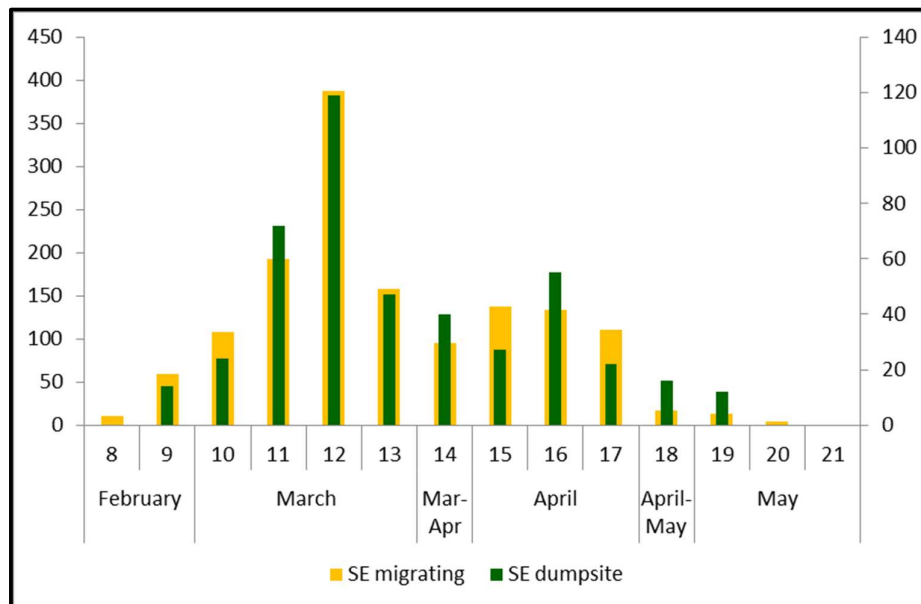


Figure 54: Pattern of Steppe Eagles Numbers Migrating through VPs (left axis) and Birds at Dumpsite (DS)

There is a strong relationship between the passing times for the Steppe eagle and the White Stork and their presence at the dumpsite. If we remember, the highest bird passing rate was detected at OP3; thus, the dumpsite would play a crucial role as stopover site for the White Stork increasing the number of birds landing there or even staying for a while. In addition to this, there were six observations of White Storks from OP3 and OP6 landing and staying on the ground (70, 44, 100, 320, 1, and 1 individual).

The dumpsite falls within the planned road infrastructure of the project. The road access will run through the site, so the expected works will remove definitively the rubbish from the site. In this regard, it is essential the role of the Ras Gharib City Council, which supports the project in all aspects requiring permissions. In addition, the Council is also responsible for supervision and follow-up for monitoring compliance to environmental requirements along with EEAA and Red Sea Governorate, and also has overall responsibility for solid waste management and disposal within their area of influence.

## 7.6 Bats

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to bats.

### 7.6.1 Baseline Assessment Methodology

The baseline assessment of the Project site was based on a literature review and a dedicated bat acoustic survey undertaken between May and October 2025. The literature review drew on previous studies, data, surveys, and records available in published scientific papers, books, and journals on bats of Egypt and the Gulf of Suez (Qumsiyeh, 1985; Osborn, 1988; Hoath, 2003; Benda & Ševčík, 2020). The conservation status of the bat species is based on the IUCN Red List of Threatened Species (IUCN, 2020) and the Egyptian Mammal Red List (Basuony et al., 2010).

The acoustic survey was conducted by Safe Soar on behalf of Alcazar Energy (Amr, 2026). Four stationary stations equipped with Song Meter SM4BAT FS Ultrasonic Recorders were deployed across the Project site from 27 May to 19 October 2025.

Station locations are presented in Table 40 below. A total of 75,581 recorded files were analysed using Anabat Insight and Batexplorer software.

**Table 40: Bat Detector Station Locations**

Station	Latitude	Longitude
1	28.334188	32.987665
2	28.293332	32.998174
3	28.257510	32.968508
4	28.283854	32.930107

### 7.6.2 Results

#### ■ Literature Review

Based on literature, a total of 22 bat species are found in Egypt as a whole. Out of which, at least ten species are known to have a presence within the Project site and its vicinity as part of their distribution range. In addition to those ten species, there are at least four more species that have their distribution range adjacent to the area of Gulf of Suez. All ten species listed in the literature are species of Least Concern according to the IUCN Red List of Threatened Species, see table below.

**Table 41: List of Bat Species Recorded in Project Site and Vicinity Based on Literature Review**

Family	Scientific name	Common name	IUCN Red List of Threatened Species (IUCN, 2020)
Hipposideridae	<i>Allesia tridens</i>	Geoffroy's Trident Leaf-nosed Bat	Least Concern
Nycteridae	<i>Nycteris thebaica</i>	Cape Long-eared Bat	Least Concern
Vespertilionidae	<i>Pipistrellus kuhlii</i>	Kuhl's Pipistrelle	Least Concern
	<i>Pipistrellus rueppellii</i>	Ruppel's Pipistrelle	Least Concern
	<i>Nycticeinops schlieffeni</i>	Schlieffen's Bat	Least Concern
	<i>Hypsugo ariel</i>	Desert Bat	Least Concern
	<i>Cnephaeus bottae</i>	Botta's Serotine	Least Concern
Rhinopomatidae	<i>Rhinopoma microphyllum</i>	Greater Mouse-tailed Bat	Least Concern
	<i>Rhinopoma cystops</i>	Egyptian Mouse-tailed Bat	Least Concern
Emballonuridae	<i>Taphozous nudiventris</i>	Naked-rumped Tomb Bat	Least Concern

#### ■ Acoustic Survey Results



Of the 75,581 files analysed over the study period, bat calls were confirmed on only two dates: 34 calls of *Hypsugo ariel* were recorded on 22 September 2025, and 46 calls of *Taphozous nudiventris* were recorded on 5 October 2025, giving a total of 80 confirmed bat call files. No bat activity was recorded on any other date across the entire survey period. Both species were confirmed through spectrogram analysis, with call parameters falling within the known echolocation ranges for each species.

Both recorded species are listed as Least Concern at the global level according to the IUCN Red List (IUCN, 2020). However, both *Hypsugo ariel* and *Taphozous nudiventris* are listed as Vulnerable (VU) in the Egyptian Mammal Red List (Basuony et al., 2010).

The acoustic survey findings are consistent with the literature review conclusions. Bat activity across the Project site was very limited, with confirmed detections on only two days out of nearly five months of continuous monitoring. The study area is characterized by the absence of vegetation cover capable of supporting insect populations on which bats feed; only ground-dwelling insects such as grasshoppers and beetles were observed, and flying insect activity was very low throughout the survey period. No caves or suitable bat roosting structures were identified within the Project site during field surveys.

The low level of bat activity recorded is consistent with the arid, sparsely vegetated character of the site, which does not support conditions favorable for regular bat foraging or roosting. The two recorded species — *Hypsugo ariel* and *Taphozous nudiventris* — appear to be transient visitors rather than resident or regularly foraging bats within the Project area. Potential roosting habitat may exist in the mountainous areas to the west of the Project site, outside the wind farm footprint.

## 7.7 Archaeology and Cultural Heritage

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to archaeology and cultural heritage.

### 7.7.1 Baseline Assessment Methodology

The baseline assessment of the Project site was based on a literature review and a field survey, each of which is discussed below.

#### ▪ Literature Review

Literature review included a comprehensive review of archives, publications, and studies on previous archaeological and cultural heritage work and surveys undertaken in the area, and which are available through desktop review as well as through the Red Sea Antiquities Inspection Office and Suez Antiquities Inspection Office. Such literature review included information available through the French Institute for Oriental Archaeology, French Institute in Cairo, and data published by the French mission working at in Sukhna city.

#### ▪ Field Survey

A field survey was undertaken in 2021 by an archaeology and cultural heritage expert. The objective of the field survey was to ascertain the presence of any surface archaeological or cultural heritage remains within the Project site. The survey was undertaken to cover the entire Project site boundary. The surface area was walked by the expert in order to inspect the entire ground surface. Where any sites of interest are recorded the following would be undertaken:

- Sketch plans and /or a photograph as appropriate;
- Global Positioning System (GPS) coordinates for the area; and

- Undertake an analysis to categorize the sites and archaeological features and making an assessment of their significance.

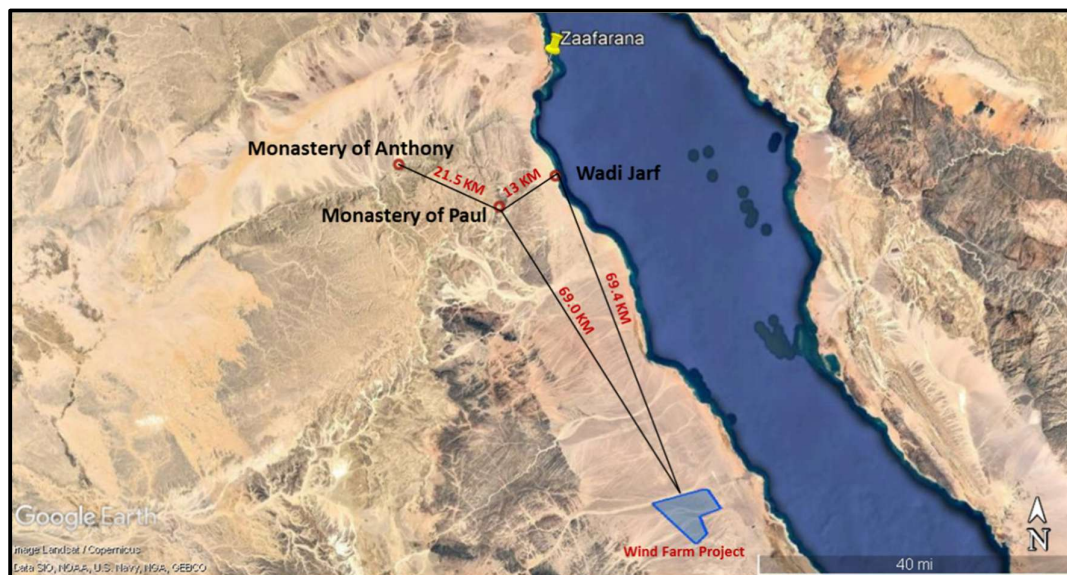
### 7.7.2 Results

This section presents the results in accordance with the methodology discussed above. Based on the literature review, it is concluded that there are no registered archaeological sites within the Project area itself and the area adjacent to the Project site. The closest sites that are considered of great archaeological, historical and cultural heritage value are described in the table below and presented in the figure that follows.

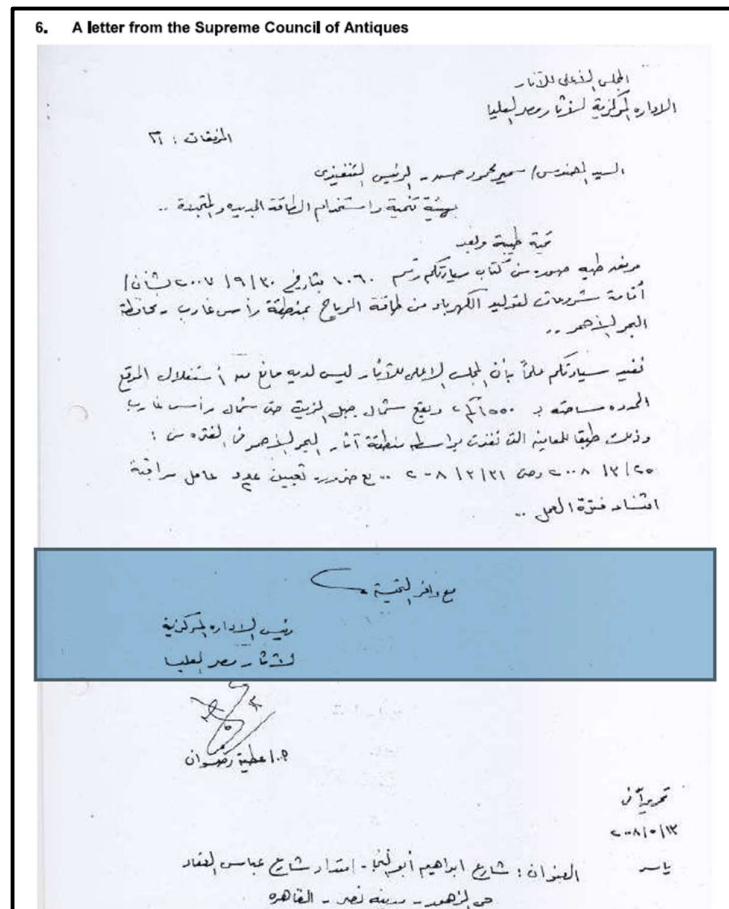
It is important to note that in 2008, an official letter has been issued by the Supreme Council of Antiquities (SCA) to NREA which states that the SCA has no objection on the development of wind farms within the NREA concession area allocated for wind energy developments. The official letter is presented in the figure below.

**Table 42: Nearest Archaeological Sites**

Site	Description	Distance
Wadi Jarf / Red Sea coast	A harbour complex which was used regularly during the second half of the Old Kingdom and the Middle Kingdom (from 2550 to 1700 B.C.E.). It was used by the expeditions seeking turquoise and other products from south Sinai. Moreover, it's also known for its very famous Wadi Jarf papyrus which dates to the reign of king khufu and which describes the organization of labour under the supervision of their leader Merer who recorded the diary of the mission on a long papyrus sheet.	69km to the north
Saint Anthony Monastery (Deir el Qidis Antun)	Saint Anthony's disciples founded the monastery between 361 and 36 (Starkey.2012:205)	88km to the north
Saint Paul Monastery (Deir el Qidis Bulus):	The monastery is located in front of mount el galala. The caves in this area which was used by Christian monks who used the limited resources available in the harsh desert for living, while the cave and chapel of Saint Paul in particular were considered the base for the current monastery (Starkey.2012: 207).	70km to the north



**Figure 55: Location of Closest Archaeological Sites to the Project Area**



**Figure 56: Letter Issued by SCA**

## 7.8 Air Quality and Noise

This section provides an assessment of baseline conditions within the Project site and surroundingss in relation to air quality and noise.

### 7.8.1 Baseline Assessment Methodology

Assessment of baseline conditions was based on an onsite air quality and noise monitoring program undertaken at the Project site in 2021.

In addition, updated baseline noise monitoring was undertaken in March 2026 at selected Noise Sensitive Receptor (NSR) locations to support the operational noise impact assessment. Additional details are discussed below.

**Noise and Air Quality Survey - 2021**

(i) *Selection of Parameters*

Monitoring was undertaken for the following parameters: (i) gases, including Carbon monoxide (CO), Sulphur Dioxide (SO<sub>2</sub>) and Nitrogen Dioxide (NO<sub>2</sub>), Ozone (O<sub>3</sub>), Total Volatile Organic Compounds (TVOC), (ii) Suspended Particulate Matter, including Total Suspended Particulate (TSP) and Respirable Particulates (i.e. Particulate Matter smaller than 10.0 (PM<sub>10</sub>) and 2.5 microns (PM<sub>2.5</sub>) in diameter); and (iii) Noise Pressure Levels (NPL). These parameters were selected based on the following rationale:

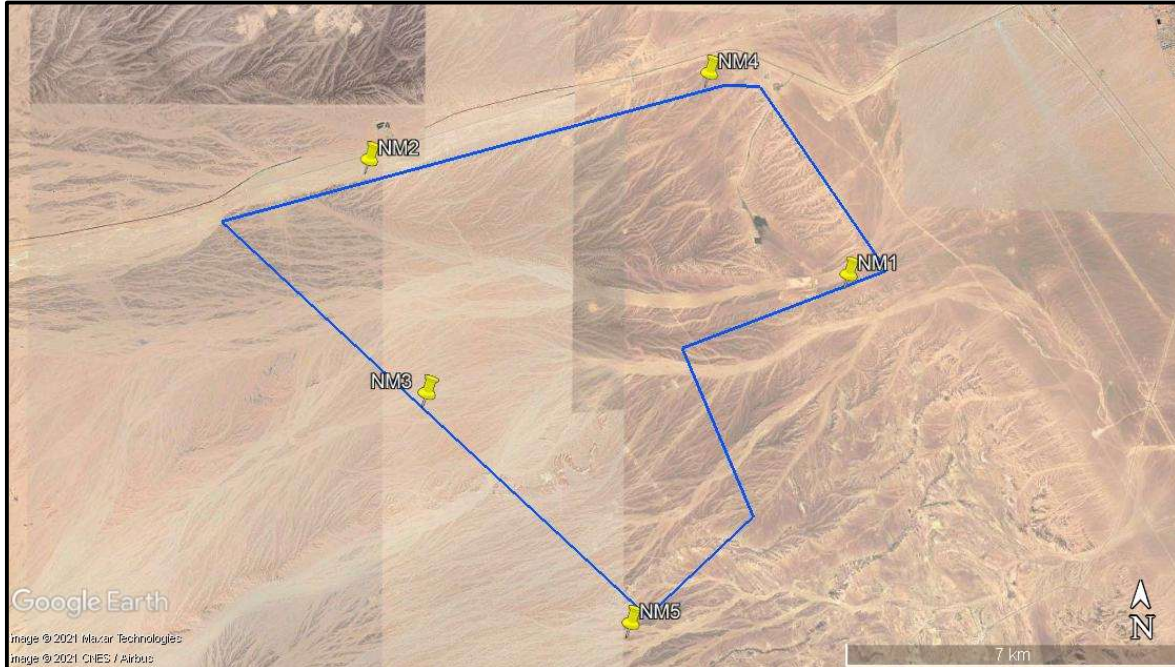
- Such parameters are likely to be present within the Project site given its characteristic and attributes. Suspended particulate matter is expected given the barren nature of the site. On the other hand, pollutants (such SO<sub>2</sub>, NO<sub>2</sub>,) are expected onsite but rather at minimal concentrations as the site is relatively in a remote area; nevertheless, motor emissions particularly from vehicles passing casually through the site (or from the main road) could be a source of such pollutants. Finally, noise levels are expected from vehicular movement and to some extent from onsite and surrounding areas and activities.
- Such parameters are likely to be affected mainly during the Project's construction and operational activities. All air pollutant parameters selected are expected to be slightly impacted and increase specifically during the Project's construction activities. Emissions from vehicles and machinery used onsite and their movement onsite will increase gaseous emissions, suspended particulate matter, as well as noise pressure levels.

(ii) Selection of Locations

To assess the air quality and noise baseline conditions within the Project area, 4 monitoring points were selected as shown in the figure below that were distributed throughout the site. Monitoring was undertaken for 24 hours at each point respectively. The coordinates for the monitoring points and location are presented in the table and figure that follows.

**Table 43: Location of Monitoring Points**

Locations	Latitude	Longitude
NM1	28°17'47.50"N	33° 0'46.93"E
NM2	28°19'3.64"N	32°54'38.33"E
NM3	28°16'26.06"N	32°55'23.45"E
NM4	28°20'3.30"N	32°58'59.16"E
NM5	28°13'51.13"N	32°58'0.90"E



**Figure 57: Location of Monitoring Points**

(iii) Legislative Requirements

With regards to air quality, the results of the measurements were compared to the national limits as set within Annex 5 of the Executive Regulation (D1095/2011) for ambient air quality. The table below identifies the



corresponding applicable national ambient air quality permissible limits. The limits included for 'industrial' areas were used for comparison given the industrial nature of the site that includes petroleum activities and wind farms.

**Table 44: Applicable National Ambient Air Quality Permissible Limits (Annex 5 of the Executive Regulation (D1095/2011) for ambient air quality)**

Pollutant	Location	Maximum Limit ( $\mu\text{g}/\text{m}^3$ )			
		1 Hour	8 Hours	24 Hours	1 Year
Sulphur Dioxide ( $\text{SO}_2$ )	Urban	300	---	125	50
	Industrial	350	---	150	60
Carbon Monoxide (CO)	Urban	30 $\text{mg}/\text{m}^3$	10 $\text{mg}/\text{m}^3$	---	---
	Industrial	---	---	---	---
Nitrogen Dioxide ( $\text{NO}_2$ )	Urban	300	---	150	60
	Industrial	300	---	150	80
Total Suspended Particles (TSP)	Urban	---	---	230	125
	Industrial	---	---	230	125
Respirable Particulates ( $\text{PM}_{10}$ )	Urban	---	---	150	70
	Industrial	---	---	150	70
Solid Particulates < 2.5 $\mu\text{m}$	Urban	---	---	80	50
	Industrial	---	---	80	50

With regards to noise, the results were compared to the national limits set in Annex 7 of the Executive Regulation (D710/2012) for the 'Day' and 'Night' intervals. The table below lists the different area classifications and their corresponding applicable permissible limits for noise. Similarly, the limits included for 'industrial' areas were used for comparison given the industrial nature of the site that includes petroleum activities and wind farms, which is set at 70dB(A) for both night and day.

**Table 45: Applicable National Permissible Limits for Noise (Annex 7 of the Executive Regulation (D710/2012))**

Type of Area	Permissible Limit for Noise Intensity [dB (A)]	
	Day (7 am to 10 pm)	Night (10 pm to 7 am)
Sensitive areas to noise	50	40
Residential suburb with low traffic and limited activities service	55	45
Residential areas in the city and have commercial activities	60	50
Residential areas are located on roads less than 12 m and have some workshops or commercial activities or administrative activities or recreational activities ... etc.	65	55
Residential areas located on roads equal or more than 12 m, or industrial zones with light industry and some other activities	70	60
Industrial areas (heavy industries)	70	70

## 7.8.2 Results

### Noise and Air Quality Survey - 2021

#### (i) Air Quality

The tables below present the overall results for the air quality monitoring that was undertaken. As noted in the tables below, at all monitoring points and for all parameters monitored, the results are significantly lower than the maximum allowable ambient air levels indicated within the legal limits.

In particular, there was no key source of pollutant emissions or activities throughout the monitoring period which could affect or impact air quality levels as presented in the table below – for example no ongoing burning activities were undertaken at the dumpsite (refer to Section 7.9.6) which could affect results of NM1 in particular.



**Table 46: Ambient Air Quality Measurements Results (24 hours)**

Parameter in $\mu\text{g}/\text{m}^3$		(CO)	(SO <sub>2</sub> )	(TSP)	(PM <sub>10</sub> )	(PM <sub>2.5</sub> )	O <sub>3</sub>	NO <sub>x</sub>	TVOC
Concentrations ( $\mu\text{g}/\text{m}^3$ )	NM1	0	10.30	40	28	8	260	33.47	5.23
	NM2	0.49	10.30	58	46	20	385	14.61	8.94
	NM3	0.45	10.30	40	28	8	273	26.44	5.23
	NM4	0.34	10.30	49	38	13	364	15.53	6.23
	NM5	0	10.30	40	28	8	260	33.47	5.23
National Maximum Permissible Limits ( $\mu\text{g}/\text{m}^3$ )		-	150	230	150	-	-	-	-
International Maximum Permissible Limits ( $\mu\text{g}/\text{m}^3$ ) - IFC		-	125	-	150	75	-	-	-

**(ii) Noise**

The following tables present the overall results for the noise monitoring that were undertaken. As noted in the tables below, the results for Monitoring Points NM1, NM2, NM3 and NM5 exceed the national and IFC allowable limits at day time. Additionally, all monitoring points exceed both National and IFC limits during night time.

No key source of noise emission or activity were noted throughout the monitoring period. Therefore, the exceedance of noise levels is mainly attributed to the intensity and speed of the wind at the measurement sites, despite efforts to mitigate the effect of wind speed on measurements.

**Table 47: Outcomes of Ambient Noise at the Respective Monitoring Point**

Maximum permissible noise level limits		
Point #	Day Time (7:00am-10:00pm)	Night Time (10:00pm-7:00am)
NM1	82.8	83.56
NM2	70.95	70.34
NM3	79.13	81.47
NM4	62.51	69.75
NM5	76.13	78.57
National limits (LAeq/dBA)	70	60
IFC limits (LAeq/dBA)	70	70

**7.9 Infrastructure and Utilities**

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to infrastructure and utility.

### 7.9.1 Baseline Assessment Methodology

Assessment of baseline conditions was based on an onsite survey undertaken for the Project and surrounding areas as well as consultations with relevant entities that are managing such infrastructure and utility elements as applicable. The survey was completed in 2021 and partially repeated in 2026 to verify a few points identified on Google Earth. Additional details are discussed below.

### 7.9.2 Civil and Military Aviation

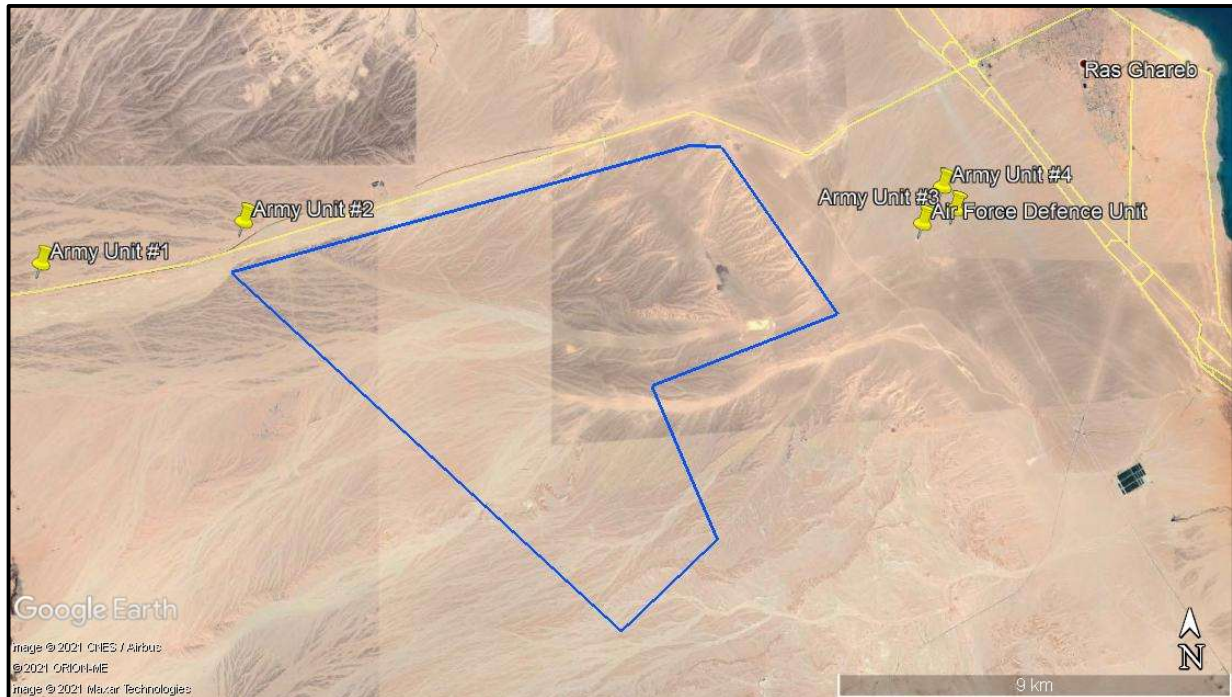
Based on a survey undertaken for the Project area and its surroundings, five (5) military posts have been identified as noted within the table and figure below.

No detailed information could be obtained on the military posts and air force defence unit and whether they include any radar systems in specific.

The 300km<sup>2</sup> Strategic ESIA states that the area has already been cleared by the Ministry of Defence. However, the approval has not been provided or included within the ESIA. Therefore, it could not be verified if such an approval includes no-objection from Egyptian Armed Force/Air Force Unit as well as the Egyptian Civil Aviation Authority.

**Table 48: Location of Military Posts**

Point	Latitude (N)	Longitude (E)	Description of the land use
1	28.307287°	32.834600°	Army unit #1 that is likely to be active. However, no additional details could be obtained from the unit.
2	28.316020°	32.882035°	Army unit #2 that seems to be abandoned. However, no additional details could be obtained from the unit.
3	28.315553°	33.040814°	Air defence unit that seems to be active. However, no additional details could be obtained from the unit.
4	28.318479°	33.048392°	Army unit #3 that is likely to be active. However, no additional details could be obtained from the unit.
5	28.323128°	33.045500°	Army unit #4 that is likely to be active. However, no additional details could be obtained from the unit.



**Figure 58: Project Site and Army Units**

### 7.9.3 Radio, TV and Telecommunication Infrastructure

Based on the survey undertaken in 2021 for the Project area and its surrounding, two (2) telecommunication towers were identified. Those belong to Orange and Etisalat with a height of about 70m. Those are located around 500m to the north of the Project site.

During the site visit undertaken in 2026, a total of three (3) telecommunication towers were identified within the same area, indicating the addition of one tower since the earlier assessment. These towers remain located in the same general vicinity to the north of the Project site as indicated in the figure and table below.

As discussed previously under “Section 4.5”, the ESIA team held meetings with officials from telecommunication companies back in 2021 in Egypt, including Vodafone, Etisalat and Orange. The officials explained that the presence of telecommunication towers in the region means that there are other towers in the area that are connected through microwave connections through Lines of Sight (LoS). However, LoS connections could not be provided and it was explained that this can be provided as it will require a site visit that needs to be undertaken but it must be requested through a formal letter to be submitted. They stated that in general, LoS needs to be free from any obstacle along with a buffer of 30m to maintain the effectiveness of the network and the continuity of the connection.

The ESIA Consultant established communication with the Ministry of Communication, who stated that following up on this issue should be through the NTRA, as the national authority responsible for regulating and administering the telecommunication sector.

An official letter was sent to conduct a meeting with officials in NTRA. NTRA stated that communication on this matter should be through NREA and not the ESIA consultant. Therefore, no additional information could be obtained on this issue.

Similarly, the ESIA consultant held meetings with the Radio and Television Unit in Ras Ghareb who indicated that there are radio and television towers in the area in general that are used for receiving and transmitting

microwave signals, radio waves, TV waves, and VHF waves. They explained that to determine the impacts on radio and television towers, the Radio and Television Union in Cairo should be contacted.

The ESIA consultant established formal communication with the Radio and Television Union in Cairo. They indicated that they have studied the site and therefore there is no impact from the Project on radio and TV infrastructure in the area. The official letter is provided in the figure that follows.

Further attempts were made in 2026 to to re-engage with NTRA. It was reiterated that any formal communication should be conducted through the competent authority, namely NREA, rather than directly by the Consultant. It was also indicated that such coordination can be undertaken prior to the commencement of construction activities, particularly those related to wind turbine installation, in order to identify any required procedures in the event of potential impacts on existing telecommunication infrastructure. Accordingly, any future communication will be facilitated through NREA, in its capacity as the authority having jurisdiction over the Project area.

**Table 49: Coordinates of Telecommunication Towers**

Point	Latitude (N)	Longitude (E)	Description of the land use
1	28°18'41.27"N	32°52'50.49"E	2 telecommunication towers – 1 for Orange and 1 for Etisalat.
2	28°18'41.73"N	32°52'51.60"E	
3	28°18'38.22"N	32°52'47.78"E	New telecommunication tower – Egyptian Armed Forces



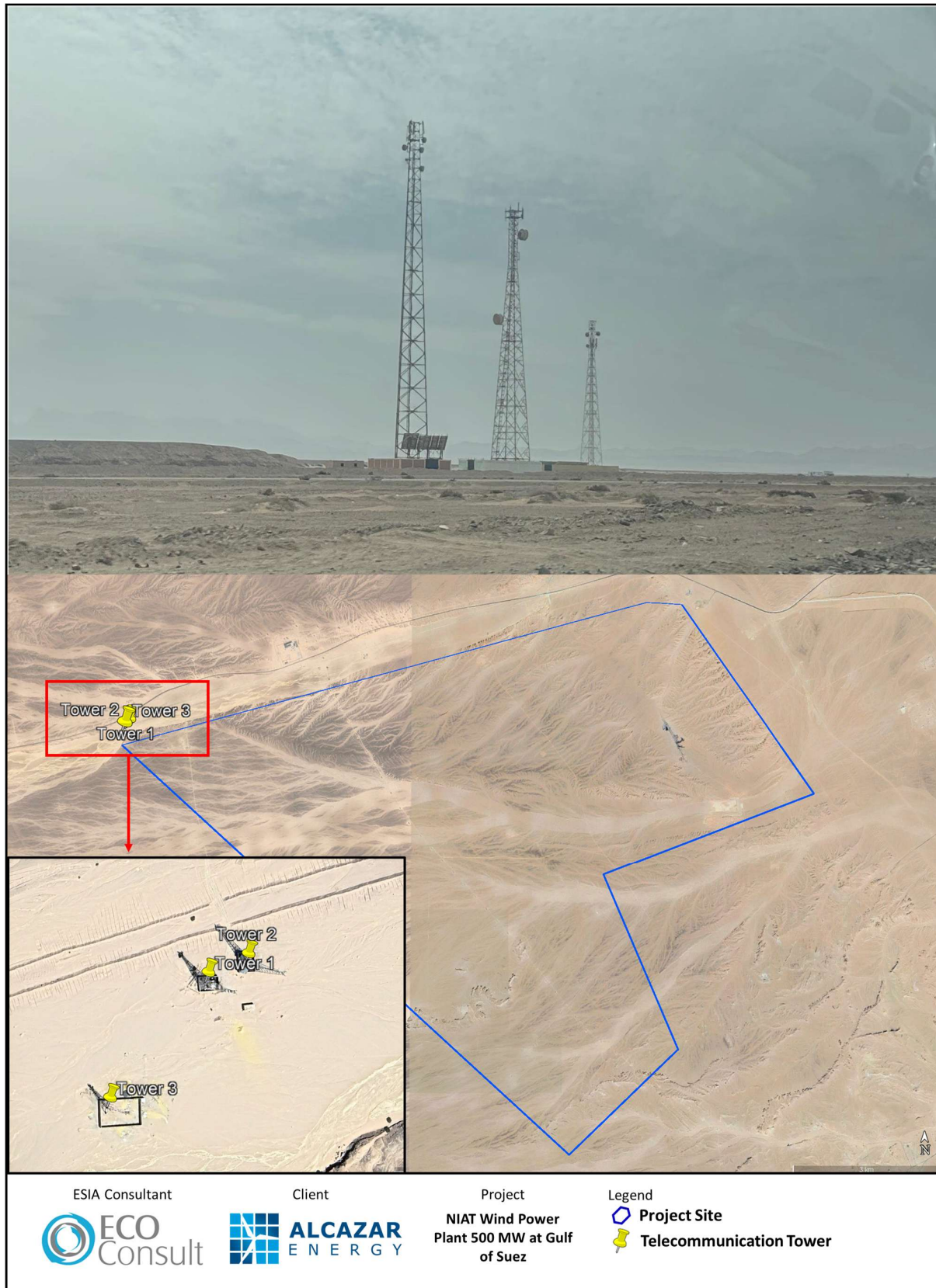


Figure 59: Project Site and Telecom Towers





Figure 60: Official Letter from Radio and Television Union in Cairo

#### 7.9.4 Petroleum Facilities

Based on a survey undertaken for the Project area and its surrounding in 2021, six (6) petroleum units were located that include what seems like closed exploration wells and /or seismic exploration sites. In addition, such locations are supported by an internal road network to provide access to the sites.

The table below presents the location of the petroleum units, while the figure that follows presents the units and road network (please note that road network was mapped based on satellite image review and is not considered official or representative).

It is important to note that a Work Coordination Agreement has been signed between NREA and the General Petroleum Company in 2005 for an area of 700km<sup>2</sup> in which wind farm developments will take place (including the Project site). The Agreement includes several articles for the development projects to include for example:

- The General Petroleum Company has agreements for oil exploration and utilisation within concession areas located within the agreed area.
- Wind turbines will be allocated in rows with a distance of 1 to 3.5km between each row and the next

- A distance of around 360m will be respected between each wind turbine
- The tower height of the turbines should be around 100m above ground
- The dimensions of the concrete foundation should be around 20.3m of diameter and depth of 3m below ground
- Cables should be laid out next to the rows of turbines at a depth ranging from 1.5-2m and enclosed within special pipes with a diameter of around 15cm that connects to the NIAT wind farm substation that will be constructed on an area of 500m×500m
- Within the same trench, communication cables will be included that will connect with a control room in the main administrative building
- The wind rows will be serviced with internal roads with a width of 7m located adjacent to each row and these roads should be designed without an asphalt layer and should be able to withstand a load of 15ton/axle
- Other requirements will include an administrative building, service buildings, accommodation facilities, etc.
- General Petroleum Company has the right to undertake surveys, measurements or any other exploration activities along with any other company associated with it. The agreement identifies several provisions that should be met for any well drilling or survey activities some of which include: (i) ensure appropriate areas are available within the wind farms for installation of equipment and machinery to undertake required surveys; (ii) turn off turbines when required for security reasons or reduce noise impacts on survey results; (iii) provide the General Petroleum Company with final, detailed and accurate as built drawings for all infrastructure elements above and underground (e.g. cables, roads, etc.).
- NREA will inform the General Petroleum Company before commencement of any activity of any wind farm development in the area.

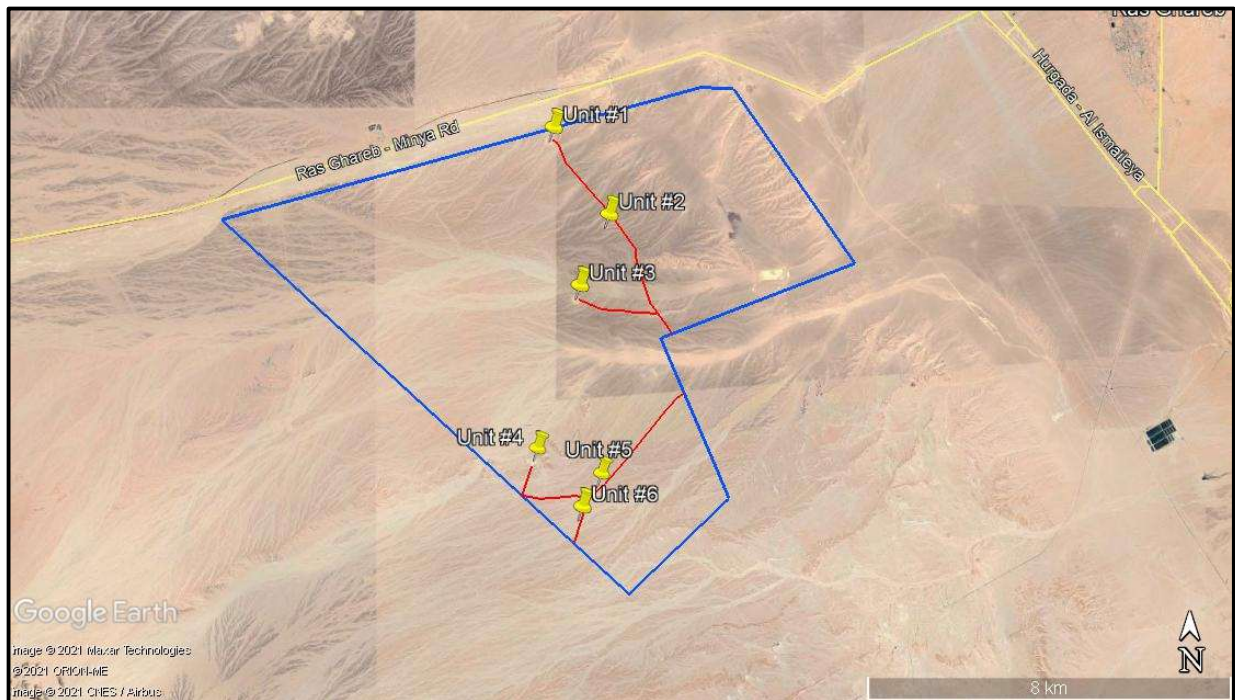
A meeting was held with General Petroleum Company in Ras Ghareb in 2021 to discuss and obtain additional information on the wells onsite and the requirements included within the Work Coordination Agreement. Consultations indicated that there are exploratory wells in the Project land and nearby sites, but they are currently closed. However, it was indicated that to provide additional information on the Project site (e.g. number of wells, their status, any underground infrastructure, etc.), this should be undertaken through official communication with the head Office in Cairo.

An official meeting request was sent by the ESIA Consultant to obtain information on the above and additional requirement that should be considered as part of the detailed design. The Company indicated that communication on this matter should be through NREA and not the ESIA consultant. Therefore, no additional information could be obtained on this issue.

However, it is important to note that at a later stage, an update agreement will be developed between NREA, the Developer and the General Petroleum Company to agree on the requirements that should be considered and taken into account for the Project.

**Table 50: Coordinates of Petroleum Units**

Point	Latitude (N)	Longitude (E)	Description of the land use
1	28.323961°	32.953603°	Petroleum Unit #1
2	28.306794°	32.966021°	Petroleum Unit #2
3	28.292806°	32.959461°	Petroleum Unit #3
4	28.260931°	32.950036°	Petroleum Unit #4
5	28.255975°	32.964369°	Petroleum Unit #5
6	28.249161°	32.960009°	Petroleum Unit #5



**Figure 61: Project Site and Petroleum Units**



**Figure 62: View of the Petroleum Units Onsite**

During the February 2026 site visit, an additional consultation was undertaken with the General Petroleum Company (refer to Section 4.5), attended by the General Manager of the Fields, the Public Relations Manager, and several engineers responsible for concession area operations. During the site visit, it was also confirmed that the structures previously identified during the 2021 survey (i.e., small concrete pads/slabs and associated access tracks) remain present on site. The consultation confirmed that they are likely associated with preparatory exploration activities rather than active wells.

The consultation further confirmed that part of the Project site overlaps with an existing petroleum concession area. Based on the information provided, the overlap is estimated to be approximately 327 m in width and around 3.75 km in length. A map illustrating the extent of this overlap was provided during the consultation and is presented in the figure below. It was agreed that further coordination is required to address this overlap. In this regard, Alcazar Energy will coordinate with the relevant petroleum authority, through the New and Renewable Energy Authority (NREA), to confirm land use compatibility, clarify any constraints associated with the concession area, and ensure that the final wind turbine layout and associated infrastructure do not conflict with existing or planned petroleum activities.





**Figure 63: Petroleum Concession Area and Overlap with Project Site**

### 7.9.5 Dam

Based on a survey undertaken for the Project area and its surrounding, a dam was located within the Project site as noted in the table and figure below. The Dam is managed by Ras Ghareb Local Unit and is known as the Wadi Aldarb Dam.

Formal communication was undertaken to determine if there are any specific requirements that should be taken into account and considered as part of the design.

Officials explained that the dam was established through an advisory committee from the Water Resources Research Institute and the Ground Water Authority, as part of projects to protect Ras Ghareb City from the flood risk. Officials required that: (i) any construction work should be avoided in the areas behind and in front of the dam, because these areas are the most vulnerable to flood risks; and (ii) a minimum distance of 20 m on the right side and the left side of the dam must be avoided for the maintenance works of the dam.

**Table 51: Coordinates of Dam**

Point	Latitude (N)	Longitude (E)	Description of the land use
1	28.297635°	33.003001°	Dam



**Figure 64: Dam Location within Project Area**



**Figure 65: View of the Dam Onsite**

### 7.9.6 Dumpsite

Based on a survey undertaken in 2019 for the Project area and its surrounding, a dumpsite was recorded within the eastern part of the Project site. The Ras Ghareb municipality formerly utilized this specific area to dispose of waste generated by Ras Ghareb city. This included the gathering of municipal solid waste (MSW) from neighboring facilities in the Ras Ghareb region. This location served as the repository for solid waste originating from Ras Ghareb city, amounting to approximately 80 tons per day from a population of around 55,000. The primary dumpsite covers an area of roughly 19 acres (equivalent to about 80,000 m<sup>2</sup>), and additional waste is scattered along both sides of the road. Notably, this open dumpsite lacks a lining to safeguard against groundwater contamination. While a significant portion of the accumulated waste was subjected to burning. A site visit conducted in February 2026 confirmed that the former dumpsite remains present within the Project area, further details on its current status is provided below.



Studies revealed that the continuous deposition of MSW at this site will result in a rise in accumulated quantities, potentially increasing the estimated volume of solid waste within the dumpsite from 120,000 to 200,000 m<sup>3</sup>.

In August 2021, utilizing its own financial resources, the original Developer (SGRE) took full ownership of the closure process for the open dumpsite, following the national guidelines established by the EEAA and WMRA for such closures.

Upon receiving the outcomes of topographical surveys, geotechnical examinations, soil analyses, and chemical assessments of the accumulation, it was ascertained that the existing accumulation was inert, largely a result of sustained incineration practices spanning the past decade. This had led to the conversion of much of the waste into ash, significantly reducing the potential for subsequent self-ignition post-closure. The ensuing closure procedures were meticulously executed in accordance with the prescribed methodology:

- The site closure plan revolved around transferring waste from both sides of the roads and gathering it within the dumpsite. Solid waste from the site and the surrounding area was collected and transferred, covering two parcels of land totaling approximately 80,000 square meters. Additionally, a certain amount of waste was scattered across the site, estimating a collection area of 20 to 30 thousand square meters, as per engineering specifications and drawings.
- Utilizing heavy machinery such as loaders, tippers, and bulldozers, the dispersed waste was collected and transported from the road edges. It was then deposited within the dumpsite and compacted, ensuring proper levelling and maintaining a uniform height across the dumpsite.
- The dumpsite's perimeters were squared off, reducing the area that needed to be covered.
- Following the transfer, trimming, and squaring operations, sand barriers were established to serve as boundaries for the landfill areas. Additional trimming and compaction were performed to decrease size and enhance the cohesion of the surface layer.
- The next steps involved filling, levelling, and covering the designated cells with sand sourced from the site. These cells, with areas ranging from 20 to 30 thousand square meters, were covered by a 50 cm-thick layer of sand, applied in individual layers not exceeding 30 cm thickness. The sand layer was compacted, forming an earthen embankment around the cell with a slope of 2 horizontal units to 1 vertical unit. Water was then sprayed onto the surface, which was compacted further to achieve optimal impermeability.

The site was totally closed and a national committee from the Ministry of Local Development and Ras Ghareb city had performed a site visit and confirmed proper closure, where another location has agreed to be the temporary site for the disposal of the generated waste until identifying the new location for the proposed sanitary landfill.

However, after the closure of the dumpsite, and Ras Ghareb Municipality's had agreement to divert the generated waste to a new location, separate from the designated NIAT and RASGHA project area, regrettably, due to the absence of daily waste disposal oversight from the municipality, the collection trucks persisted in depositing generated solid waste from the city at the former dumpsite. This has resulted in the accumulation of fresh waste heaps at the site.

Consequently, the Developer initiated discussions with national authorities to incorporate the establishment of the new landfill for Ras Ghareb city into Egypt's national rehabilitation plan for solid waste management infrastructure, scheduled for the period 2020-2024. Several site visits were conducted to determine the most suitable location for the new sanitary landfill.

#### Status and Subsequent Developments

The Developer maintained consistent communication with Ras Ghareb city to advance the creation of a new landfill cell. This facility was intended to serve as a secure and well-managed location for the proper disposal of generated waste from Ras Ghareb city.

An official memorandum of understanding was developed by the executive unit for waste management within the Ministry of Local Development. This memorandum of understanding was subsequently directed to the Red Sea Governorate, following the endorsement of the Minister of Local Development. The memorandum conveyed the details of the contractual arrangement between the Developer and the NREA for the establishment of a 500 MW wind energy project. It emphasized the significance of closing the existing dumpsite to ensure the smooth execution of the project. Additionally, the memo underscored the need to identify a new site for the implementation of a sanitary landfill. This relocation was to be carried out in a manner that would not impede the progress of the NIAT and RASGHA wind energy project or any other anticipated developments within the region.

As a result of these efforts, Ras Ghareb city designated a new location for the landfill. This chosen site is situated adjacent to the current wastewater treatment facility. The suitability of this location was grounded in several compelling reasons:

- The site received an approval from Egyptian Military authorities.
- Initial topographical surveys have confirmed the suitability of the site for the establishment of a sanitary landfill.
- A formal request from the Ministry of Water Resources and Irrigation has been received, urging the initiation of a comprehensive technical study, including additional topographical and geotechnical surveys. The objective was to evaluate potential implications of flood plains on the project and propose necessary measures for flood mitigation. Furthermore, the study will address the implementation of civil works that can withstand potential floods.
- The site's strategic placement ensures no adverse impact on nearby wind energy projects; rather, the development of a well-managed sanitary landfill positively contributes to the reduction of migratory bird attraction points.
- Situated in close proximity to the Cairo-Hurghada Road, the site's location facilitates easy access for the transportation of collection and transfer equipment associated with the Ras Ghareb Solid Waste Management system.

**Table 52: Coordinates of Dumpsite**

Point	Latitude (N)	Longitude (E)	Description of the land use
1	28.308614°	32.994719°	Dumpsite
2	28.305967°	32.995117°	Burning Area within the Dumpsite



**Figure 66: Location of Dumpsite Area**



**Figure 67: View of the Area**

### Current Status (2026)

Following the closure of the former dumpsite, Ras Ghareb Municipality continued, for a period, to divert some waste to the site in the absence of consistent daily oversight. This resulted in the accumulation of quantities of fresh waste. However, with the official closure of the site on summer and the establishment of a new sanitary landfill to serve Ras Ghareb city, waste disposal activities at the former site have significantly decreased. Illegal dumping is now understood to be subject to enforcement measures, including municipal fines, according to Ras Ghareb City Council.

This was further confirmed during consultation with the Ras Ghareb Local Authority, including the Head of the City Council (refer to Section 4.5), where municipal representatives reiterated that the dumpsite has been officially closed and that a new municipal sanitary landfill is now operational.

A site visit conducted in February 2026 confirmed a substantial reduction in waste disposal activities compared to previous observations. Construction waste and residual municipal waste remain present within the site. The



Developer will continue to monitor the area and coordinate with Ras Ghareb Municipality to ensure the complete cessation of dumping activities and maintain compliance with closure requirements.



**Figure 68: Photographs from the Dumpsite during the most recent Site Visit in 2026**

### 7.9.7 Existing powerlines

Based on a survey undertaken for the Project area a high Voltage OHTL was noted that runs in a north-south direction within the Project area. The Location of the OHTL is presented in the figure below.

Based on a survey undertaken for the Project area, two (2) high Voltage Over Head Transmission Line (OHTL) pass through the project land. One runs from Gulf of Suez Substation to the Substation of a nearby operational wind farm, while the other runs from the mobile station located on Sheikh Fadl Road to a Substation of another wind farm project in Jabal Al-Zayt near Ras Shukeir. Both OHTLs are fully constructed and energised.

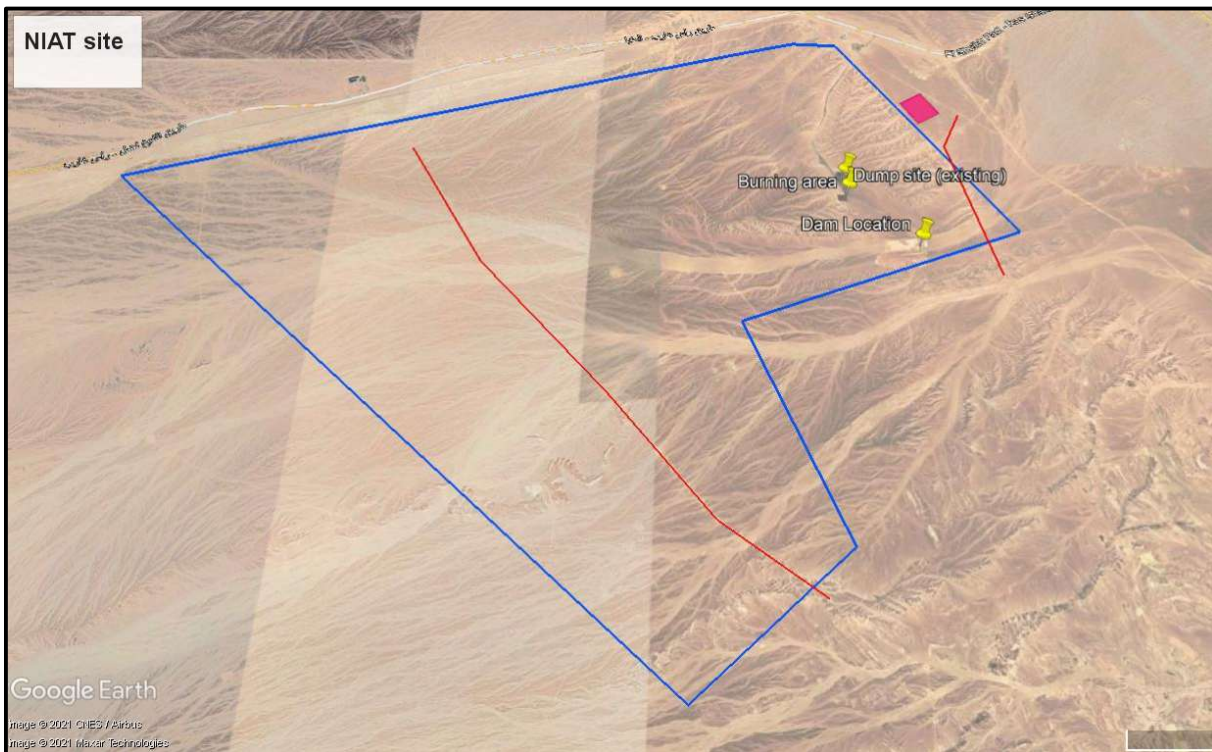


Figure 69: Location of OHTL within the Project Site

## 7.10 Public Health and Safety

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to public health and safety.

As discussed earlier, the closest human settlement to the Project site is located 8km to the east (Ras Ghareb city); of which is considered at a distance from the area. These are considered sensitive receptors.

In addition, as discussed within the land use section (refer to “Section 7.2”) it was concluded that the Project site in particular is uninhabited and vacant with no indication or evidence of any physical or economical land use activities. However, worker accommodation is present in the vicinity of the Project, including accommodation associated with a quarry located approximately 400 m to the north-east of the Project site, and accommodation associated with an EETC substation located approximately 650 m to the north of the Project site. These are considered NSRs due to their use for rest and overnight stays.

Such receptors are defined as key sensitive receptors, defined as areas where occupants are more susceptible to the adverse effects of a wind farm, such as noise and shadow flicker. Sensitive receptors generally include, but are not limited to, educational facilities (e.g. schools or universities), places of worship (e.g. mosques), dwelling houses or units, healthcare facilities (e.g. hospitals or health centres), workforce accommodation, etc.

## 7.11 Socioeconomics

This section provides an assessment of baseline conditions in relation to socioeconomics.

### 7.11.1 Baseline Assessment Methodology

Socioeconomic conditions were assessed through collection of secondary data on key socio-economic indicators, including the Central Agency for Public Mobilization and Statistics (CAPMAS) Statistical Yearbook



2025, the CAPMAS Sixth Economic Census 2022/2023, CAPMAS national population and vital statistics data 2024/2025, CAPMAS Poverty Map 2018, and the Red Sea Governorate Information Centre Statistical Yearbook 2019/2020. The baseline was verified through consultations with relevant stakeholders including Red Sea Governorate officials, Ras Ghareb City Council officials, representatives of the General Petroleum Company, and the Al Hamadin Bedouin tribal leadership.

### 7.11.2 Results

#### **Basic Demographic Characteristics**

- *Population Profile:*

Based on the CAPMAS Statistical Yearbook (2025), the estimated population of the Red Sea Governorate at mid-year 2025 is approximately 418,000, representing around 0.39% of Egypt's total population of 107.3 million (an increase from 105.9 million in 2024). The population of the governorate has shown steady growth, increasing from approximately 376,000 in 2019 to 418,000 in 2025.

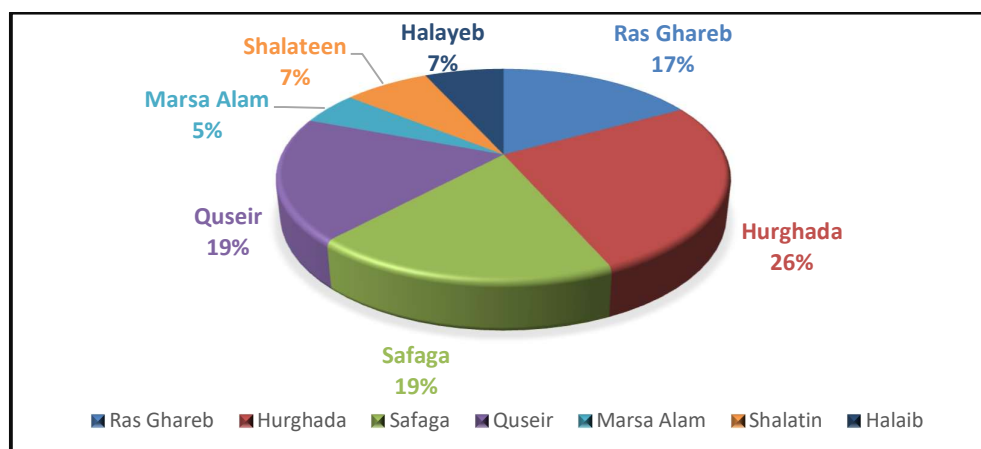
Further information on population distribution within the Project area is presented in the table below. The data is sourced from the Red Sea Governorate Information Centre (2020), noting that more recent disaggregated data is currently not available.

**Table 53: Population (Red Sea Governorate Information Centre, 2020)**

Area	Households	Population		Total Population
		Male	Female	
Red Sea Governorate	100,477	198,488	183,326	381,815
Ras Ghareb	16,118	34,214	30,260	64,474
Hurghada	25,912	50,365	48,102	98,467
Safaga	18,430	35,671	34,363	70,034
Quseir	18,692	36,265	34,768	71,033
Marsa Alam	5,500	11,509	9,294	20,903
Shalateen	7,777	15,700	13,656	29,556
Halayeb	7,196	14,465	12,683	27,348

A household is defined as family (and non-family) members who share a residence and operates as a single social and economic unit. The national average household size was 4.0 persons as of the 2017 Census (CAPMAS Statistical Yearbook 2025), consistent with the Ras Ghareb local estimate.

Ras Ghareb represents 17% of the total population of the Red Sea Governorate, where the majority of population is located in Hurghada, due to the large-scale touristic activities in the city. However, services and population activities are concentrated in Ras Ghareb City. The following figure shows the distribution of the population in the Red Sea Governorate according to each city.



**Figure 70: Distribution of Population Density According to Districts (Red Sea Governorate Information Centre, 2020)**

Bedouin communities in Ras Ghareb are mostly unsettled, and live deep in the desert, away from the city and the villages. However, some of them currently settle permanently in Ras Ghareb town, Zaafarana and Wadi Dara. Such Bedouin groups generally engage in traditional economical activities such as agriculture and animal husbandry and in addition, they are also employed in the development projects in the area (mainly the petroleum companies) either as guides, security guards, or contractors (more details are provided throughout this section).

The demographic trend also includes migrant workers from neighbouring governorates. The predominant majority of these migrant workers work for oil companies located in the area, and a very small number work in farms in Wadi Dara village.

#### ▪ *Age and Gender Distribution*

According to the CAPMAS Statistical Yearbook 2025, the Red Sea Governorate had an estimated population of 414,005 in 2024, comprising 200,093 males and 213,912 females. Based on the 2017 Population Census (the most recent census-level age breakdown available), the age structure of the Red Sea Governorate showed that 13.6% of the population were aged 0–4, 22.6% aged 5–14, 48.6% aged 15–44, 10.6% aged 45–59, and 4.7% aged 60 and above. This indicates a predominantly young and working-age population, consistent with the governorate's labour-intensive petroleum and tourism economy.

#### ▪ *Rate of Natural Increase*

The natural increase rate for the Red Sea Governorate stands at 19 per 1,000 population in 2024 (CAPMAS Statistical Yearbook 2025). The birth rate has declined from 28.70 per 1,000 (Red Sea Governorate Statistical Yearbook 2019–2020) to 24.8 per 1,000 in 2024, consistent with Egypt's national trend of declining fertility rates.

The following table illustrates demographic trends in the Red Sea Governorate:

**Table 54: Demographic Trends (CAPMAS Statistical Yearbook 2025)**

Demographic Trends	Value
Natural Growth Rate (per 1,000 persons)	19
Birth Rate (Births per 1,000 persons)	24.8
Mortality Rate (Deaths per 1,000 persons)	5.8
Total Births	10,170
Total Deaths	2,359

#### **Bedouin Communities:**

Bedouin communities in Ras Ghareb are mostly unsettled and live deep in the desert, away from the city and villages, currently settling permanently in Ras Ghareb town, Zaafarana and Wadi Dara. Consultations conducted in February 2026 with Sheikh Eid Shar'an, representing the Al Hamadin tribe, one of the established Bedouin tribes in the Ras Ghareb region with a geographic area of influence extending from Wadi Al Hawashiya in the north to areas approaching Hurghada in the south, have confirmed that no Bedouin families reside within the Project site and the area is not utilized for grazing, seasonal migration, or nomadic routes, with Bedouin seasonal movements typically occurring in mountainous areas more than 20 km from the site. No evidence of Bedouin structures such as tents, animal shelters, or water wells was observed within the Project area, and no cultural, spiritual, or historically significant sites of importance to the Bedouin community were identified within or in proximity to the Project site.

The primary livelihood activity for Bedouin communities in the area is guarding services (Ghafra), providing security for infrastructure, industrial facilities, and development projects. Existing wind farm projects in the region currently provide employment opportunities for Bedouin communities, particularly in security and guarding roles. Land use and territorial arrangements among Bedouin tribes are governed by long-standing customary agreements which clearly define zones of influence and are strictly respected to avoid encroachment between tribes.

### **Labour Profile**

According to the CAPMAS Statistical Yearbook 2025, Egypt's national unemployment rate declined to 6.6% in 2024, down from 9.9% in 2018. The total national labour force reached 32 million in 2024, of which 26.1 million are male and 5.96 million are female. The female unemployment rate remains significantly higher at 17.1% compared to 4.2% for males.

**Table 55: National Labour Force Indicators (CAPMAS Statistical Yearbook 2025)**

Indicator	2024	2023	2022	2018
Total Labour Force (million)	32.0	31.2	30.1	28.9
Total Employed (million)	29.9	29.0	27.9	26.0
Unemployment Rate (%)	6.6	7.0	7.2	9.9
Male Unemployment Rate (%)	4.2	4.7	5.0	6.8
Female Unemployment Rate (%)	17.1	17.8	18.4	21.4

At the Red Sea Governorate level, the labour force participation rate is 32.84% of the population aged 15+, with a total labour force of 105,713. The unemployment rate in the Red Sea Governorate stands at 7.46%, comprising 7.08% for males and 7.87% for females (CAPMAS Statistical Yearbook 2025).

**Table 56: The Distribution of Population by Work Status & Sex (Red Sea Governorate Statistical Yearbook 2019-2020)**

Workforce	Total No. of Employed Persons 89.20 thousand		Total No. of Unemployed Persons 25.7 thousand		Unemployment Rate 21.7%	
	Males	Females	Males	Females	Males	Females
116.60 Thousand	77.5%	22.5%	59.8%	40.2%	17.6%	27.3%

According to the Statistical Yearbook 2018 of the Red Sea Governorate, the service sector constitutes 60.3% of the Governorate's workforce. Hurghada City represents the largest proportion of employment, due to the presence of coastal touristic areas, followed by Safaga City.

According to Ras Ghareb City Council officials, the majority of the workforce can be divided into three main categories: Government/Public Sector, Oil and Gas (O&G)/Petroleum Sector, and Fishing.

There is also a percentage of wagedworkers. Agricultural activities are relatively minor, compared to petroleum-related activities. In addition, tourism-related activities are limited in Ras Ghareb, even though some residents work in the tourism sector in other cities in the Governorate, such as Hurghada and Safaga.

Based on discussions with City Council officials, it was indicated that there is a rise in the unemployment rate in Ras Ghareb City due to the limited tourism in the Governorate during recent years, which increased the lack of employment opportunities.

**Table 57: Labour Status of Ras Ghareb & Zaafarana (CAPMAS Poverty Map, 2018)**

Employment Information	Ras Ghareb City	Zaafarana Village
Male Workforce (aged 15+) from Total Population	46%	57%
Female Workforce (aged 15+) from Total Population	25%	12%
% of Employed Adults (aged 24+) from the Total Workforce	57%	58%
Distribution of Workforce by Sector		
Self-Employed Males	49%	19%
Self-Employed Females	24%	33%
Male Workers in the Agricultural Sector	1.6%	37.2%
Female Workers in the Agricultural Sector	0.05%	84.2%
Workers in the Public Sector	57%	19%

Ras Ghareb City attracts many migrant workers from neighbouring governorates, such as Beni Suef, Minya, Assyut, Sohag, Qena and Luxor. Workers also come from the Delta Governorates and Sinai, and the majority of them work for oil companies, while few of them work as farmers, particularly in Wadi Dara Village.

### **Economic Activities and Well Being**

Economic activities in the city of Ras Ghareb and its affiliated villages include oil and gas production, as well as agricultural activities. According to the representative of Ras Ghareb city Council, tourism is not a key economic activity in the city, compared to other regions in Red Sea Governorate.

According to Ras Ghareb City Council officials (2021 consultations), government employees earn between 1,200 and 3,000 Egyptian pound (EGP) per month, while employees of oil and gas companies earn between 6,000 and 20,000 EGP per month. As for waged workers (e.g. plumbers, electricians and service workers), they earn between 80 and 120 EGP per working day.

According to City Council officials, family expenses can reach 5,000 EGP, which is disproportionate compared to the current level of income. CAPMAS Poverty Map 2013 indicated that consumption<sup>9</sup> in Ras Ghareb City marked 7320.52 per capita, compared to 6066.47 in Zaafarana Village. These figures are sourced from 2021 consultations and 2018 poverty data respectively; updated income and consumption data to be incorporated prior to ESIA finalization.

**Cultivated Lands:** The area of cultivated lands in the Red Sea Governorate in 2012/2013 is almost 0.02% of the total nationwide cultivated lands. The Red Sea Governorate relies on rain and underground water in agriculture, which causes fluctuations in cultivated areas (Red Sea Governorate Statistical Yearbook 2012/2013).

**Fisheries:** The Red Sea Governorate contributes to supplying fish, since the Governorate's coastline extends across 1,080 km and 240 km wide. The southern part of the Governorate is rich in fish resources (CAPMAS Statistical Yearbook 2025).

**Livestock:** 78.74% of the total number of livestock is butchered in state-owned slaughterhouses. The Red Sea Governorate has no livestock feed or poultry feed plants. Heifers account for 35% of cattle butchered in state-owned slaughterhouses (Red Sea Governorate Statistical Yearbook 2019-2020).

<sup>9</sup> Household spending is the amount of final consumption expenditure made by resident households to meet their everyday needs, such as food, clothing, housing (rent), energy, transport, durable goods (notably cars), health costs, leisure, and miscellaneous services. It is typically around 60% of gross domestic product (GDP) and is therefore an essential variable for economic analysis of demand (Source: OECD National Accounts Statistics: National Accounts at a Glance, <https://data.oecd.org/hha/household-spending.htm>).

**Industrial Activity:** According to the CAPMAS Sixth Economic Census 2022/2023, the Red Sea Governorate has a total of 20,627 economic establishments, of which 92.4% are formally registered — one of the highest registration rates among all Egyptian governorates and significantly above the national average of 49.3%. The largest category of establishments is trade and retail (9,688), followed by accommodation and food services (3,197), transportation and storage (2,091), construction (2,021), and manufacturing (1,924). The total invested capital across the governorate is approximately EGP 225 billion and total annual cash wages amount to approximately EGP 14.1 billion (CAPMAS, 2023).

**Table 58: Economic Establishment Indicators — Red Sea Governorate (CAPMAS Economic Census 2022/2023)**

Indicator	2023
Total economic establishments	20,627
Registered establishments	92.4%
Trade and retail	9,688
Accommodation and food services	3,197
Transportation and storage	2,091
Construction	2,021
Manufacturing	1,924
Total invested capital	~EGP 225 billion
Total annual cash wages	~EGP 14.1 billion

## **Social Services Profiles**

### ▪ *Education*

Education is one of the most important criteria for measuring the progress of people and their ability to advance and improve their standard of living. According to CAPMAS Statistical Yearbook 2025, Egypt's illiteracy rate stood at 25.8% based on the 2017 Population Census, down from 29.7% in 2006 and 39.4% in 1996.

Ras Ghareb City contains 18 schools covering the three basic stages of education (primary, preparatory and secondary), which include two experimental schools. Additionally, there are two secondary vocational training schools. According to Ras Ghareb City Council officials, the main objective of the two secondary vocational training schools is to provide their students with the necessary basic skills that enable them to work in oil companies.

At the Red Sea Governorate level, the 2023/2024 academic year recorded 2,298 students at secondary level across 15 schools with 158 teachers, 2,579 students at preparatory level across 18 schools with 143 teachers, and 8,182 students at pre-primary level across 21 schools with 395 teachers. Additionally, 10,859 students were enrolled in technical/vocational education across 1,167 industrial and 263 commercial programs (CAPMAS Statistical Yearbook 2025).

CAPMAS Poverty Map 2018 shows that 20.23% of males and 21.14% of females of Ras Ghareb City received basic education. Likewise, the percentage of males and females who finalized their basic education in Zaafarana is approximately 19% and 15% respectively. The following table details the educational status of inhabitants of Ras Ghareb and Zaafarana.

**Table 59: Education Mapping of Ras Ghareb & Zaafarana (CAPMAS Poverty Map, 2018)**

Education Information	Ras Ghareb City	Zaafarana Village
University Degree Holders/Males	19%	9%
University Degree Holders/Females	15%	0%
Male School Enrolment/Males (age: 6-18)	99.28%	72.2%



Education Information	Ras Ghareb City	Zaafarana Village
School Enrolment/Females (age: 6-18)	99.45%	74.3%
School Drop-outs/Males	0.21%	0%
School Drop-outs/Females	0.23%	0%

Based on the 2017 Population Census, the Red Sea Governorate had a total population of 264,972 aged 10 years and above. Of these, 16.3% held university degrees, 5.3% held above-intermediate qualifications, and 33.5% held intermediate-level education. The illiteracy rate for the governorate was 9.1% for males and 15.1% for females, significantly lower than the national averages of 21.1% and 30.8% respectively, reflecting the governorate's relatively educated workforce driven by petroleum and tourism industries (CAPMAS Statistical Yearbook 2025).

**Table 60: Education Mapping of Ras Ghareb City (The Statistical Yearbook, Ras Ghareb City Information Centre, 2018)**

Area	University Degrees		Above Intermediate Education		Intermediate Education		Less than Intermediate Education		Workers	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Ras Ghareb	133	31	112	39	281	199	301	70	232	68

#### ▪ Health

Data from the Health Affairs Directorate in the Red Sea Governorate showed that the Governorate is free of the following diseases:

- Endemic diseases
- Infectious diseases
- Diseases related to water and air quality

The data indicated that non-communicable diseases include diabetes, and hypertension. Other common diseases include digestive system and cardiovascular diseases. Cancer is also increasing, and the most common cancers include breast, liver, bladder and lymph nodes. In addition, there are other communicable diseases to include diarrhoeal diseases (especially in children), cold and flu, fever and inflammations or infections of the ear, nose or throat, as well as skin rashes and infections.

The Red Sea Governorate suffers from a lack of specialized health services which are suitable for the middleclass. Furthermore, these services are concentrated in Hurghada City, and are absent in some other cities, such as Shalateen and Halayeb. The following tables show the health services available in the Governorate.

According to the CAPMAS Statistical Yearbook 2025, the Red Sea Governorate had 9 hospitals with 459 beds as of 2023, compared to 11 hospitals with 456 beds in 2022. Hospital admissions in 2022 totalled 12,637 with a mortality rate of 2.7%.

**Table 61: Hospital Indicators — Red Sea Governorate (CAPMAS Statistical Yearbook 2025)**

Year	Number of Hospital	Number of Beds
2020	11	220
2021	11	456
2022	11	454
2023	9	459

Ras Ghareb City contains one central hospital, one ambulance station, and one civil defence unit, in addition to a limited number of private clinics and health centres. All health services are concentrated in Ras Ghareb City.

The central hospital serves all the areas and villages administratively affiliated with Ras Ghareb Local Government Unit (LGU). The hospital is equipped with an Emergency room section, and has outpatient clinics. There is an ambulance unit on Zaafarana–Ras Ghareb Road north of Ras Ghareb city, near the Project site; these is the nearest ambulance unit to the project area (Red Sea Governorate Health Affairs Directorate, 2018).

Human resources is one of the main factors for the success and continuity of health services, and the absence of qualified medical staff affects the quality of services provided. At the national level, Egypt had 122,378 physicians, 86,498 pharmacists, 39,493 dentists and 232,303 nursing staff as of 2023, representing rates of 11.6, 8.2, 3.8 and 22.1 per 10,000 population respectively (CAPMAS Statistical Yearbook 2025). Governorate-level health workforce data is not available in the published yearbook; the most recent Red Sea Governorate-specific figures are from 2016 as presented in the original ESIA baseline.

**Table 62: Number & Categories of Health Sector Workers in the Red Sea Governorate (CAPMAS, Census of Population Activities of the Governorates, Arab Republic of Egypt, 2016)**

Area	No. of Doctors		No. of Pharmacists		No. of Dentists		No. of Nursing Staff		No. of Assistants	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Red Sea Governorate	255	137	60	170	49	29	79	412	102	0

### **Investment and Development**

There is large focus on investment in the Red Sea Governorate, and many fields of investment are available (touristic, industrial, services), which positively impact comprehensive development in the Governorate.

The following table shows the fields of investment in the Red Sea Governorate and Ras Ghareb City

**Table 63: Fields of Investment in the Red Sea Governorate & Ras Ghareb City (Red Sea Governorate Official Website, 2018)**

Item	Red Sea Governorate	Ras Ghareb
Mineral Production	The Red Sea is one of the important Egyptian governorates in the field of mineral production, as it contains deposits of most of metallic and non-metallic minerals, decoration stones and construction materials. The Red Sea Governorate stretches across the larger part of Eastern Desert, which forms one-fourth of Egypt's total area (about 250,000 km <sup>2</sup> ), and contains huge mineral resources.	There are several metal productions sites in Ras Ghareb, including: <ul style="list-style-type: none"> <li>- Gold in Abu-Marwat</li> <li>- Iron in Abu-Marwat</li> <li>- White sands in Dakhl Valley</li> <li>- Gypsum in the northwest of El-Dob Valley</li> <li>- Marble in Al-Shaikh Fadl Road and El-Dob Valley</li> <li>- Granite in Al-Shaikh Fadl Road</li> </ul>
Fish Production	The Red Sea Governorate is an important region that can be utilized to increase fish production, as it has a 1,080 km-long coastline, with an average width of 240 km. There are various coral reef sites, with 3-5 square mile-area each. Different kinds of fish pass by these sites in certain seasons. Fish food is four times more abundant in the southern part of the Red Sea coast compared to the northern part.	There are several fish production sites in Ras Ghareb: <ul style="list-style-type: none"> <li>- Al-Mallaha fish farm which is located between Ras Ghareb and Shoqair, with an area of 15,000 acres and a total annual production of more than 250 tons.</li> <li>- Suez Gulf fish farm with an area of 12,000 acres, and a total annual production of more than 400 tons.</li> <li>- Gamsha Gulf fish farm with an area of 9000 acres and total annual production of more than 350 tons.</li> </ul>
Agricultural & Livestock Projects	Agriculture is a basic element in the regional comprehensive and integrated development in the Red Sea Governorate either through providing the food supply required for the development in the region or taking part in the attraction of new population from the crowded places over the Nile banks and confronting the	Suggested areas for agricultural investment in Ras Ghareb include: Cultivation of 500,000 acres in Wadi Araba (to the south of Zaafarana), which can be irrigated by groundwater from El-Bowerat well.

Item	Red Sea Governorate	Ras Ghareb
	<p>expected increase in the population and consumption. The southern triangle (Shalateen, Halayeb, Abu-Ramad) is one of the most important places for the agricultural investment in addition to other cities in the Governorate.</p>	<p>Cultivation of Ghareb basin using groundwater in the area, as it is possible to extract 4,000 m<sup>3</sup> of medium-salinity water per day, which can be used in irrigating citrus fruits and barley. Cultivation of Wadi Dara village.</p>
Touristic Investment	<p>The General Tourist Planning of the Red Sea Governorate</p> <p>Red Sea Governorate contains a number of planned touristic zones.</p>	<p>Zaafarana Sector</p> <p>Gamsha Sector</p>
	<p>Available Elements for Supporting the Establishment of Touristic Projects in the Red Sea Governorate:</p> <p>A colourful, rocky mountain range extends along the Red Sea coast, providing a wonderful backdrop to the beach. The area is teeming with mines that had been exploited during ancient ages; mines that once rendered Egypt as one of the richest nations in ancient times, which were used to excavate gold, diamonds and valuable stones like Schist, white granite, etc.</p> <p>The beaches of the Red Sea coast are renowned for their clear blue waters, calm waves, and a paradise of colourful underwater coral reefs, which contains a multitude of rare and colourful fish.</p> <p>The yearlong moderate climates attract tourists both in summer and in winter to Red Sea Governorate resorts.</p> <p>The Governorate hosts various national parks, which contain a multitude of biological diversity.</p> <p>The Governorate contains valleys and archaeological, religious and curative sites.</p> <p>The Red Sea is also renowned for its black sands, which are used to cure rheumatoid and psoriasis.</p>	
	<p>Touristic Projects Proposed for Implementation in the Governorate:</p> <ul style="list-style-type: none"> <li>- Touristic villages, hotels, motels and camps in Safaga, Qoseir and Marsa Alam, the southern triangle (Shalateen, Abu-Ramad &amp; Halayeb), as well as Zaafarana. Project lands are allocated according to vacant areas.</li> <li>- Cinemas, amusement parks and malls proposed to be established in Hurghada, Safaga, Qoseir &amp; Marsa Alam.</li> <li>- Fairs, aquariums, sports centres, golf courses, billiard halls and bowling alleys proposed to be implemented in Hurghada, Safaga, Qoseir, Marsa Alam &amp; Zaafarana.</li> <li>- Centres for providing diving equipment in Hurghada, Safaga, Qoseir &amp; Marsa Alam.</li> <li>- Tourist companies that provide safari trips in Hurghada, Safaga, Qoseir &amp; Marsa Alam.</li> <li>- Shipyards in Hurghada, Safaga, Qoseir &amp; Marsa Alam.</li> <li>- Internal shipping lines connecting the ports of Hurghada, Safaga &amp; Marsa Alam with the ports of Al-Tour, Nuweiba, Taba &amp; Sharm El-Sheikh, as well as Port Tawfik in Suez. Additionally, an international shipping line is proposed to connect the Governorate's ports with the ports the Red Sea and the Arabian Gulf.</li> <li>- Establishing integrated projects for underwater imaging in Hurghada and Marsa Alam.</li> <li>- An international conference centre in Hurghada.</li> <li>- A hotel school in both Hurghada and Qoseir.</li> <li>- Schools for teaching diving and swimming, drawing on graduate divers and specialized trainers in Hurghada, Safaga &amp; Marsa Alam.</li> <li>- Utilizing the islands in the construction of suitable projects in accordance with environmental laws.</li> <li>- Small and medium industries for providing hotel equipment.</li> </ul>	

## 8 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

This Chapter first provides an overview of the strategic environmental and economic impacts related to the Project development, after which it assesses the anticipated impacts from the Project throughout its various phases on all E&S receptors and attributes.

### 8.1 Overview of Strategic Environmental and Economic Impacts

#### 8.1.1 Governmental Vision for the Energy Sector

The 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 Supreme Council of Energy) had developed and adopted the ISES 2015 – 2035, which provides an ambitious plan to increase the contribution of renewable energy to 20% of the electricity generated by the year 2022, through hydro, wind, and solar. This target has since been revised to 42% by 2030, reflecting Egypt's accelerated transition towards renewable energy sources, including hydro, wind, and solar<sup>10</sup>.

To promote renewable energy sources and in order to open the way for the private sector to effectively participate in the implementation of renewable energy projects, the Renewable Energy Law (Decree Law 203/2014) has been issued. With this law, investors had the opportunity to identify and develop renewable grid-connected electricity production through the BOO scheme as discussed earlier in "Section 1.1".

***In line with the above, this development allows for more sustainable development and shows the commitment of the Government of Egypt to realizing its energy strategy and meeting the set targets for renewable energy sources.***

#### 8.1.2 Energy Security

Recently, most policy makers around the world are grappling with issues related to energy security, energy poverty, and an expected increase in future demand for all energy sources – and Egypt is no exception. Almost certainly, the most spoken words by policy makers and government bodies in Egypt in the last couple of years revolved around 'energy security'.

Through various strategies and visions, Egypt has emphasised on the importance of energy security. This includes for example Egypt's Sustainable Development Strategy, Egypt Vision 2030, in which the sustainable development targets include energy and in which Goal I specifically addresses security of energy supply to ensure availability of reliable supplies to satisfy the future development needs of the country through adoption of a more diverse energy mix. Similarly, the ISES 2015 – 2035 addresses energy import dependence and diversification of electricity generation sources.

***In line with the above, the Project will contribute to increasing energy security through reliance on an sustainable, inexhaustible and mostly import-independent energy resource. The estimated electricity generation from the Project is at a minimum 2,400 Gigawatt hours (GWh) per year on average; which will serve the annual electricity needs of more than 700,000 local households.***

The above has been calculated based on statistics obtained from Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS). The total household electricity consumption in Egypt for 2016 – 2017 (latest statistics available online) was 64,100 GWh (CAPMAS, 2018). In addition, in 2016 – 2017 the total number of household

<sup>10</sup> IRENA, 2022

beneficiaries from the public electricity network was 23,383,521 Households (CAPMAS, 2017). Therefore, average electricity consumption per household per year can be assumed to be around 2,700 (kWh/household).

### 8.1.3 Environmental Benefits

The negative environmental impacts from generating electricity through conventional fossil fuel burning at thermal power plants are well known. This most importantly includes air pollutant emissions such as ozone, Sulphur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>2</sub>), Particulate Matter (PM), and other gases which are the cause of some serious environmental concerns such as smog, acid rain, health effects, and many others.

In addition, the burning of fossil fuels results in carbon dioxide emissions; a primary greenhouse gas emitted through human activities which contributes to global warming. The main human activity that emits CO<sub>2</sub> is the combustion of fossil fuels for electricity production and transportation. Concurrently, global climate change has become an issue of concern and so reducing greenhouse gas emissions have also emerged as primary issues to be addressed as the world searches for a sustainable energy future.

***Generating electricity through wind power is pollution-free during operation. Compared with the current conventional way of producing electricity in Egypt through thermal power, the clean energy produced from renewable energy resources is expected to reduce consumption of fossil fuels, and will thus help in reducing GHG emissions, as well as air pollutant emissions. The Project will likely avoid more than 925,000 metric tons of CO<sub>2</sub> annually.***

The above has been calculated based on statistics obtained from the IFI Dataset of Default Grid Factors (UNFCCC, 2021), which provides a CO<sub>2</sub> emission factor for electricity generation in Egypt of approximately 406 gCO<sub>2</sub>/kWh.

In addition, the Project is aligned with both national and international climate change mitigation commitments. At the national level, Egypt has committed under its Nationally Determined Contribution (NDC) and national energy strategies to increasing the share of renewable energy in its energy mix and reducing greenhouse gas emissions. The Integrated Sustainable Energy Strategy (ISES) 2015–2035 originally set a target of achieving approximately 42% of electricity generation from renewable sources by 2035; however, this target has since been brought forward to 2030 under updated national commitments, reflecting Egypt's accelerated transition towards renewable energy sources. The Project supports these objectives by contributing to the expansion of renewable energy capacity and reducing reliance on fossil fuel-based power generation.

At the international level, the Project is consistent with the objectives of the Paris Agreement, which aims to limit global temperature rise by reducing greenhouse gas emissions and promoting low-carbon energy systems. By generating electricity from wind power and avoiding significant CO<sub>2</sub> emissions, the Project contributes to global efforts to mitigate climate change and support the transition towards a more sustainable energy future.

## 8.2 Landscape and Visual

This section identifies the anticipated impacts on landscape and visual from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.



### 8.2.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the Contractors for installation of the wind turbines and the various Project components to include substation, transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Construction activities would create a temporary effect on the visual quality of the site and its surroundings. The visual environment during the construction phase would include the presence of elements typical of a construction site such as equipment and machinery to include excavators, trucks, front end loaders, compactors and others.

However, as discussed in “Section 7.1”, there are no key sensitive visual receptors within the Project site and surrounding vicinity with the exception of Ras Ghareb city which is located around 8km from the Project site. However, such impacts during construction will not be visible from the city due to the distance from the Project site.

The visual environment created during the construction period would be temporary, of a short-term duration, limited to the construction phase only. For the duration of construction, the visual impacts will be of a negative nature and be noticeable, and therefore of a medium magnitude. As the only key sensitive visual receptors in the area are of an industrial nature, the receiving environment is determined to be of a low sensitivity. Given all of the above, such an impact is considered to be of minor significance.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by the Contractors during the construction phase:

- Ensure proper general housekeeping and personnel management measures are implemented which could include:
  - Ensure the construction site is left in an orderly state at the end of each work day.
  - To the greatest extent possible construction machinery, equipment, and vehicles that are not in use should be removed in a timely manner and kept in locations to reduce visual impacts to the area.
  - Ensure proper storage, collection, and disposal of waste streams generated as discussed in detail in “Section 8.4.2”.

Following the implementation of these mitigation measures, the significance of the residual impact would be categorised as not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by Contractors during the construction phase:

- Inspections of the works should be carried out at all times to ensure the above measures are implemented.

### 8.2.2 Potential Impacts during the Operation Phase

Visual impacts associated with wind energy projects typically concern the turbines themselves (e.g. colour, height, and number of turbines) and impacts relating to their interaction with the character of the surrounding landscape and the visual receptor which might be present.

Turbines are tall structures (tip height of 162.5m in the case of the Project) that can be seen from several kilometres away and impose a change on the landscape of the area where they are installed. However, visual

impacts depend on several factors such as distance, size, visibility, landscape and geography, and the presence of potential sensitive visual receptors.

Nevertheless, visual impacts created from the development of the Project are not considered an issue of concern due to the following:

- The close by visual receptors (worker accommodations) are all of an industrial nature. Furthermore, the only critical visual receptor within the Project area and the 10km radius would be Ras Ghareb city that is located 8km to the southeast of the Project site. At such distances such turbines are more likely to be seen as part of the wider landscape as only minor elements (if seen at all). There are no other critical or sensitive visual receptors within such distances.
- The ESIA Consultant has previously undertaken several ESIA studies for wind farms within the Project area. Such ESIA studies included in specific disclosure session in Ras Ghareb (involving local communities as well). No key issues of concern were raised in relation to project visibility and/or visual impacts. Disclosure for some ESIA studies can be found online (<https://www.ebrd.com/work-with-us/projects/esia/red-sea-wind-energy-rswe-500-mw-wind-power-project-gulf-of-suez-ii.html> )
- Project area is considered a barren and desert area and in general is located within an industrial area with petroleum activities with limited aesthetical value.
- There are several operational and planned wind farm developments in the area as well as several electricity distribution and transmission lines so the addition of this Project will bring a significant change to the visual and landscape characteristics of the area.
- Being visible is not necessarily the same as being intrusive. Aesthetic issues are by their nature highly subjective. For some viewers, a wind farm could be regarded as manmade structures with visual burdens while to others it represents a positive impact in the sense that they introduce a break in the otherwise dull and monotonous view.

Given all of the above, the potential impacts on landscape and visual are of a long-term duration throughout the Project operation phase. The impacts will be of a negative nature, and medium magnitude given that such elements of the Project will be visible. However, given the key visual receptors in the project route and its surroundings the receiving environment is considered of low sensitivity. Given all of the above, such an impact is considered of low significance.

#### Mitigation Measures

There are no mitigation measures per se that can be implemented to eliminate the visual impacts from the Project. However, given the outcomes of the assessment presented above, no mitigation measures are required.

### **8.3 Land Use**

This section identifies the anticipated impacts on land use from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

#### **8.3.1 Potential Impacts during the Planning and Construction and Operation Phase**

As noted earlier, the Project site location does not conflict with any of the relevant governmental entities formal planning context. Therefore, there are no impacts on formal land use from the Project.

With regards to informal or ‘actual land use’ as discussed earlier, the following is concluded:

- The Project site itself in general is uninhabited and vacant and does not include any physical or economical land use activities (with the exception of infrastructure elements which are discussed further in “Section 8.10”). Therefore, no physical or economic displacement would result from the project.
- The Project site is owned by NREA and will be utilised for the Development of the Project. However, as discussed earlier, Bedouin Groups in general implement the Ghafra system in such land areas, including the Project site. The Developer’s understanding of Bedouin culture thus plays a major role in regulating the relationship amongst them. Inappropriate management of such issues could result in potential conflicts with Bedouins.

As such, should the above issues not be taken into account as part of the planning phase of the Project, it could result in impacts that are considered of long-term duration, of negative nature, and of medium magnitude and high sensitivity given that it could result in land use impacts and disputes with Bedouin Groups. Given all of the above, the impact is considered of moderate significance.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer during the planning phase:

- Establish coordination with the Bedouin Groups for inclusion and engagement in employment and procurement opportunities. This issue is further discussed in “Section 8.13”.

Following the implementation of these mitigation measures, the significance of the residual impact would be categorized as not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Contractors during the construction phase:

- Submission of proof of coordination and agreement with Bedouin groups.

### **8.4 Geology, Hydrology and Hydrogeology**

This section identifies the anticipated impacts on hydrology and hydrogeology from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

#### **8.4.1 Potential Impacts from Flood Risks on the Project Site**

In general, it is important to investigate potential risks of local flood hazard from the wadi systems (as discussed previously under “Section 7.3.1”) during the rainy season and especially during flash flood events which in turn could affect the Project components. Such risks must be taken into consideration throughout the planning phase of the Project as they could inflict damage to the Project and its various components.

Therefore, a comprehensive Hydrological, Hydraulic, and Flood Risk Assessment has been undertaken for the NIAT Wind Farm Project in 2026. The assessment adopted a robust, science-based methodology aligned with international best practices, integrating:

- Remote sensing and GIS analysis: Use of satellite imagery, DEM/DTM data, and topographical/geological maps to delineate drainage basins, identify wadis and tributaries, and define flow paths and catchment characteristics;
- Field reconnaissance surveys: Site verification to confirm drainage patterns, identify evidence of runoff and erosion, and document existing flood protection infrastructure (e.g., culverts, diversion channels, artificial lakes);
- Hydrological modelling: Simulation of rainfall–runoff processes using long-term rainfall data and watershed characteristics to estimate peak discharges and runoff volumes for return periods ranging from 5- to 200-years;
- Hydraulic modelling (HEC-RAS 2D): Two-dimensional flood modelling supported by a high-resolution (~2 m) Digital Terrain Model (DTM) to simulate flood extent, depth, velocity, and flow behaviour across the Project site; and
- Flood hazard classification: Application of internationally recognised depth–velocity criteria to map flood hazard zones and identify areas requiring design considerations and mitigation measures.

In Egypt, flash floods are considered one of the few natural hazard that causes major damages to properties and loss of life. Ras Ghareb City was subjected to a destructive flash flood in more recent years, particularly in October 2016. The city was founded 85 years ago and this is the largest recorded flash flood since its establishment. This catastrophe caused major damage to many houses, the death of at least 8 people, and the displacement of thousands. Also, the city's infrastructure was affected, causing blackouts, water outages and road network collapses. This led the local government to explore and implement some methods for rain protection. With the support of the central government, a plan has been drawn up to implement mega protection projects such as dams and artificial lakes to contain rainwater.

A flash flood is defined as an immense flood with just a few minutes or hours of excessive rainfall. A flash flood can occur during or shortly following a rainfall storm, especially when high-intensity rain falls on steep slopes with shallow, impermeable soils, exposed rocks and poor or sparse vegetation cover.

The physiographic features of the project area and its surroundings could be distinguished into three units; high, medium, and low relief as noted in the figure below.

- High Relief Unit: this unit comprises the mountainous area, which is composed essentially of Pre-Cambrian basement rock. This unit rises above 500 m above mean sea level (refer to figure below);
- Medium Relief Unit: this unit occupies the eastern foot slopes of the mountainous area. This area is composed of dissected hills and weathered zone. The elevation of this unit ranges from 150 up to 500 m above sea level (asl). This unit is characterized by the presence of shallow and wide drainage lines with dissected hills. This unit is characterized by the presence of some applications to control the flash flood hazards.
- Low Relief Unit: the unit occupies the low land area between the hilly unit and the Gulf of Suez. The ground surface elevation of this unit is less than 150 m (asl). This unit comprises many dissected alluvial terraces and dissected peneplain at the exits of drainage basins like Wadi Ahu Had and Wadi Aldarb (discussed in further details below). It represents a good collecting basin for surface water runoff. It has a ground elevation ranging between zero to about 150 m (asl), with a general surface slope towards the east. The following geomorphic features are expected in this plain.
  - The dissected alluvial terrace unit: it occupies an extended plain covered by thick alluvial terraces. It faces the hilly area and receives its outwash of the weathering products.
  - The coastal plain unit: it occupies a limited zone towards the east between the dissected alluvial plain and the Gulf of Suez shoreline. This coastal plain is narrow to the north and becomes wider

towards the south. It receives the finer sediments carried through streams, which cut the dissected alluvial plain and the peneplain.

- The Salinas and lakes unit: it occupies a low land area north and south Ras Ghareb city. Sabkhas, salt marshes and ponds of saline water surround it.
- The wadi channel unit: it occupies the main channels of the two (2) dry Wadies dissected the area; which are Wadi Abu Had and Wadi Aldarb.

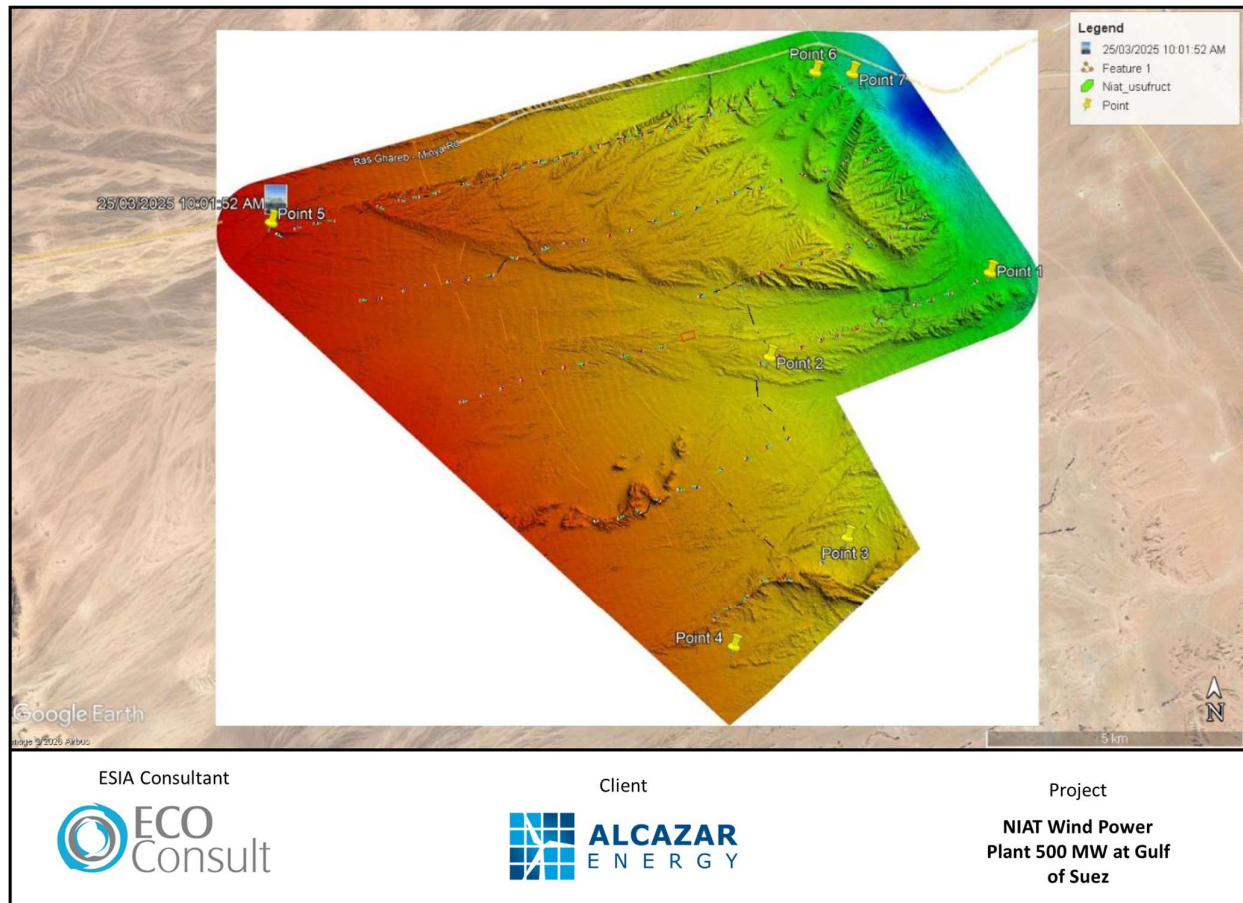


Figure 71: Digital Elevation Map of the Area



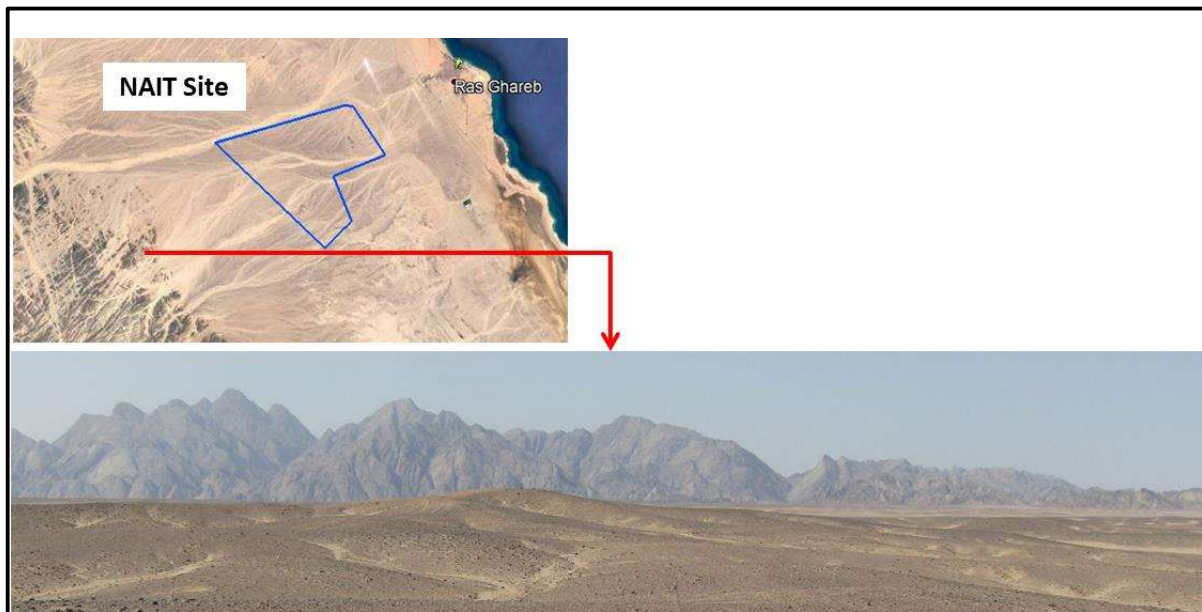


Figure 72: Peaks of the Red Sea Mountains to the West and Southwest of Project Site

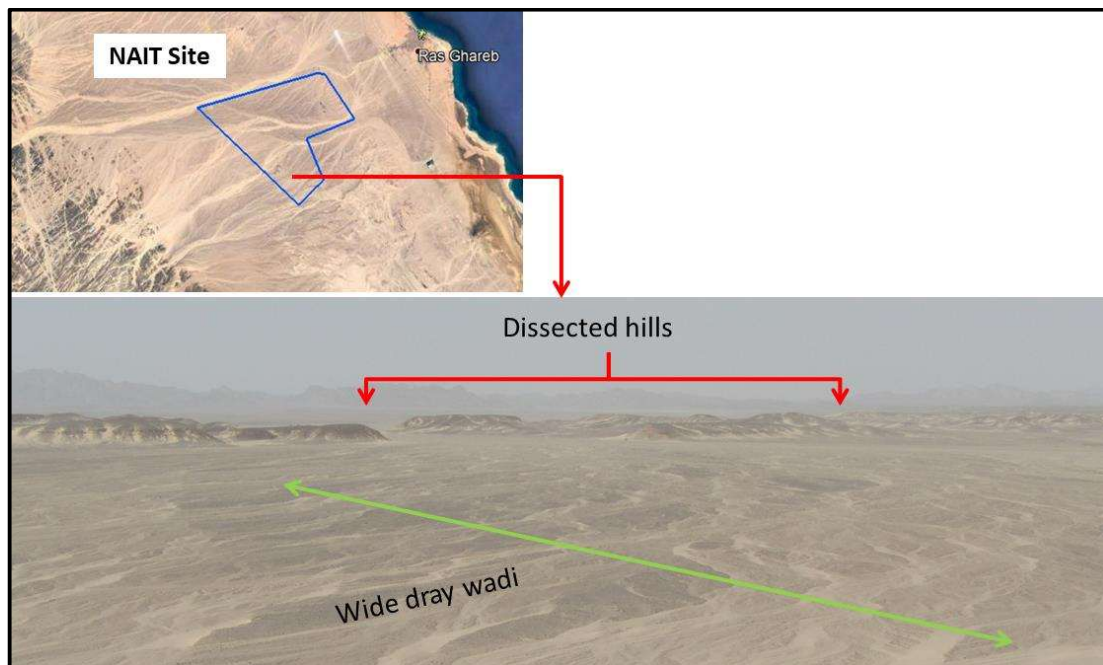


Figure 73: Dissected Hilly Unit of Medium Relief

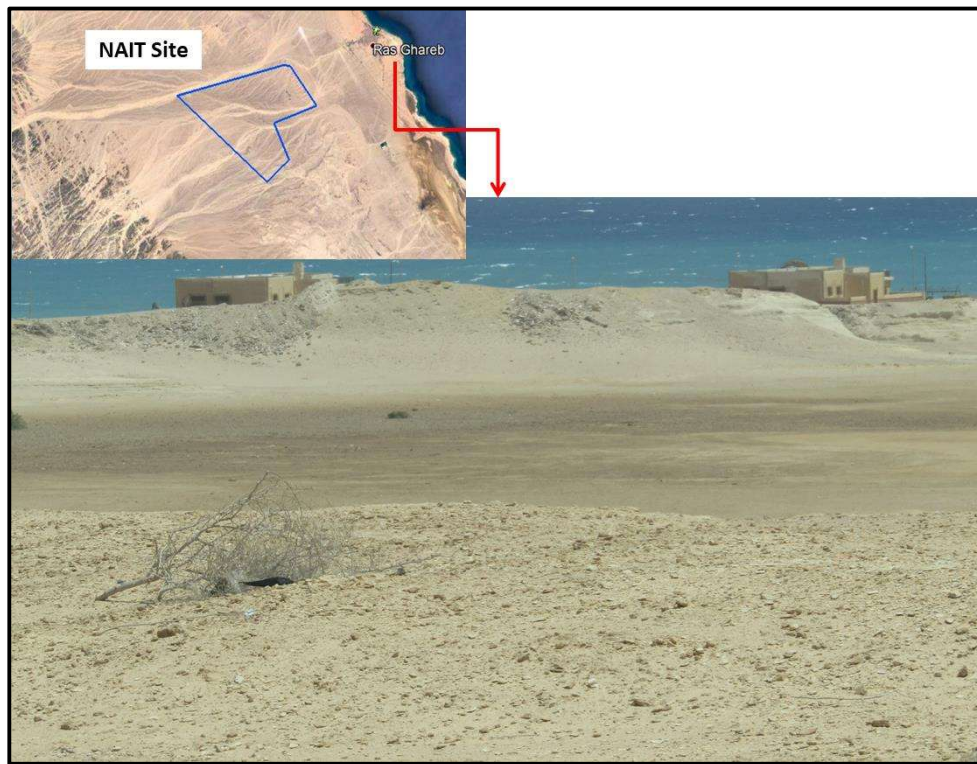


Figure 74: Field Photograph Showing Low Relief Unit (piedmont plain).

#### Key Studies Reviewed

Youssef and Hegab 2005, applied Geographic Information System (GIS) and statistical analysis for developing a database management system of the flood hazard of Ras Ghareb area. They mentioned that two basins (Wadi Abu Had and Wadi Aldarb) out of the nine basins they delineated in the studied area that threat Ras Ghareb city as shown in the figure below. Note that the Project site lies within the basins of Wadi Abu had and Wadi Aldarb.

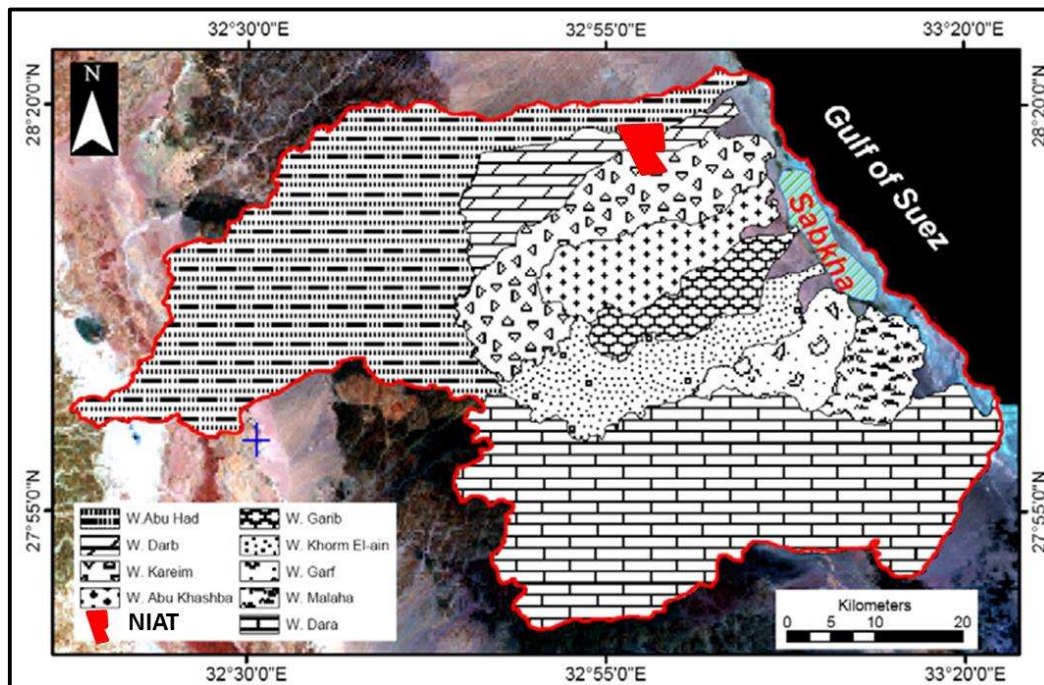


Figure 75: Drainage Basins Delineated in the Area around Ras Ghareb City



Based on the above, they proposed a flood hazard and a vulnerability maps of Ras Ghareb area as shown in the following figure. As noted in the figure below, the expected degree of flash flood hazard in the site ranges from medium to high.

During intensive precipitations, Ras Ghareb city is faced with a high hazard flash flood from Wadi Abu Had that affected the centre of the city and the other one has affected the south of the town as shown in the figure below. As noted again, the expected degree of flash flood hazard in the site ranges from medium to high as the Project site is located between two basins of expected high flash flood hazard, Wadi Abu Had at the north and Wadi Aldarb at the south.

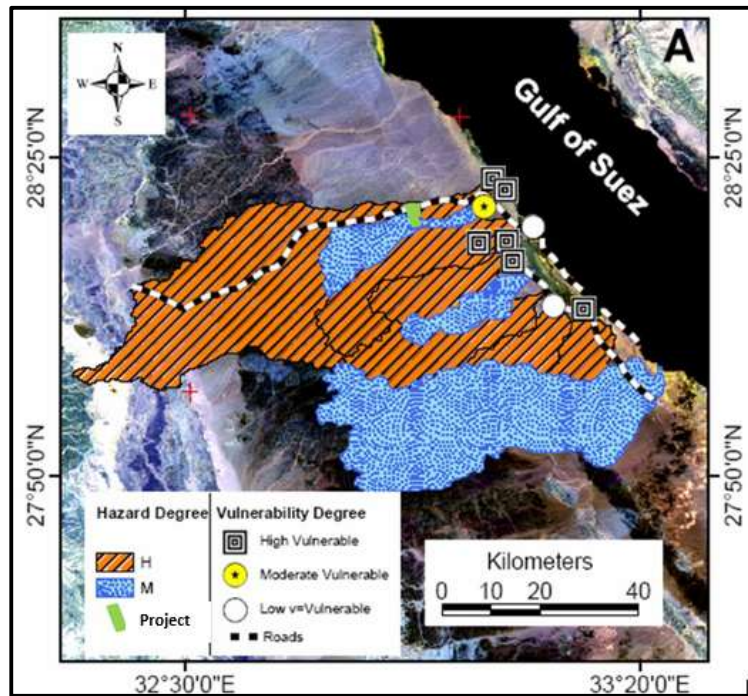


Figure 76: Drainage Basins Hazard and Vulnerability Map for Ras Ghareb City

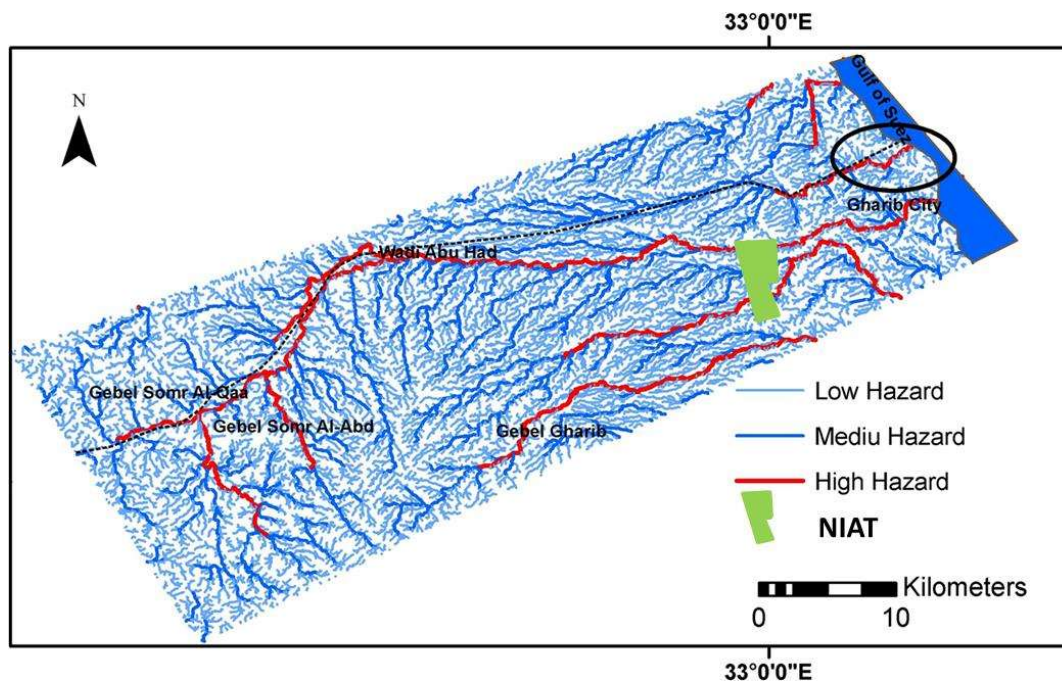


Figure 77: Drainage Network of the Area

Based on the above analysis, Elnazer et al. 2017 proposed establishing a channel nearly 38 km long directed to the north of the city to decrease the flash flood problem and its effect on Ras Ghareb as shown in the following figure.

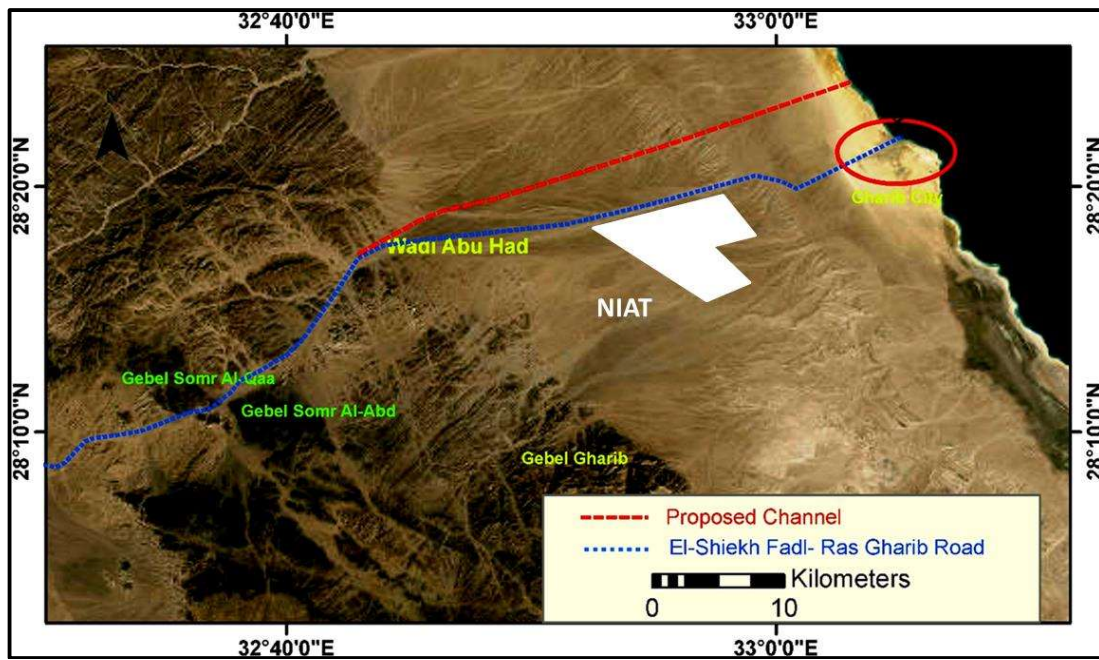
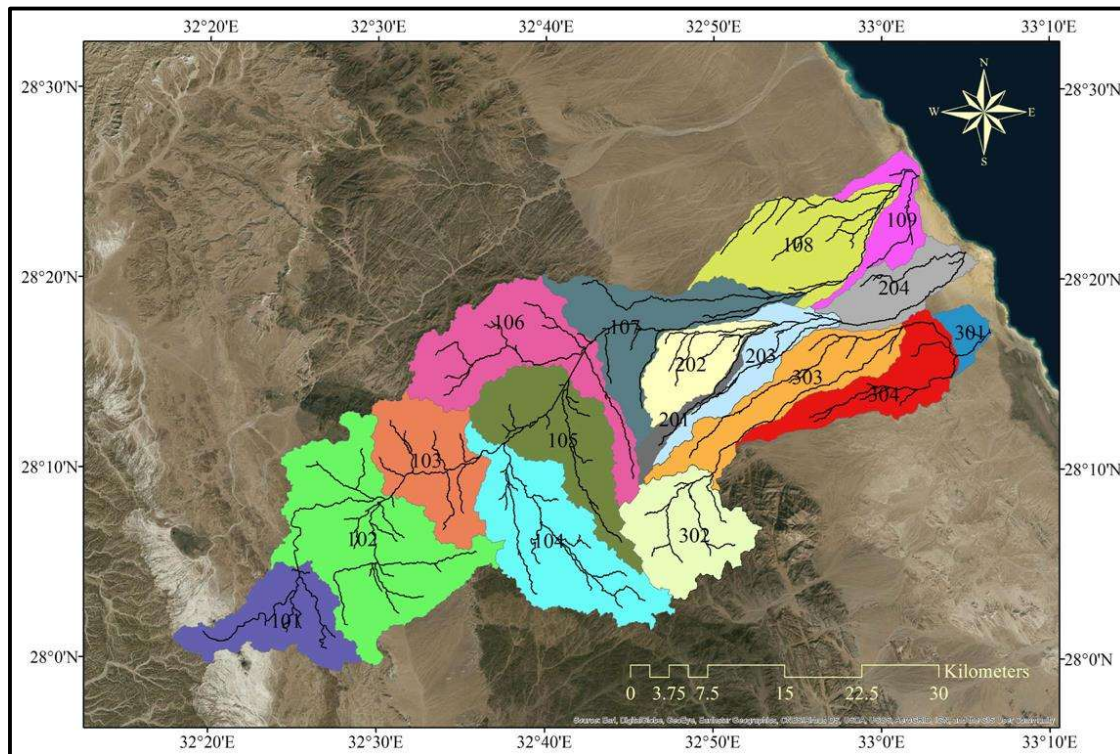


Figure 78: Proposed Flash Flood Channel Located in Study Area

In addition to the above, recently, a comprehensive flood risk assessment study was undertaken for the area (which also includes the Project site) known as “Watershed Delineation and Estimation of Groundwater Recharge for Ras Ghareb Region” (Ezz et al., 2019). Based on GIS software, the study delineated the watershed for Ras Ghareb region into main three basins and then divided them into sub-catchments (as per figure below).



**Figure 79: Ras Ghareb Watersheds and Streamlines**

The three basins and their sub-catchments are listed in the following table. The Project Site is located mainly in sub-catchments 107, 202 and 203.

**Table 64: Ras Ghareb sub-catchment areas and average slopes**

Catchment label	Sub-catchment label	Area (km <sup>2</sup> )	Slope (%)
Basin 1	101	94.84	6.19
	102	242	5.42
	103	111.17	12.48
	104	173.21	15.53
	105	132.76	13.13
	106	161.91	15.62
	107	126.88	6.75
	108	129.32	3.12
	109	50.52	1.9
Basin 2	201	19.04	10.41
	202	64.27	5.83
	203	56.41	3.63
	204	65.87	3.06
Basin 3	301	18.64	23.27
	302	107.54	6.69
	303	109.2	4.27
	304	87.74	1.81

Based on Thiessen polygon method and rainfall data points nearby the study area, the study used the Log-Pearson III distribution to calculate the design storm for different return periods (100, 50, 25, and 10 years) as shown in the figure and table below. The nearest points to the Project site would be areas 1 and 2.



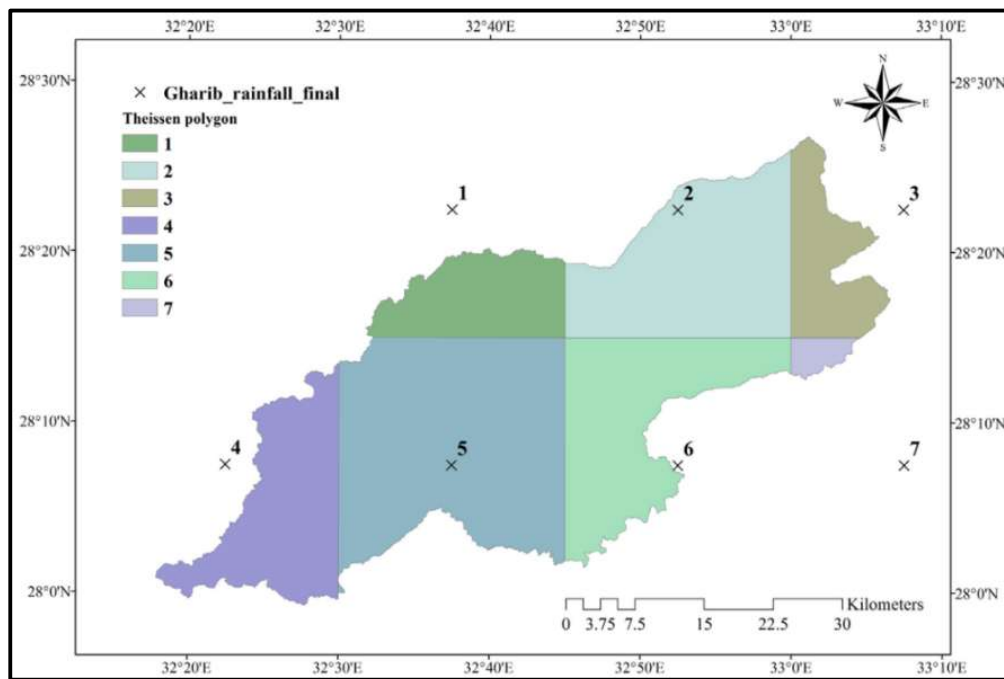


Figure 80: Rainfall Data Points and Corresponding Influenced Area

Table 65: Effective Rainfall Depths for Different Return Periods

Rainfall data points			Area (km <sup>2</sup> )	Rainfall depth (mm) for return periods			
Label	X	Y		100 yrs	50 yrs	25 yrs	10 yrs
1	463,257.34	3,138,801.32	160.9	79	53	35	20
2	468,752.49	3,138,750.53	344.3	62	49	37	25
3	512,247.86	3,138,750.53	136.1	53	44	36	26
4	438,618.80	3,111,207.21	247	71	43	25	12
5	463,171.54	3,111,106.20	540.6	76	46	28	14
6	487,723.89	3,111,055.70	300.1	55	41	30	19
7	512,276.11	3,111,055.70	22.3	46	36	27	18
Effective rainfall depth (mm)				67.1	45.7	30.9	18.3

According to the data from the above table, the maximum rainfall depths expected in the Project area with returned periods 100, 50, 25, and 10 years are 0.8, 0.53, 0.35 and 0.20 cm, respectively.

By applying the Soil Conservation Service (SCS) model, the study calculated the peak discharges flowing from the three basins affecting Ras Ghareb region when applying different rainfall depths as shown in the following table.

Table 66: Runoff Depths, Discharges, and Groundwater Recharge Volume Values

		Return periods			
		100 yrs	50 yrs	25 yrs	10 yrs
Discharge (m <sup>3</sup> /s)	Rainfall (mm)	67.1	45.7	30.9	18.3
	Runoff (mm)	19.86	8	2.32	0.06
	Basin 1	1157.35	466.56	135.32	3.6
	Basin 2	160.95	64.88	18.82	0.5
	Basin 3	382.88	156.35	44.77	1.19
	<b>Total discharge</b>	<b>1701.18</b>	<b>685.79</b>	<b>198.91</b>	<b>5.3</b>
Runoff volume*10 <sup>6</sup> (m <sup>3</sup> )	Basin 1	24.28	9.788	2.839	0.076
	Basin 2	4.083	1.646	0.47	0.013
	Basin 3	6.417	2.587	0.75	0.02

	<b>Total runoff volume</b>	<b>34.78</b>	<b>14.02</b>	<b>4.07</b>	<b>0.11</b>
Recharge volume * 10 <sup>6</sup> (m <sup>3</sup> )	Basin 1	49.1465	26.4793	15.3291	2.6873
	Basin 2	8.26431	4.45267	2.57769	0.45189
	Basin 3	0.74929	0.40371	0.23371	0.04097
	<b>Total recharge volume</b>	<b>58.16</b>	<b>31.34</b>	<b>18.14</b>	<b>3.18</b>

The results of applying the SCS model estimated the runoff depths as 19.86, 8.00, 2.32, and 0.06 mm for the return periods 100, 50, 25, and 10 years, respectively; whereas the total surface runoff for the entire area was estimated at 34.78, 14.02, 4.07, and 0.11 million m<sup>3</sup>, respectively for the selected return periods. The total groundwater recharge volumes for the entire area were estimated at 58.16, 31.34, 18.14, 3.18 million m<sup>3</sup>, respectively.

According to the above data it can be concluded that:

- The estimated runoff depths in the whole area are 19.86, 8.00, 2.32, and 0.06 mm for the return periods 100, 50, 25, and 10 years, respectively. This means that in the maximum rainfall storm which is expected to happen in the area once every 100 years, the maximum runoff depth will be 2 cm.
- Basin 1 is the catchment area of Wadi Abu Had which runs out of the Project site (as explained in further details throughout the section that follows) has the maximum discharge rate of 1157.35, 466.56, 135.32, and 3.6 m<sup>3</sup>/s for selected returned periods 100, 50, 25, and 10 years, respectively. While Basin 2 (Aldarb catchment area) which covers the most areas of the Project site (as explained in further details throughout the section that follows) has the minimum discharge rate of 160.95, 64.88, 18.82 and 0.5 m<sup>3</sup>/s in returned periods 100, 50, 25, and 10 years, respectively.
- Basin 1 has the maximum runoff volume of 24.28, 9.788, 2.839 and 0.076 million m<sup>3</sup> for selected return periods 100, 50, 25, and 10 years, respectively, while Basin 2 has the minimum runoff volume of 4.083, 1.646, 0.47, and 0.013 million m<sup>3</sup> for selected return periods 100, 50, 25, and 10 years, respectively.
- Basin 1 has the maximum groundwater recharge volume of 49.1465, 26.4793, 15.3291 and 2.6873 million m<sup>3</sup> for selected return periods 100, 50, 25, and 10 years, respectively, while Basin 2 groundwater recharge volume of 8.264, 4.4527, 2.57769 and 0.45189 million m<sup>3</sup> for selected return periods 100, 50, 25, and 10 years, respectively.
- The groundwater discharge volume is double the surface runoff volume meaning that the sediments cover the whole areas of the site is highly permeable to adsorb a large amount of the rainfall and thus weakens the surface runoff.

### Field Assessment

A field reconnaissance survey was undertaken as part of the Hydrological, Hydraulic and Flood Risk Assessment to validate desktop analysis, confirm drainage characteristics, and assess flood-related features within and surrounding the Project site. The survey focused on the wadis influencing the site, including Wadi Abu Had, Wadi El Darb, and Wadi El Khorim, extending from upstream catchments to their downstream outlets.

The field survey formed a key input to the hydrological and hydraulic modelling and included the following:

- Inspection of drainage basins and wadi systems from their intersections with the Project boundary to accessible upstream locations to confirm watershed characteristics and flow paths;
- Verification of natural drainage patterns, including identification of tributaries, flow accumulation zones, and direction of surface runoff;
- Assessment of geomorphological and geological features influencing runoff behaviour, infiltration capacity, and sediment transport;

- Identification of evidence of past or recent flood events (e.g., erosion features, sediment deposits, and flood marks); and
- Documentation of existing man-made flood protection structures (e.g., diversion channels, culverts, barriers, dams, and artificial storage areas) and their interaction with natural drainage systems.

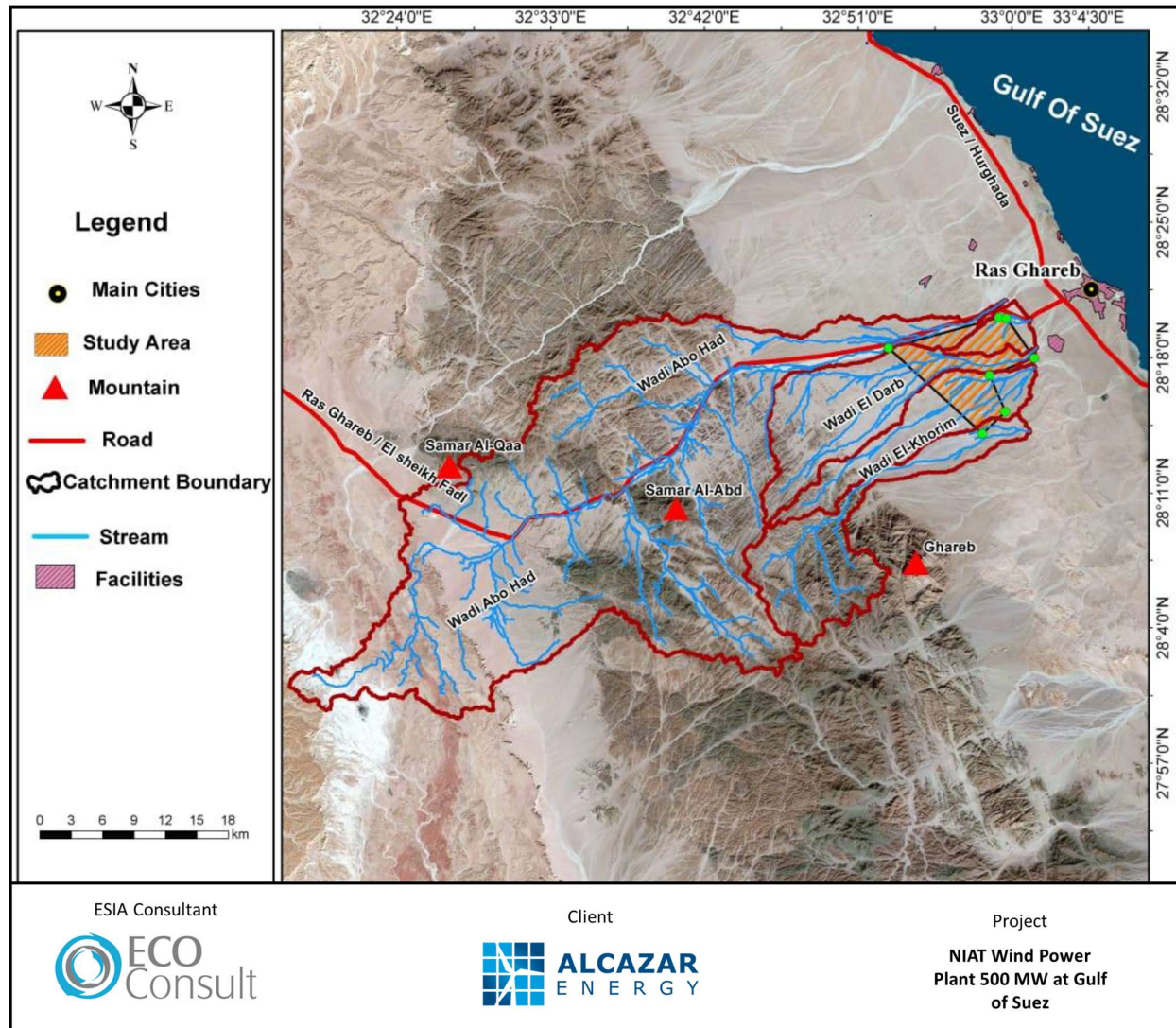


Figure 81: Drainage Basins Crossing the Area around Project Site



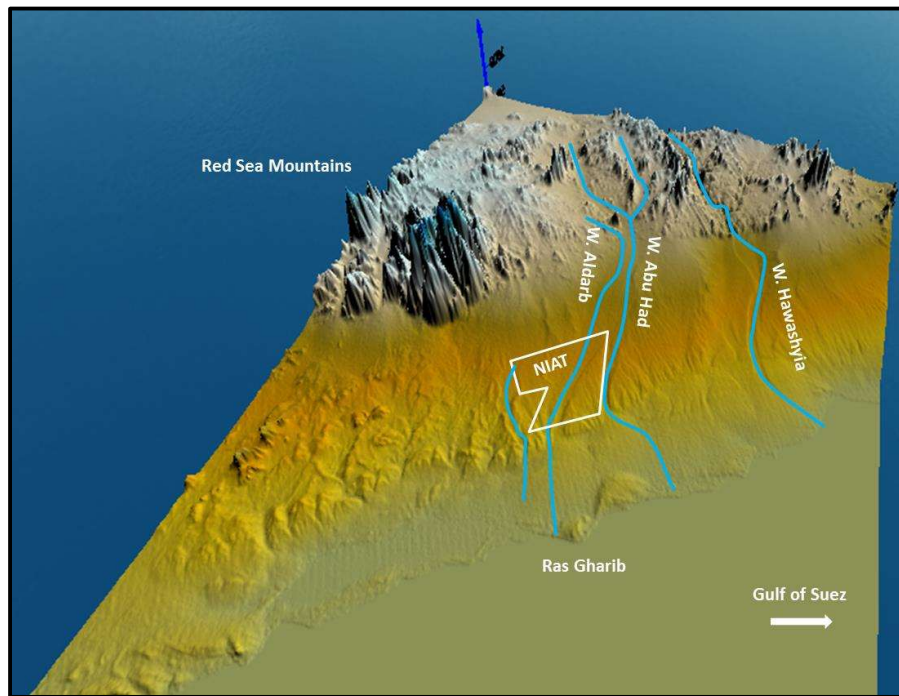


Figure 82: 3D model of the Area Constructed from (Shuttle Radar Topography Mission) SRTM Maps

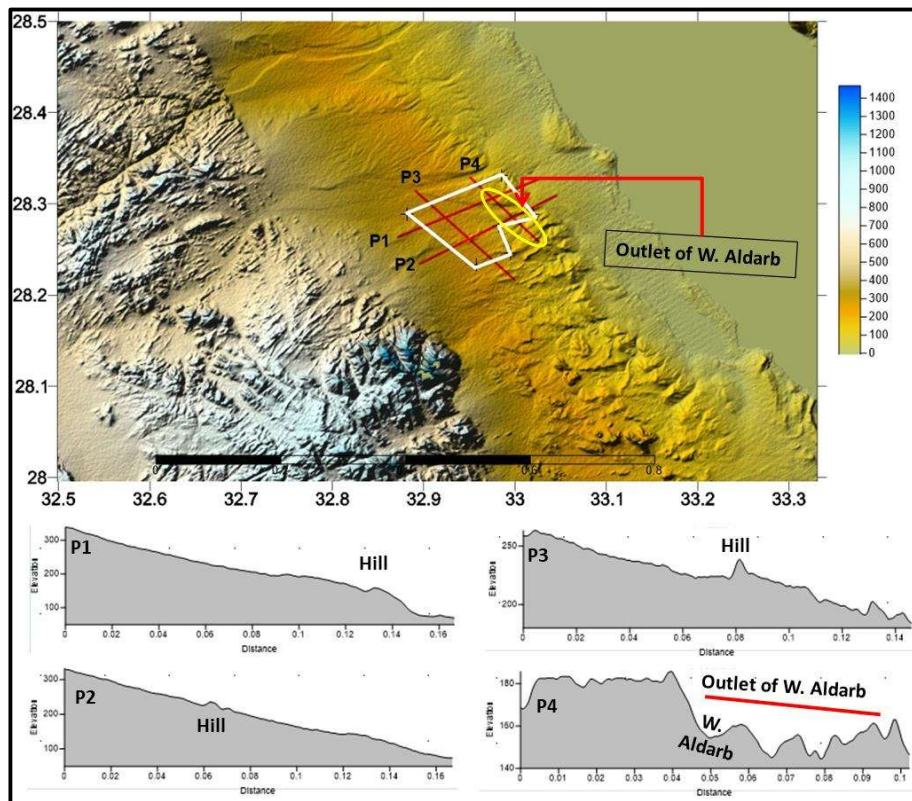
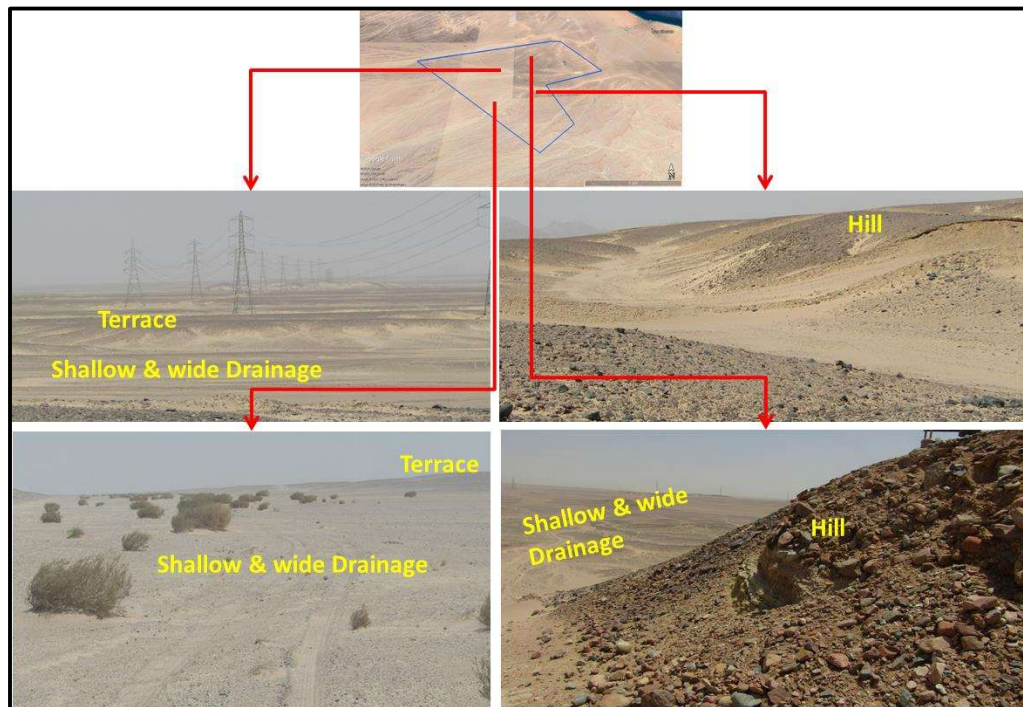


Figure 83: Four Topographic Profiles Constructed along Project Site



**Figure 84: Shallow Dissected Hills Separated by Wide Shallow Drainage Lines Prevailed at Project Site**

Regarding the potential for hazardous flash flooding within the Project area, the field reconnaissance survey was undertaken to identify physical evidence of surface runoff and validate the hydrological and hydraulic modelling outputs. Observations from the site visit are consistent with the findings of the Alcazar Flood Risk Assessment, which indicates that the site is influenced by episodic flash flood events originating from upstream wadis, but that flood behaviour is largely controlled by topography, sediment characteristics, and drainage patterns.

The most notable field observations are summarized below:

- The Project site is characterised by generally flat to gently sloping terrain, with numerous shallow, straight tributaries. This morphology reflects predominantly low-energy overland flow conditions, limiting the formation of deep or incised channels;
- Main drainage channels are wide and shallow, composed of mixed fine sediments and coarse gravels, indicating relatively low flow velocities and limited capacity to transport large materials under typical conditions;
- More pronounced geomorphological features, including dissected hills and localized erosion patterns, are present towards the eastern portion of the site near the outlet of Wadi El Darb, where runoff becomes more concentrated;
- Across the southeastern parts of the site, drainage lines are wide with low sinuosity and variable grain size deposits, further indicating diffuse and low-intensity surface flow;
- Minor tributaries within the Project site are generally short, shallow, and poorly defined, reflecting limited runoff volumes and slow surface flow across much of the site;
- Surface sediments across the site comprise thick, highly permeable sandy and gravelly materials, promoting significant infiltration and reducing surface runoff volumes;
- Wadi Abu Had, located to the north of the Project site, represents a major regional drainage system associated with higher flood potential; however, its main flow path lies outside the Project boundary and is partially controlled by existing flood mitigation infrastructure; and



- Wadi El Darb crosses the eastern part of the Project site and is associated with existing flood protection infrastructure, including a barrier dam and artificial storage lake, which function to attenuate peak flood flows downstream.

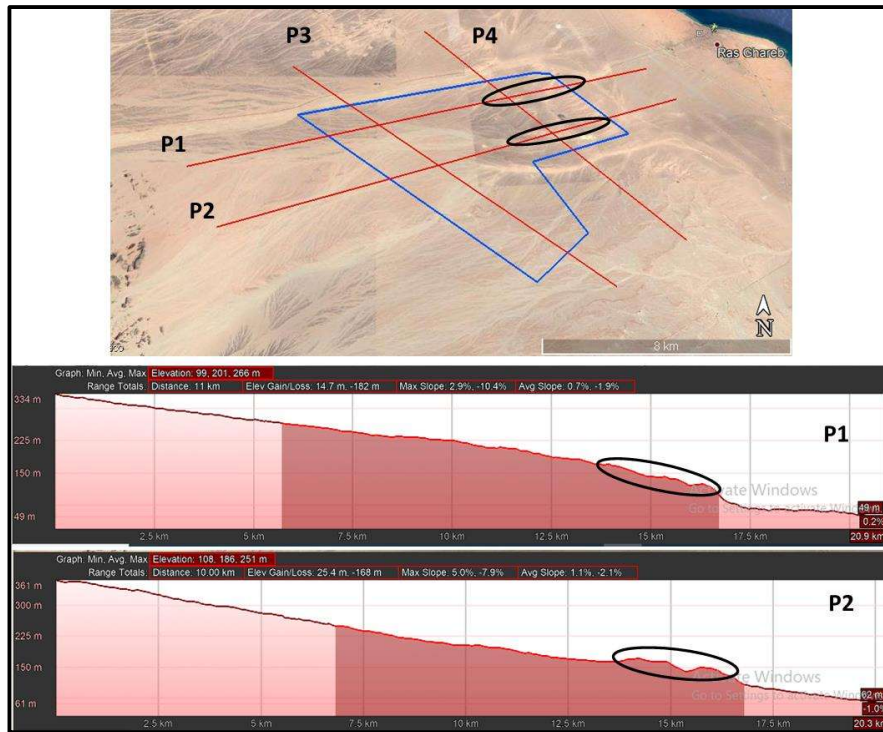


Figure 85: Google Map Showing Elevation Profile along the Middle Part of the Area

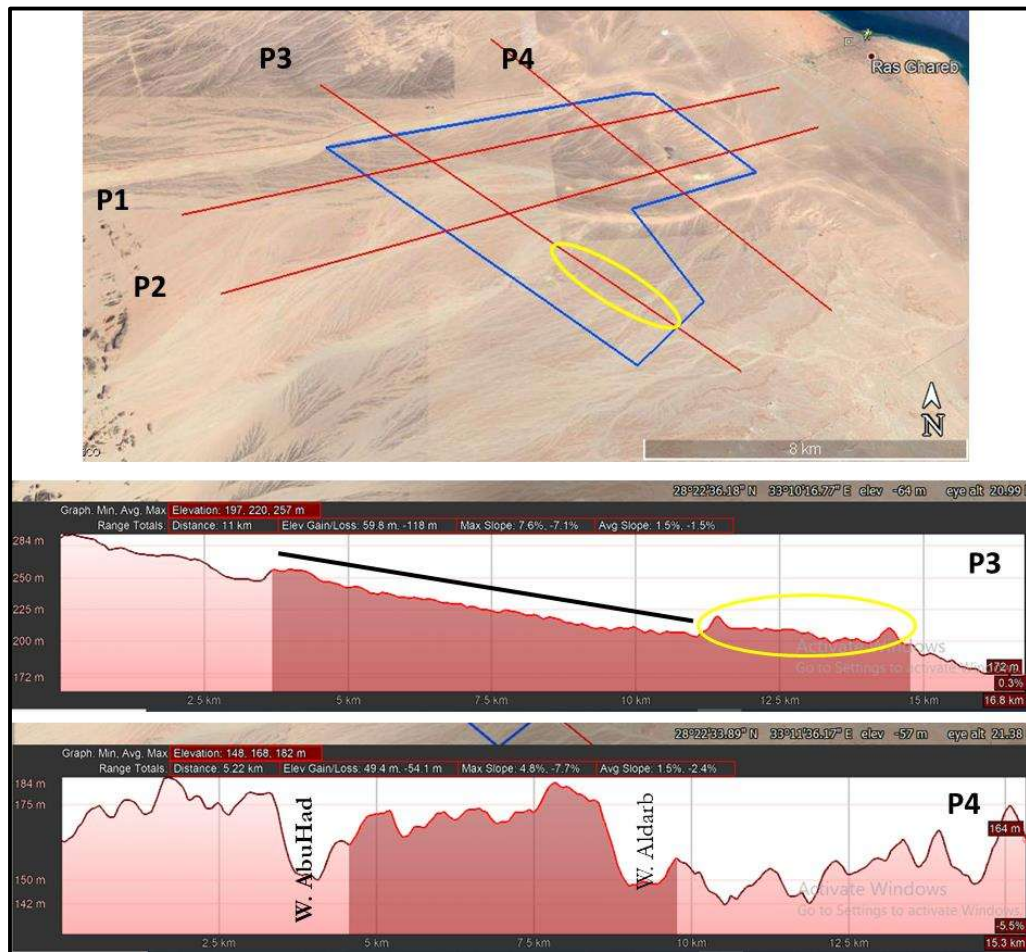


Figure 86: Google Map with NW-SE Elevation Profiles (P3 & P4)

### Outcomes

From the review of the previous studies that dealt with the flash flood hazards occurring in the area surrounding the Project site, in addition to the field visit that was conducted the following could be summarized:

- With the global warming and climate changes, Ras Ghareb region began to experience dangerous floods in the rainy seasons during the last 15 years.
- The Project site is influenced by regional drainage systems, primarily Wadi Abu Had, Wadi El Darb, and Wadi El Khorim, which convey runoff eastwards towards the Gulf of Suez.
- Wadi Abu Had, located to the north of the Project site, represents a major regional drainage basin with relatively higher flood potential; however, its main flow path lies outside the Project boundary and is partially controlled by existing diversion structures and culverts.
- The site represents a part of the Wadi Aldarb basin, in which rainwater is collected through the small tributaries abundantly spread in the Project area in the form of a weak surface flow until it meets at the exit of the main wadi located to the east outside the site, causing a violent torrent that directly hits the city of Ghareb.
- The sediments covering the Project site have a high percentage of porosity and permeability, which leads to the sub-surface leakage of a large amount of rainwater, which reduces the surface flow occurs at the Project site.

- The entire Project site is characterized by simple relief with a very gentle slope towards the east and north-east, and there are no signs of a severe surface flow that may cause a vertical deepening of the tributaries paths as all-drainage lines in the Project site are wide and shallow except at the eastern part where a flood barrier dam was constructed at the exit of Wadi Aldarb.
- The surface sediments that cover the project site and drainage lines of different orders are multi-sized deposits, from fine to very large sized deposits. This means that the surface run off is weak and unable to carry large sized sediments. Once the surface flow from the fine tributaries reaches the high ordered segments of the wadi (main wadi course) its intensity is reduced dramatically leaving the fine sediments (clay & silt) deposited along the wadi course.
- There is a sign of deep dry wadis crossing the Project site with large alluvial fan deposits reflecting strong surface flow at that part.
- The drainage lines that drain the Project site are very short, wide, and shallow that reflect a complete absence of floods except at the outlet of Wadi Aldarb to the east.
- Flood protection, barrier dam with artificial storage lake, is the only flood protection facility that was constructed in the whole area of the Project site.

Since the violent torrents struck Ras Ghareb city and most cities of the Red Sea coast and the Gulf of Suez in 2016, the Government has established some facilities along the course of many dry wadis in and around the region to protect lives and facilities. As for the basins in the area near the Project site, which are Wadi Abu Had and Wadi Aldarb, the following flood mitigation facilities were constructed:

#### Along Wadi Abu Had

- Three redirected barriers were established on Ras Ghareb – El Sheikh Fadl Road to protect the asphalt road and Ras Ghareb city. The first one is at the 8 km and includes 16 culverts with a capacity of 3 × 3 meters each (check figure below). The second barrier is at 20 km, and it includes 10 culverts with a capacity of 3 x 3 meters each, and the third one is at 51 km, with 10 culverts, 3 x 3 meters each.

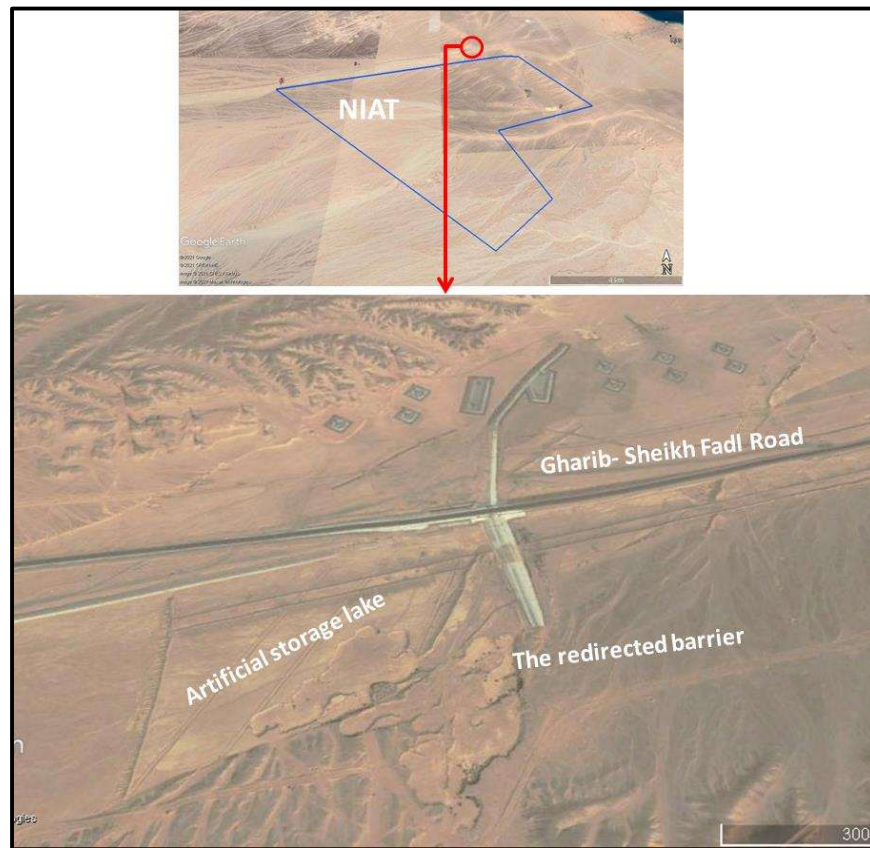


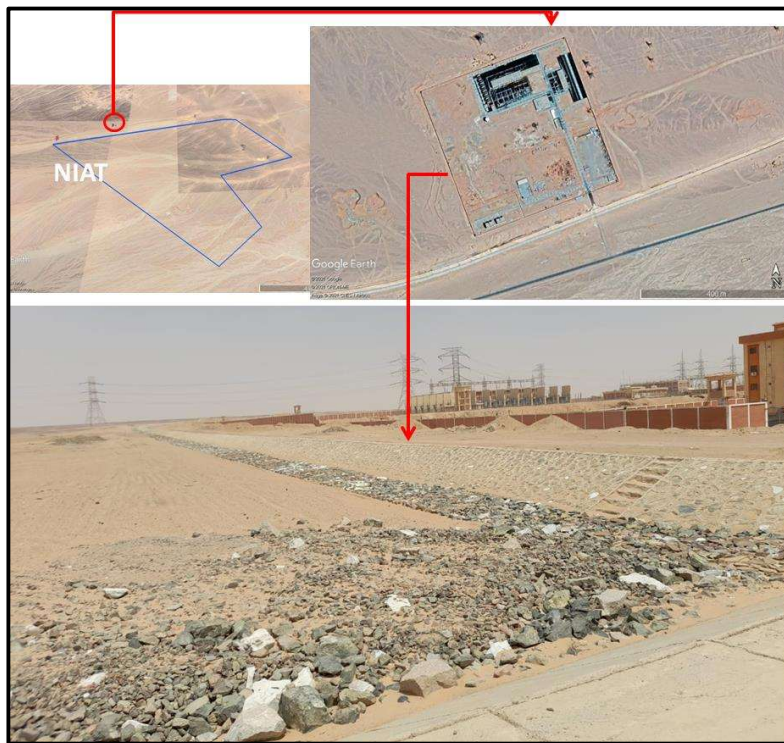
Figure 87: Redirected Water Barrier along Ras Ghareb-El Sheikh Fadl Road at 8km Mark



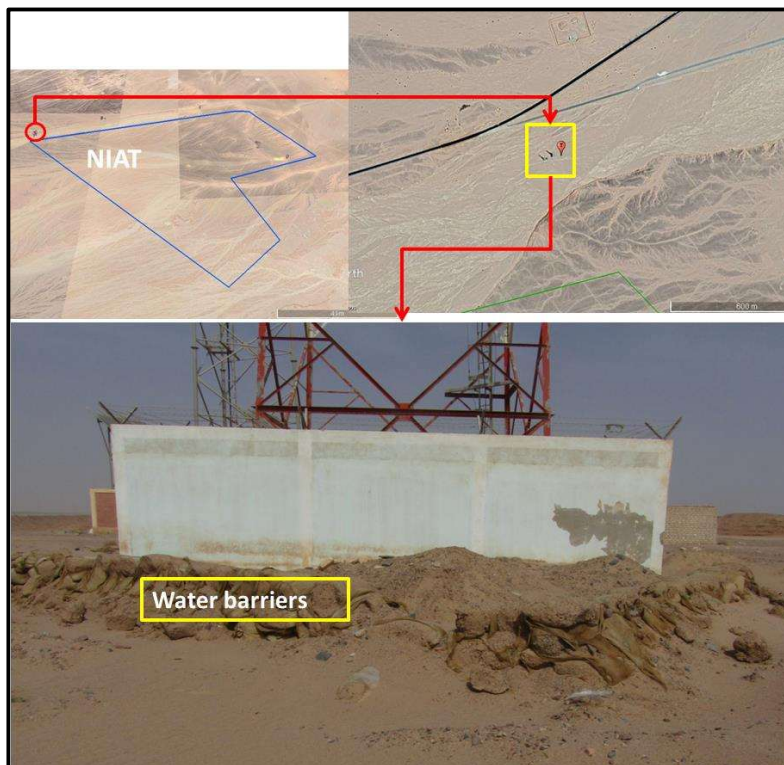
Figure 88: Field photographs of Water Barrier at 8km Mark and Associated Culverts

- Other applications to protect the important constructions in the area include:
  - Concrete fence to protect the power substation and the electricity OHTL in the area close to Wadi Abu Had (refer to figures below).





**Figure 89: Stone and Concrete Fence Protecting the Substation**



**Figure 90: Stone and Concrete Fence at the base of the OHTL to Protect from Surface Run Off**

- A simple fence was built using the local materials to protect the communication towers located along Wadi Abu Had close to the project site (refer to figure below)



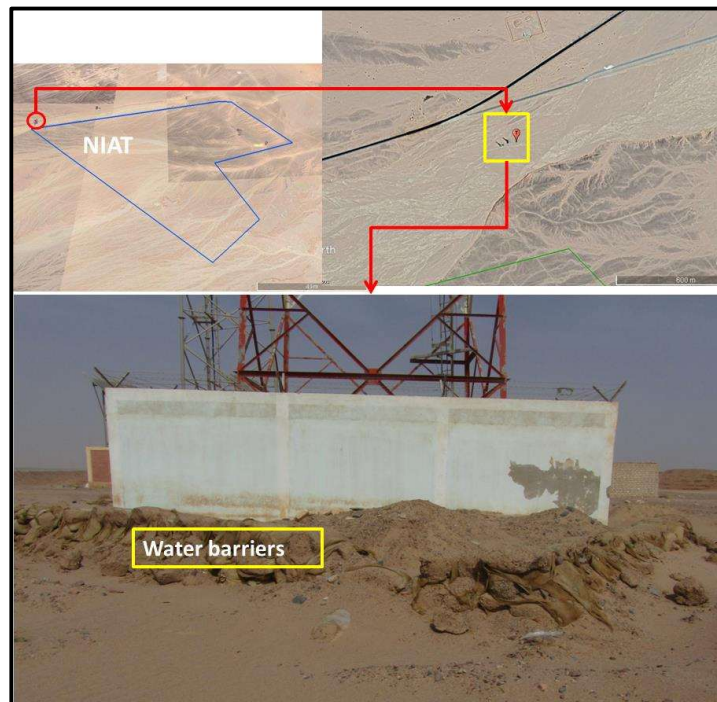


Figure 91: Containers Filled with Sand and Gravels Stacked Forming a Wall to Protect the Towers

#### Along Wadi Aldarb

As discussed earlier in “Section 7.9”, a barrier dam was constructed at the outlet of Wadi Aldarb with an artificial lake that can store about nine million seven hundred cubic meters of water in rainy events to protect Ras Ghareb city (refer to figure below).

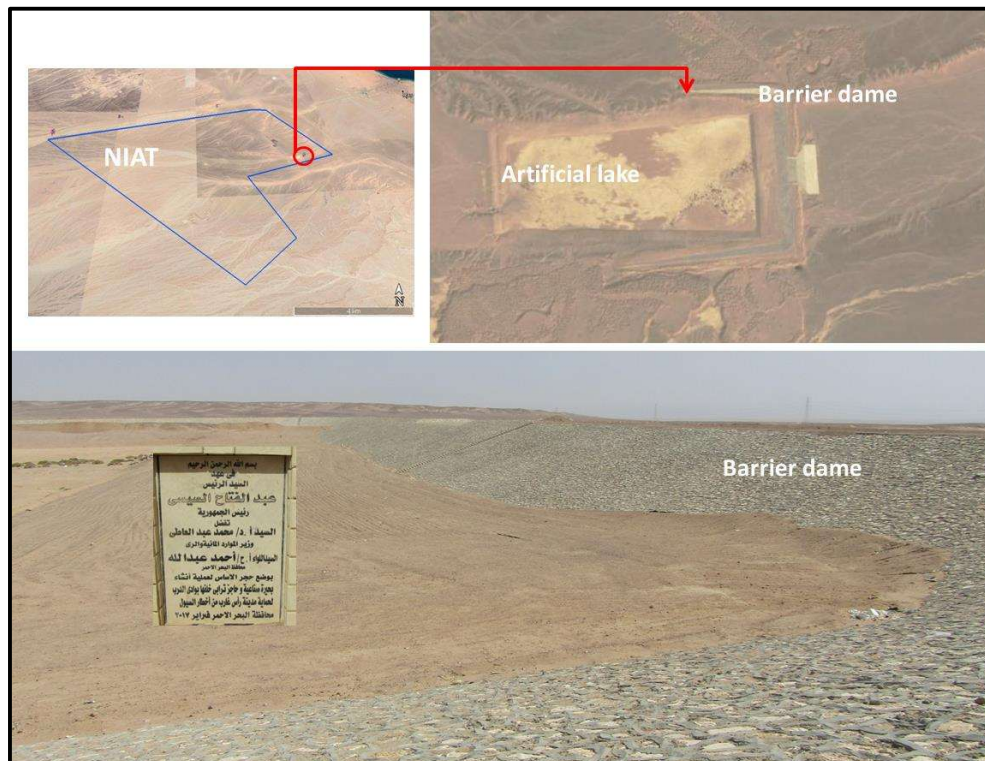
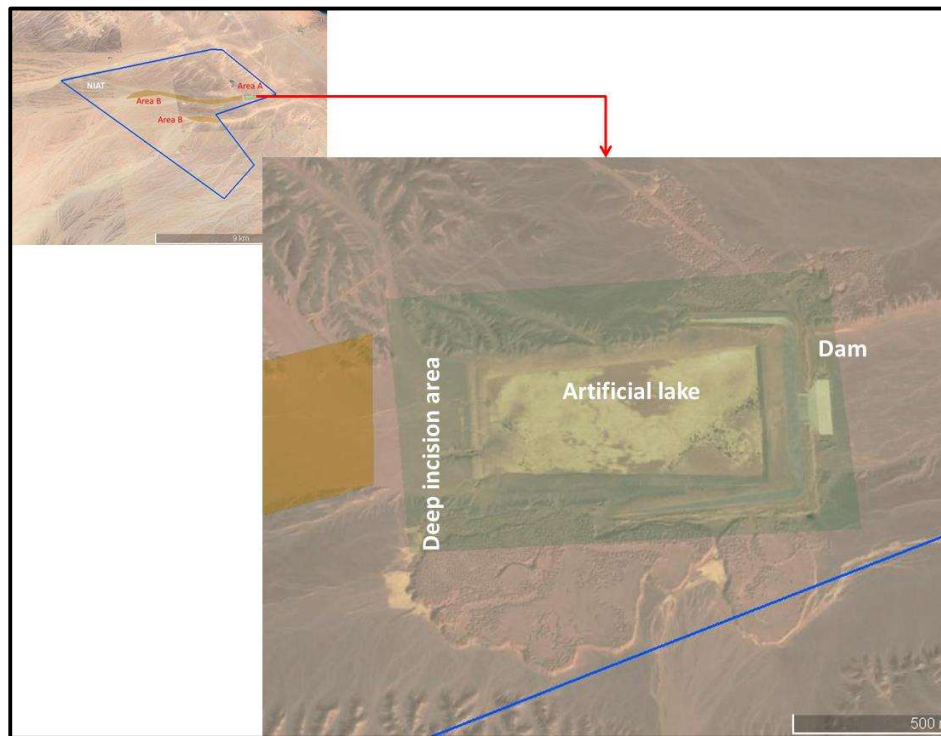


Figure 92: Barrier Dam and Artificial Lake Established at the Outlet of Wadi Aldarb



**Figure 93: Area A in Project Site**

The potential impacts from flood risk, should the above issues not be taken into account as part of the planning phase of the Project, could result in impacts that are considered of long-term duration, of negative nature, and of medium magnitude and high sensitivity given that it could damage turbine's foundation and access roads. Given all of the above, the impact is considered of moderate significance.

#### Mitigation Measure

The outcomes of the preliminary and comprehensive flood assessment undertaken should be reviewed and taken into account as part of the detailed design. In specific, based on a site survey and revision of the outcomes of the study, the Project should confirm and incorporate they key outcomes to include the following recommendations:

- No Project components should be developed in the dam area located within the Project site, which includes the dam, artificial lake area and the incision area preceding the lake area as noted in the figure below and denoted as 'Area A'.
- Within the key areas denoted as 'Area B' in the figure below components can be placed however it is recommended that simple protection measures are included. These areas are considered as the main trunk streams, where rainwater accumulates from a number of large tributaries scattered around and therefore the surface run-off is slightly larger than the surrounding areas. Protection measures need to be identified by the Civil/Design Engineer along with their specifications and could include for example: (i) simple concrete fences for turbines, substation, buildings, etc. similar to those included within the existing nearby structures (e.g. telecom towers, OHTL towers, etc.) as presented earlier (ii) appropriate foundations for turbine structures; (iii) culverts for asphalt roads; (iv) insulation for underground cables; among others.

Following the implementation of the mitigation measures highlighted throughout this section, the residual significance would be reduced to low significance.

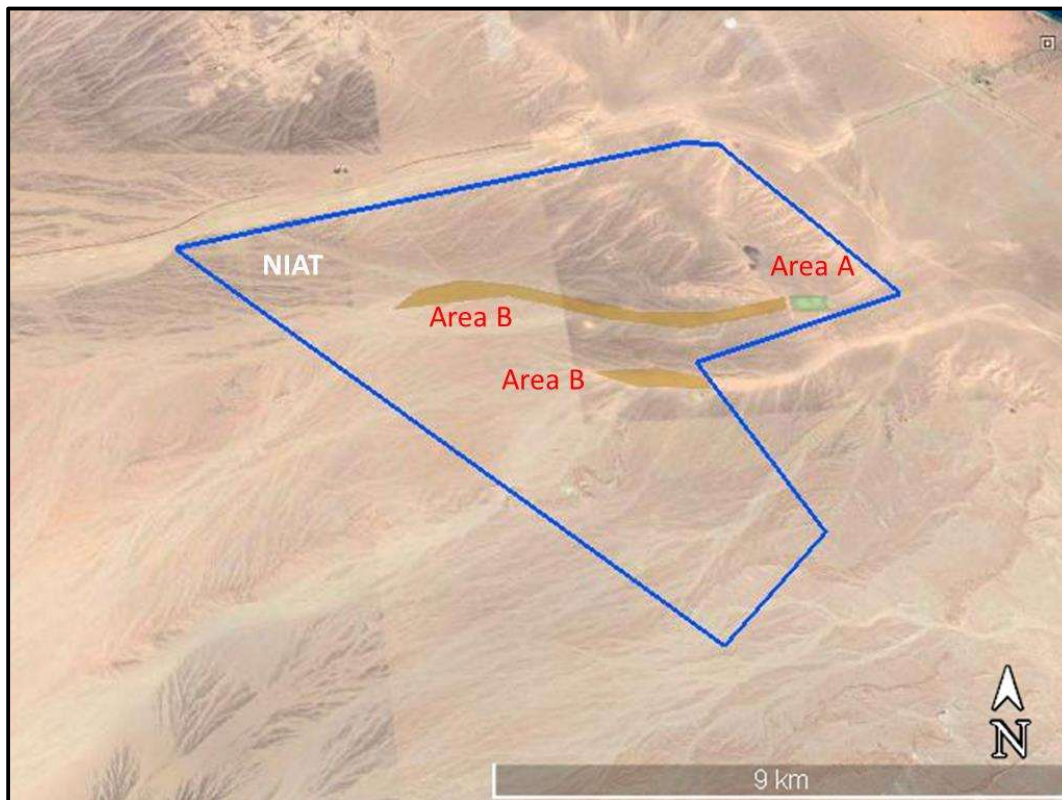


Figure 94: Demarcation of Area A and Area B

#### 8.4.2 Potential Impacts from Improper Management of Waste Streams during Construction and Operation

Given the generic nature of the impacts on soil and groundwater for both phases of the Project (construction and operation) those have been identified collectively throughout this section. Generally, this includes potential impacts from improper housekeeping practices (e.g. improper management of waste streams, improper storage of construction material and of hazardous material, etc.).

Improper housekeeping practices during construction and operation (such as illegal disposal of waste to land) could contaminate and pollute soil which in turn could pollute groundwater resources. This could also indirectly affect flora/fauna and the general health and safety of workers (from being exposed to such waste streams). Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures as highlighted throughout this section, which are expected to be implemented by the Contractors throughout construction operation phases.

The potential impacts from improper management of waste streams could be of a long-term duration throughout the construction and operation phases. Such impacts are negative in nature and could be noticeable and are therefore of medium magnitude. However, they are considered of low sensitivity as they are generally controlled through the implementation of general best practice housekeeping measures. Given all of the above, such an impact is considered to be of minor significance.

Following the implementation of the mitigation measures highlighted throughout this section, the residual impact would be reduced to not significant.

##### (i) **Solid Waste Generation**

Solid waste is expected to be generated from construction and operational activities. Solid waste generated will likely include construction waste (such as debris) and municipal solid waste (during construction and operation such as cardboard, plastic, food waste, etc.).



Municipal solid waste and construction waste generated will likely be collected and stored onsite and then disposed to the closest approved dumpsite (Ras Ghareb Landfill) or, if possible, reused in the construction activities.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities, including contractors during construction and operations phases unless stated otherwise:

- Undertake training to workers on waste management measures as included below
- Coordinate with Ras Ghareb City Council for the collection of solid waste from the site to the municipal approved landfill (Ras Ghareb Landfill) or for recycling (as discussed in further details below);
- Prohibit fly-dumping of any solid waste to the land;
- Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste";
- During construction, distribute a sufficient number of properly contained containers clearly marked as "Construction Waste" for the dumping and disposal of construction waste.
- During construction, it is recommended that recycling measures are implemented. It is recommended that recycling is undertaken in the following approach: (i) separation at source of recyclables and disposal in separate containers (cardboard, paper, glass, metal, etc.); and (ii) separation and disposal of non-recyclable materials in a separate container (e.g. food waste). Each container must be clearly marked. In addition, Contractor must seek ways to reduce construction waste by reusing materials (for example through recycling of concrete for road base coarse);
- Implement proper housekeeping practices on the construction site at all times; and
- Maintain records and manifests that indicate volume of waste generated onsite, collected by waste contractors, and disposed of at the landfill. The numbers within the records are to be consistent to ensure no illegal dumping at the site or other areas.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities, including contractors during construction and operations phases unless stated otherwise:

- Inspection of waste management practices onsite;
- Review of records and manifests for volume of waste generated to ensure consistency; and
- Regular environmental reporting on implementation of the waste management practices onsite.

#### **(ii) Wastewater Generation**

Wastewater is mainly expected to include black water (sewage water from toilets and sanitation facilities), as well as grey water (from sinks, showers, etc.) generated from use by workers during the construction and operation phases. Wastewater quantities are expected to be minimal, especially during the operations phase, when the number of workers is much smaller. It is expected that wastewater will be collected and stored in fully contained septic tanks and then collected and transported by transportation tankers to be disposed at the closest Wastewater Treatment Plant (WWTP) (being Ras Ghareb WWTP).

#### Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities, including contractors during construction and operations phases unless stated otherwise:

- Coordinate with Ras Ghareb Water and Wastewater Company to hire a private contractor for the collection of wastewater from the site to the closest WWTP (being Ras Ghareb WWTP);
- Prohibit illegal disposal of wastewater to the land or sea;
- Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractors, and disposed of at the WWTP. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas;
- Ensure that constructed septic tanks during construction and those to be used during operation are well contained and impermeable to prevent leakage of wastewater into soil; and
- Ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities, including contractors during construction and operations phases unless stated otherwise:

- Inspection of wastewater management practices onsite;
- Review of records and manifests for volume of wastewater generated to ensure consistency; and
- Regular environmental reporting on implementation of the wastewater management practices discussed above.

#### **(iii) Hazardous Waste Generation**

Hazardous waste is expected to be generated throughout both the construction and operation phase and this could include consumed oil, chemicals, paint cans, etc. Hazardous waste generated will likely be collected and stored onsite and then disposed at the approved hazardous waste disposal facilities managed by the Hazardous Waste Management Project and supervised by the governorate and the EEAA.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities, including contractors during construction and operations phases unless stated otherwise:

- Undertake training to workers on hazardous waste management measures as included below
- Coordinate and hire a private contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities;
- Ensure that hazardous waste is disposed in a dedicated area that is enclosed; of hard surface; with proper signage and suitable containers as per hazardous waste classifications and that they are labelled for each type of hazardous waste;
- Ensure hazardous waste storage area is equipped with spill kit, fire extinguisher and anti-spillage trays and a hazardous waste inventory is available;
- Ensure all workers handling hazardous waste are equipped with the necessary personal protective equipment;
- Prohibit illegal disposal of hazardous waste in unlicensed facilities/areas;



- Potentially contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste;
- Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing; and
- Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous waste disposal facilities. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities, including contractors during construction and operations phases unless stated otherwise:

- Inspection of hazardous waste management practices onsite;
- Review of records and manifests for volume of hazardous waste generated to ensure consistency; and
- Regular environmental reporting on implementation of the hazardous waste management practices onsite.

#### ***(iv) Hazardous Material***

The nature of construction and operational activities entail the use of various hazardous materials such as oil, chemicals, and fuel for the various equipment and machinery. Improper management of hazardous material entails a risk of leakage into the surrounding environment either from storage areas or through the use of equipment and machinery.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities, including contractors during construction and operations phases unless stated otherwise:

- Ensure that hazardous materials are stored in proper areas and in a location where they cannot reach the soil in case of accidental spillage. This includes storage facilities that are of hard impermeable surface, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another;
- Maintain a register of all hazardous materials used and accompanying Safety Data Sheet (SDS) must be present at all times;
- Spilled material should be tracked and accounted for in the registers;
- Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.);
- Regular maintenance of all equipment and machinery used onsite. Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refuelling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material;
- Ensure that hazardous materials warehouses are equipped with emergency eye wash and/or emergency shower, first aid kits, as well as fire extinguishers, based on type of material stored;

- Ensure that all workers handling hazardous materials or working at the warehouses are equipped with the necessary personal protective equipment based on information provided in materials' SDSs and risk assessments;
- Ensure that a minimum of 1,000 liters of general-purpose spill absorbent is available at hazardous material storage facility. Appropriate absorbents include zeolite, clay, peat and other products manufactured for this purpose; and
- If spillage on soil occurs, spill must be immediately contained, cleaned up, and contaminated soil disposed as hazardous waste.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities, including contractors during construction and operations phases unless stated otherwise:

- Inspection for storage of hazardous materials to include inspections for potential spillages or leakages; and
- Report any spills and the measures taken to minimize the impact and prevent them from occurring again.

#### **8.4.3 Potential Impacts from Erosion and Runoff during the Construction Phase**

Site preparation activities which are to take place onsite by contractors for installation of the various Project components, such as wind turbines, substation, cables, etc. are expected to include land clearing activities, excavation, grading, etc.

The nature of construction activities discussed above could disturb soil, potentially exposing it to increased erosion during rainfall events. If onsite erosion and runoff are not controlled, they can result in siltation of surface water. Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures as highlighted throughout this section/ Such measures are expected to be implemented throughout construction phase.

The potential impacts from erosion and runoff are of short-term duration as they are limited to the construction phase. Such impacts are negative in nature and could be noticeable and are therefore of medium magnitude. However, they are considered of low sensitivity as they are generally controlled through the implementation of general best practice housekeeping measures. Given all of the above, such an impact is considered to be of minor significance.

Following the implementation of the mitigation measures highlighted throughout this section, the residual impact would be reduced to not significant.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities, including contractors during the construction phase:

- Avoid executing excavation works under harsh weather conditions.
- Place clear markers indicating stockpiling area of excavated materials to restrict equipment and personnel movement, thus limiting the physical disturbance to land and soils in adjacent areas.
- Erect erosion control barriers around work site during site preparation and construction to prevent silt runoff where applicable. This could include but not limited to silt fences, gravel bag berms, fibre rolls, or other similar applications.

- Reinstall surfaces disturbed during construction to their original (or better) condition to the greatest extent possible.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities, including contractors during the construction phase:

- Inspection for erosion and runoff control to include inspections for implementation of mitigation measures.

### **8.5 Biodiversity**

This section identifies the anticipated impacts on biodiversity from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

#### **8.5.1 Potential Impacts during the Construction Phase**

Site preparation activities which are to take place onsite by the contractors for installation of the wind turbines and the various Project components, including substation, transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Such activities are limited to the relatively small individual footprints of these facilities and the actual area of disturbance is relatively minimal. Nevertheless, such activities would still likely result in the alteration of the site's habitat and thus potentially disturb existing habitats. Other impacts on the biodiversity of the site may result from improper management of the site, which could include improper conduct and housekeeping practices by workers (i.e. hunting of animals, discharge of hazardous waste to land, etc.).

However, as discussed earlier, the Project site is generally considered of low ecological significance, but special consideration should be given to the globally threatened Egyptian Dabb Lizard *Uromastix aegyptia*, since the Project site provides a typical habitat for such species.

The importance of this species is also emphasized within the "Strategic Environmental and Social Impact Assessment for an area of 300 km<sup>2</sup> of potential wind farms at the Gulf of Suez (2013)". The environmental permit issued for the 300km<sup>2</sup> ESIA requires adherence to all specifications and conditions included within the 300km<sup>2</sup> ESIA study. The study identifies the following specifications in relation to biodiversity:

- *Installation of turbines and other technical installation should be avoided in areas settled by the Egyptian Dabb Lizard.*
- *Execution of reconnaissance on Dabb Lizard burrow sites prior to detailed design. Installation of turbines and other construction measures are to be avoided at a distance of 250 m from Dabb Lizard burrows.*

Given all of the above, the potential impacts on biodiversity created during the construction phase would be of a long-term duration as they would result in a permanent change in the natural biodiversity of the site. Such impacts are considered of negative nature and of a medium magnitude given that the change in the natural biodiversity of the site will be noticeable in limited individual footprints. In addition, as the site is considered of low ecological significance, the receiving environment is determined to be of a low sensitivity. Given all of the above, such an impact is considered to be of minor significance.

#### Additional Surveys

As discussed above, the permit issued for the 300km<sup>2</sup> Strategic ESIA identifies specific buffer distance requirements for turbine design related to the Egyptian Dabb Lizard. However, this is not considered a feasible or practical solution given that burrows can change and are not fixed (an active burrow this year can become inactive next year given that they continuously move to other locations).

Therefore, it is recommended that as alternative and more feasible option that a detailed survey is undertaken prior to land clearance as part of construction works through a biodiversity expert taking into consideration the seasonality of the Egyptian Spiny-tailed Lizard. The survey should focus on all construction activities areas and in particular the Wadi systems where such a species is likely to be located.

As a first step, the design must consider to the extent possible and feasible the avoidance of these burrows. Should this not be possible, justification should be provided and relocation activities should be undertaken to nearby undisturbed similar habitats.

Based on that, a detailed report should be submitted which documents all of the above.

In addition, findings from the Egyptian Spiny-tailed Lizard survey indicate that the Project site supports the presence of the species, with a relatively notable occurrence of burrows across the site. As the species is globally classified as Vulnerable (IUCN Red List, 2024), and given the reported population decline of over 30% over the past 15 years (three generations), appropriate consideration should be given within the Biodiversity Management Plan (BMP) during construction.

In this context, and where required, translocation of individuals may be undertaken to mitigate potential impacts on local biodiversity. In addition, training and awareness measures should be implemented for construction personnel to highlight the importance of terrestrial fauna and minimize disturbance to wildlife and their habitats.

#### Mitigation Measures

The following identifies mitigation measures to be applied by the contractors during the construction phase:

- As noted above, based on the outcomes of the Egyptian Spiny-tailed Lizard survey, as a first step, the design must consider to the extent possible and feasible the avoidance of these burrows. Should this not be possible, justification should be provided and relocation activities should be undertaken to nearby undisturbed similar habitats. The details and requirements for this are discussed in further details within the Biodiversity Management Plan (BMP).
- 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 which include the following:
  - Prohibit hunting of any wildlife at any time and under any condition by construction workers onsite;
  - Ensure proper storage, collection, and disposal of waste streams generated as discussed in detail in "Section 8.4.2";
  - Restrict activities to allocated construction areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances; and
  - Avoid unnecessary elevated noise levels at all times. In addition, apply adequate general noise suppressing measures as detailed in "Section 8.9".

Following the implementation of these mitigation measures, the significance of the residual impact would be categorized as not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the contractors during the construction phase:

- Submission of the BMP with details and requirements on the Egyptian Spiny-tailed Lizard relocation should be required
- Inspection of the works should be carried out at all times.

### 8.5.2 Potential Impacts during the Operation Phase

The only impacts anticipated during the operation phase are related to improper management of the site as discussed earlier. This could include improper conduct and housekeeping practices by workers (i.e. hunting of animals, discharge of hazardous waste to land, etc.).

The potential impacts on biodiversity would be of a long-term duration throughout the operation phase of the Project. Such impacts are of negative nature and of a medium magnitude. However, as the site is considered of low ecological significance, the receiving environment is determined to be of low sensitivity. Given all of the above, such an impact is considered to be of minor significance.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by the Operator during the operation phase:

- 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 which include the following:
  - Prohibit hunting of any wildlife at any time and under any condition by workers onsite;
  - Ensure proper storage, collection, and disposal of waste streams generated as discussed in detail in "Section 8.4.2"; and
  - Restrict activities to allocated areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances.

Following the implementation of these mitigation measures, the significance of the residual impact would be categorized as not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Wind Farm Operator during the operation phase:

- Ongoing monitoring for the Dabb Lizard sites must be undertaken during at least the first 3 years of operation. The objective of the monitoring is to ensure that the Project is not resulting in a decline of the species onsite as well as monitoring on translocated populations. Assessment report should be submitted at end of year 3 to lenders after which monitoring requirements and frequency can be determined.
- Inspection of the works should be carried out at all times.

### 8.6 Birds

This section identifies the anticipated impacts on birds (avifauna) from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation and monitoring measures, additional requirements, etc.) have been identified to eliminate or reduce the impact to acceptable levels.



As noted earlier, an avifauna monitoring program was undertaken for the Project site over six (6) seasons to include spring 2021 and 2022, autumn 2021 and 2022, autumn 2025 and spring 2026.

### 8.6.1 Potential Impacts during the Construction Phase

Site preparation activities by the contractors for installation of the WTGs and associated components, like the substation, transmission cables, access roads and internal road network, or buildings, are expected to include land clearing activities, levelling, excavation, grading, etc..

Such activities can impact the avifauna which potentially uses the site for resting – regardless whether they are soaring or non-soaring resident or migratory species. Generally, such construction activities do not result in any major alteration of the site's habitats given that they are limited to a small individual footprint, and the area of disturbance is quite reduced.

Such potential impacts are created during the construction phase only, and of a short-term duration. However, such impacts are considered of negative nature and of a low magnitude given that the construction activities' actual area of disturbance is relatively minimal. The environmental receptor is determined to be of medium sensitivity. Given all of the above, such an impact is considered to be minor significance.

#### Mitigation Measures

The following identifies the mitigation measures to be implemented by the contractors.

Implementation of proper housekeeping measures to reduce impacts including:

- Restrict activities exclusively to the allocated construction areas, including movement of workers and vehicles to allocated roads within the site, prohibiting off-roading to minimize disturbances.
  - Ban hunting of birds on site at any time and under any condition to anyone, especially workers.
  - Implement measures, preventing bird attraction to the site. This includes measures such as prohibiting littering, dumping, and ensuring waste streams are disposed appropriately in accordance with the measures identified in earlier chapters.
  - Avoid unnecessary elevated noise levels at all times. In addition, apply adequate noise abatement measures. This could include the use of well-maintained mufflers and suppressants for high noise generating equipment and machinery. Develop a regular maintenance schedule of vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.
- Reduced speed limits inside the footprint to avoid road kills and dust.
  - Prohibit night-time driving.
  - Report any incidental finding and killing of wildlife. Develop a protocol to report dispose of any dead and injured wildlife or animals recorded onsite.

Following the implementation of these mitigation measures, the significance of the residual impact would be reduced to not significant.

#### Monitoring and Reporting Requirement

The following summarizes the monitoring requirements for the projects which must be undertaken:

- Visual inspections to ensure above mitigation are implemented at all times.

### 8.6.2 Potential Impacts during the Operation Phase

Wind turbines are associated with impacts on birds resulting from risks of collision for both migratory soaring birds (which could pass over the site during the spring and autumn migration seasons) and resident soaring birds in the area.

Egypt is one of the main crossroads for MSBs crossing from breeding grounds in Europe and Asia to their wintering areas in Africa. High wind energy potentials in the GoS stimulated rapid development of wind energy facilities, which poses additional risk to migratory birds using the area. Principal risks to these species are from fatal collisions with turbines and with overhead powerlines and disturbance/barrier effects.

Based on the foregoing and given the importance of the area for bird migration routes and the implementation of related international commitments, the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) initiated the “Active Turbine Management Program” (ATMP) aiming to support wind energy operations during the heavy bird migratory seasons (spring and autumn) during pre, under, and post-construction phases of wind farms.

This program aims to ensure the avifauna protection and risk mitigation. Therefore, RCREEE has been providing coordination in the execution of the strategic framework among public and private stakeholders, including three governmental institutions; NREA, the Egyptian Environmental Affairs Agency (EEAA) and the Egyptian Electricity Transmission Company (EETC). This was achieved by releasing a Bird Migration Protocol (BMP) called the “Executive Framework for Strategic Cumulative, Environmental & Social Assessment & Program of Ornithological monitoring and Active Turbine Management for Wind Energy Developments in Gulf of Suez”. One of the objectives of the Bird Migration Protocol is to strengthen the protection of birds in their migration path in Egypt against the potential effects of wind-energy projects through a series of practical activities in the GoS area, as well as facilitate cooperation among relevant stakeholders.

#### Objective

The goal of this section is to assess potential associated collision risks based on migration patterns of MSBs across the Project Area based on the spring and autumn 2021 and 2022, autumn 2025 and spring 2026. The objective of the assessment within this section is to:

- Identify number of birds flying at risk height for wind turbines; and
- Evaluate the Collision Risk of the different species according to Collision Risk Modelling (CRM).

#### **Collision Risk Modelling**

The Collision Risk Model (CRM) is a simplified analytical tool developed to predict the potential collision risks of birds with wind turbines. Several CRM approaches have been developed and refined internationally, with one of the most widely applied being the Band model (SNH, 2012), including subsequent updates (e.g. Band, 2024: *Using a collision risk model to assess bird collision risks for onshore wind farms*, NatureScot Research Report 909). It should be noted that the CRM was not designed to provide precise predictions of collision fatalities, but rather to estimate an order of magnitude of potential impacts, which can support decision-making for project permitting. A detailed description of the model is provided in Band, Madders, and Whitfield (2001) (*Developing field and analytical methods to assess avian collision risk at wind farms*, in De Lucas et al., *Birds and Wind Farms: Risk Assessment and Mitigation*).

It is also important to highlight that the CRM was originally developed in Scotland, which does not present a major migratory bottleneck such as the Red Sea/Rift Valley flyway (RVRSF). Subsequent scientific studies have identified inconsistencies between pre-construction predictions and post-construction monitoring results at wind farms, with predicted collision risks often being unaligned with observed fatalities (e.g. Ferrer et al., 2012:

*Weak relationship between risk assessment studies and recorded mortality in wind farms*, Journal of Applied Ecology). This study was undertaken in another major migratory bottleneck within the Western Palearctic, where lower numbers of migratory soaring birds (approximately 800,000 individuals in 2025; Migres Foundation, pers. comm.) but similar species assemblages occur.

Within the local context, one of the representative papers is that from Riad<sup>11</sup> (2022) which collated data from March 2019 to May 2022 from wind farms in the NREA wind farm areas within the GoS, recording 59 fatalities with wind turbines. The second review by Camiña et al. (2024)<sup>12 13</sup> includes more wind farms and 126 fatalities, and concludes that the VP monitoring could be improved and also that there is a mismatch between the CRM predictions and the fatalities found. The most affected species in order of importance were the White stork, followed by a second group formed by the Black kite, Steppe Buzzard and Honey Buzzard, and all the remaining species: Lesser Spotted and Steppe eagles, Eurasian Sparrowhawk, Montagu's and Marsh harriers, and Common Kestrel.

The Project has completed five migratory seasons and is currently completing the sixth season (half season was completed at the time of writing this ESIA), including three autumn seasons and two and a half spring seasons. It is well established that collision risk flights can vary significantly between years within the same season (e.g. between consecutive autumn seasons). These inter-annual variations indicate that datasets are not directly comparable and reinforce the limitations of deriving precise or robust predictions based on available data. Variations for other species should also be interpreted with caution due to the low number of observations (typically fewer than five individuals per species). In addition, species not recorded in a given year may still have passed through the site undetected. In other words, the number of birds recorded at risk height can differ substantially between seasons and years, and therefore should not be used to predict collision risk for subsequent periods.

The turbine specifications applied in the CRM analysis are presented in Table 67. Based on these specifications, the maximum tip height (including rotor and tower height) is 162.5 m.

**Table 67: Turbine Specifications used for the CRM**

Component	Description
Project Generation Capacity (MW)	500
Number of Wind Turbines	100
Turbine model and manufacturer	SG5MW 145 HH90 manufactured by Siemens Gamesa Renewable Energy (SGRE)
Rotor Diameter (m)	145
Hub Height (m)	90
Tip height (m)	162.5

Data inputs for the CRM analysis were derived from the results of the VP surveys, as well as the above-mentioned turbine specifications and the following assumptions:

**Table 68: Characteristics of the wind turbine generation and operational values used in the CRM**

Rotation speed (rpm)	7.5	Average value calculated from manufacturer's Specifications for similarly-sized turbine.
Percent of time Operational (availability)	Monthly values ranging from 64% to 85%	Project specific data not available, Average calculation of 83.5%
Maximum blade width (m)	4.5	Not provided
Pitch (degrees)	47.5	Not provided

<sup>11</sup> Riad, S. 2022. Egypt. Acad. J. Biolog. Sci., 14(2): 19-33 (2022)

<sup>12</sup> Camina, A. et al. 2024. Migration of Soaring Birds at Gebel El Zeit (IBA) in relation to wind energy developments

<sup>13</sup> <https://acwapower.com/en/what-we-do/projects/suez-wind-energy-11-gw/>

In addition to bird densities derived from VP surveys, the CRM incorporates physical and behavioural characteristics of each species. These include bird dimensions (length and wingspan), flight type, and flight speed. Data on physical characteristics were obtained from the Cornell Lab of Ornithology's *Birds of the World* database, while flight speeds were derived from Alerstam et al. (2007). Observational parameters, such as flight behaviour and effective observation range, were informed by survey datasets.

**Table 69: Physical and Observational Characteristics of each Bird Species included within the CRM Analysis**

Scientific name	English Common Name	Length (m)	Wingspan (m)	Flight type	Flight speed
<i>Milvus migrans</i>	Black Kite	0.55	1.37	gliding	11.7
<i>Ciconia nigra</i>	Black Stork	1	1.55	gliding	16
<i>Aquila pennata</i>	Booted eagle	0.51	1.38	gliding	11.3
<i>Grus grus</i>	Common Crane	1.08	1.9	flapping	16.67
<i>Falco tinnunculus</i>	Common Kestrel	0.31	0.68	flapping	13.9
<i>Aquila heliaca</i>	Eastern Imperial Eagle	0.71	1.9	gliding	18.06
<i>Neophron percnopterus</i>	Egyptian Vulture	0.62	1.6	gliding	13.9
<i>Gyps fulvus</i>	Eurasian Griffon	1.01	2.52	gliding	19.4
<i>Falco tinnunculus</i>	Eurasian Kestrel	0.31	0.68	flapping	13.9
<i>Accipiter nisus</i>	Eurasian Sparrowhawk	0.34	0.67	flapping	19.4
<i>Pelecanus onocrotalus</i>	Great White Pelican	1.56	2.93	flapping	15.6
<i>Clanga clanga</i>	Greater Spotted eagle	0.71	1.8	gliding	11.7
<i>Pernis apivorus</i>	Honey Buzzard	0.6	1.5	flapping	18.06
<i>Falco naumanni</i>	Lesser Kestrel	0.31	0.66	flapping	13.9
<i>Clanga pomarina</i>	Lesser spotted eagle	0.67	1.68	gliding	11.7
<i>Accipiter brevipes</i>	Levant Sparrowhawk	0.37	0.74	flapping	11.1
<i>Buteo rufinus</i>	Long-legged Buzzard	0.53	1.3	gliding	16.67
<i>Circus pygargus</i>	Montagu's Harrier	0.49	1.23	gliding	8.4
<i>Pandion haliaetus</i>	Osprey	0.66	1.59	gliding	11.4
<i>Circus macrorus</i>	Pallid Harrier	0.46	1.1	gliding	11.1
<i>Falco vespertinus</i>	Red-footed falcon	0.32	0.75	flapping	12.8
<i>Falco cherrug</i>	Saker Falcon	0.51	1.12	flapping	22.2

As noted above, the tip height is 162.5 m (including the rotor-swept and the ground clearance area considered as the potential risk zone). The following assumptions were applied in the analysis:

- Survey datasets were collected using different height intervals (120 m for spring 2021, 150 m for autumn 2021 and both seasons of 2022, and 180 m for autumn 2025 and spring 2026). This inconsistency was addressed prior to analysis to adjust the heights to the analyses as explained in the following point.
- A height of 150 m was considered to be similar to the 162.5 m tip height. The difference (12.5 m) is considered negligible in the context of field observations, where distinguishing such height differences is inherently difficult due to the absence of visual reference points and observer variability. Accordingly, 150 m is considered a reasonable proxy for CRM modelling.
- For spring 2021, where data were available only up to 120 m, an adjustment was applied. The proportion of birds recorded between 120 m and 150 m in 2022 was calculated and applied to the 2021 dataset to estimate the proportion of birds within the risk height band.

Published and validated Avoidance Rates (AR) were not available for all species included in the analysis. However, AR is a critical parameter in the Band CRM, with outputs highly sensitive to small variations (Cook et al., 2012). For each species, a “most realistic” AR value was defined, bounded by a conservative lower estimate (95%) and an upper estimate (99.9%), based on a comprehensive review of available literature.

**Table 70: Published Avoidance Rates (AR) for Several Bird Species**

Species	Low	Mid	High
Golden Eagle <sup>14</sup> <i>Aquila chrysaetos</i>	98.1	99.58	99.9
Imperial Eagle <i>Aquila heliaca</i>	98.1	99.58	99.9
Steppe Eagle <sup>1</sup> <i>Aquila nipalensis</i>	98.1	99.58	99.9
Honey Buzzard <sup>2</sup> <i>Pernis apivorus</i>	95	99	99.5
Saker Falcon <sup>1</sup> <i>Falco cherrug</i>	99.5	99.8	99.9
Eurasian Griffon <sup>3</sup> <i>Gyps fulvus</i>	98	99	99.5
Egyptian Vulture <sup>4</sup> <i>Neophron percnopterus</i>	99	99.58	99.9
Great White Pelican <i>Pelecanus onocrotalus</i>	95	99	99.5
Eurasian Sparrowhawk <sup>1</sup> <i>Accipiter nisus</i>	99	99.5	99.9
Common Buzzard <sup>1</sup> <i>Buteo buteo</i>	97.8	99.5	99.9
Long-legged Buzzard <sup>1</sup> <i>Buteo rufinus</i>	97.8	99.5	99.9
Short-toed Snake-Eagle <sup>5</sup> <i>Circaetus gallicus</i>	98.1	99.58	99.9
Eurasian Marsh-Harrier <sup>5</sup> <i>Circus aeruginosus</i>	95	99	99.9
Pallid Harrier <sup>5</sup> <i>Circus macrourus</i>	95	99	99.9
Lesser Kestrel <sup>1</sup> <i>Falco naumanni</i>	87.3	96.9	99.9
Eurasian Kestrel <sup>1</sup> <i>Falco tinnunculus</i>	87.3	96.9	99.9
Common Crane <sup>2</sup> <i>Grus grus</i>	95	99	99.5
Black Kite <sup>6</sup> <i>Milvus migrans</i>	98	99.2	99.85
Black Stork <sup>2</sup> <i>Ciconia nigra</i>	95	99	99.5
Booted Eagle <sup>2</sup> <i>Aquila pennata</i>	95	99	99.5
Greater spotted Eagle <sup>2</sup> <i>Clanga clanga</i>	95	99	99.5
Lesser spotted eagle <i>Clanga pomarina</i>	95	98	99
Levant Sparrowhawk <i>Accipiter brevipes</i>	95	98	99
Montagu's Harrier <i>Circus aeruginosus</i>	95	98	99
Osprey <i>Pandion haliaetus</i>	98	99.2	99.5
White Stork <sup>2</sup> <i>Ciconia ciconia</i>	95	99	99.5

**The output of the CRM should be interpreted as a magnitude of the impact rather than an estimated value of the number of fatalities.** The tables below show the estimated fatalities according to three avoidance rates.

**Table 71: Estimated Collision Risk (CRM) for Spring 2021, 2022, and 2026 (incomplete), using Avoidance of 98, 99, and 99.5%**

Species	98%			99%			99.5%		
	2021	2022	2026	2021	2022	2026	2021	2022	2026
Black Kite	669	697	1015	335	348	508	167	174	254
Black Stork	114	51	0	57	25	0	29	13	0
Bonelli's eagle	0	0	-	0	0	-	0	0	-
Booted Eagle	12	15	6	6	7	3	3	4	2
Common Kestrel	12	5	4	6	3	2	3	1	1
Eastern I. Eagle	5	7	1	2	4	0	1	2	0

<sup>14</sup> Whitfield and Madders (2006a), <sup>2</sup>Cook et al.(2012), Vasilakis et al. (2012), <sup>4</sup> Whitfield and Madders(2009), <sup>5</sup>Whitfield and Madders (2009), SNH (2010),



Egyptian Vulture	6	7	5	3	4	2	1	2	1
Eurasian Hobby	0	0	-	0	0	-	0	0	-
E. Sparrowhawk	2	3	0	1	1	0	0	1	0
Greater S. Eagle	2	8	0	1	4	0	0	2	0
Griffon vulture	0	0	-	0	0	-	0	0	-
Honey Buzzard	416	702	n.a.	208	351	n.a.	104	174	n.a.
Lanner Falcon	0	0	0	0	0	0	0	0	0
Lesser Kestrel	0	0	-	0	0	-	0	0	-
Lesser S. Eagle	32	20	58	16	10	29	8	5	14
L. Sparrowhawk	0	0	-	0	0	-	0	0	-
Long-l. Buzzard	27	17	1	13	9	1	7	4	0
Marsh Harrier	0	1	0	0	0	0	0	0	0
Montagu's Harr.	1	1	0	1	0	0	0	0	0
Osprey	1	1	1	0	1	0	0	0	0
Pallid Harrier	0	1	0	0	1	0	0	0	0
S-t Snake Eagle	24	38	18	12	19	9	6	9	5
Sooty Falcon	0	1	0	0	0	0	0	0	0
Steppe Buzzard	3515	3579	2129	1758	1789	1064	879	895	232
Steppe Eagle	428	726	839	214	363	420	107	182	210
G. White Pelican	48	41	217	24	20	109	12	10	54
White Stork	4800	8955	1056	2402	4481	529	1202	2242	624

**Table 72: Estimated Collision Risk (CRM) for the Autumn 2021, 2022, and 2025, using Avoidances of 98, 99, and 99.5%**

Species	98%			99%			99.5%		
	2021	2022	2025	2021	2022	2025	2021	2022	2025
Black Kite	0	4	8	0	2	4	0	1	2
Black Stork	1	-		0	-		0	-	-
Booted Eagle	0	0	0	0	0	0	0	0	0
Common Kestrel	-	2	0	-	1	0	-	1	0
Common crane	-	0		-	0		-	0	-
Eleonora's Falcon	0	-	0	0	-	0	0	-	0
Eurasian Hobby	0	-		0	-		0	-	-
Eurasian Sparrowhawk	0	1		0	0		0	0	-
European Honey Buzzard	110	221	176	55	110	8	27	55	44
Great White Pelican	13	24	69	6	12	35	3	6	17
Lanner Falcon	0	0		0	0		0	0	-
Lesser Kestrel	0	-		0	-		0	-	-
Lesser spotted Eagle	0	-		0	-		0	-	-
Levant Sparrowhawk	2	3	0	1	1	0	1	1	0
Long-legged Buzzard	1	0	0	0	0	0	0	0	0
Montagu's Harrier	1	1		0	0		0	0	-
Egyptian vulture	1	-	0	0	-	0	0	-	0
Osprey	-	0		-	0		-	0	-
Pallid Harrier	1	0	1	0	0	0	0	0	0
Short-toed Snake Eagle	0	-		0	-		0	-	-
Sooty Falcon	1	0		1	0		0	0	-

Steppe Buzzard	2	3	0	1	2	0	1	1	0
Steppe Eagle	1	-	0	0	-	0	0	-	0
Western Marsh Harrier	4	2	1	2	1	0	1	0	0
White Stork	99	74	0	49	37	0	25	19	0

The results indicate that the highest collision risk magnitudes are associated with White Stork, followed by Steppe Buzzard and Marsh Harrier, with lower predicted values for other species. Among these, Egyptian Vulture (Endangered, EN), Steppe Eagle (EN), Greater Spotted Eagle (VU), Imperial Eagle (VU) and Sooty Falcon (Vulnerable, VU) are of particular conservation concern according to the IUCN Red List.

The CRM relies on several assumptions where site-specific data are not available. These include the proportion of time turbines are operational, which excludes periods of low wind speeds (below cut-in), high wind shutdown, and operational downtime for maintenance. These factors vary seasonally, reflecting differences in wind conditions and operational requirements.

In addition, key environmental variables, including wind speed and direction, temperature, and their influence on bird flight altitude, direction, and site usage, were not available for inclusion in the model. These variables are known to significantly influence bird behaviour and occupancy and represent an additional source of uncertainty in the analysis.

#### (i) Sensitivity of the Project Site

The baseline assessments have recorded high numbers of migratory soaring birds over the Project site and its vicinity. Some of those recorded species have an important status on the international or national levels. The baseline assessment concludes that the site is considered within a highly sensitive area in terms of avifauna. Additionally, the Project site is considered to be located along an intensive migration route. Taking all of the above into account, the receiving environment is considered of high sensitivity.

#### (ii) Magnitude of the Impact

The CRM assessment data in the tables above are helpful for assessing impacts. The results suggest:

- In general, collision risk to all species is significantly lower in the autumn compared with the spring migration period.
- For the majority of MSBs passing through the project site airspace during spring and autumn migration, the risk of collision is low or zero.
- Most species had low or zero predicted collision rates when assessed either seasonally or annually. Six species had higher CRM estimates (Steppe Buzzard, European Honey-buzzard, Black Kite, Greater White Pelican, White Stork, and Steppe Eagle).
- Based on the predicted seasonal and annual collision rate estimates, two species have the potential to be substantially impacted by the project: White Stork, Steppe eagle, and Steppe Buzzard.. The impacts for both species are likely to be greatest during spring migration without mitigation. In the autumn season, impacts are of lower risk.
- Six globally threatened MSBs pass through the project airspace. These are Steppe Eagle and Egyptian Vulture, (IUCN – Endangered), Eastern Imperial Eagle, Sooty Falcon, Greater Spotted Eagle (IUCN – Vulnerable) and Pallid Harrier (IUCN-Near Threatened). All these species had a very low predicted collision rate (around 1) with the lowest avoidance rates (95%) with the exception of the Steppe Eagle.

The CRM estimates indicate that for most MSB species including those globally threatened or near-threatened the impacts are likely to be low, however uncertainty relating to migration activity between years may mean

that impacts could be higher and, in some cases may reach or exceed acceptable thresholds.. Overall, there is potential for a noticeable change to occur and acceptable limits are likely to be breached for non-threatened species but not for the majority of MSBs, therefore the assessment concludes high magnitude of impact without any implementation of mitigation.

Based on the above, the impact significance for the wind power project is assessed as moderate, based on high receptor sensitivity and a medium magnitude of effect.

### Mitigation and Monitoring Measures

#### **(i) Site Specific Design Requirements**

As discussed within “Section 7.5” earlier the Strategic Environmental and Social Impact Assessment was undertaken for the 300 km<sup>2</sup> area identified specific requirements for site constraints related to avifauna. These included requirements such as the below:

- Use of intermittent flashing lights to be limited to that in accordance with civil aviation authority requirements.
- Given the very high levels of migration activity and based on the outputs of the CRM as well as the results of the surveys completed to date upfront mitigation including observers-led Shut Down on Demand (SDOD) is considered necessary as predicted mortality for all species is likely to result in moderate or major negative impacts.
- Shutdown on demand will take place ensuring the following principles are followed:
  - All of the turbines and a buffer area will be covered by constant observation.
  - The buffer will ensure that enough time is available for WTG to be shut down when birds approach.
  - The shutdown programme will have the capacity to implement extended shutdown in response to predicted high migration intensity and/or environmental conditions that may lead to elevated collision risk situations. Such shutdowns will remain in place until the high collision risk situation has abated.
  - Associated flight activity monitoring programmes and comprehensive fatality monitoring around turbines will be implemented to provide feedback on shutdown efficacy and support adjustment of the scale of shutdown required, where necessary.
- Should shut down on demand be observer-led:
  - Observers will work in pairs and in shifts to ensure a vigilant effort from observers.
  - Observers will communicate both with shutdown teams at Projects and other observers to ensure effective practices
  - Shut down protocol will include discussions with other Projects in the region to identify best practice for the location

EEAA has approved the installation of 200 m or even bigger turbines in the GoS. Such conditions are now typically included within the environmental permit issued for each Project. Therefore, for this project such site-specific requirements are expected to be identified once the ESIA is submitted to EEAA and the environmental permit is issued. Based on the consultant’s experience from other projects, this is expected to include the following which the current layout already meets:

- Minimum distances between wind turbines should not be shorter than  $2.5 \times$  rotor-diameter;
- Adhere to a buffer area of  $7 \times$  rotor-diameter between turbine rows;

**(ii) Strategic E&S Assessment / Cumulative Impact Assessment for GoS (SESA-CIA)**

Currently, lenders led by EBRD commissioned a SESA-CIA study for the GoS. The study will assess at the cumulative level all wind farms within the GoS region. The study will assess potential impacts of wind farms as disruptive barriers to the migration route at the cumulative level within the GoS region and identify any additional mitigation measures to be considered. This could include, for example, spacing/buffer requirements between wind farms, 'no-go' areas for windfarm in the GoS, etc.

**(iii) Avi-Fauna Monitoring and On-Demand Turbine Shutdown**

Good International Industry Practice implements the standard Shutdown on Demand with field observers (SDOD) and a bird monitoring study protocol. It will be designed and implemented by the Project informed by baseline bird data and the results of similar monitoring at GoS wind projects.

Monitoring during the operation of the wind farm must be completed in order to inform the actual impact caused by the wind farm on resident and migratory birds – known as Active Turbine Management Plan (ATMP). The monitoring has the primary objective of collision avoidance but also secondary for migration monitoring behavior.

Monitoring will take place during the migration seasons. Based on current information, monitoring must take place during the spring migration season, from 20<sup>th</sup> February until 15<sup>th</sup> May, and autumn migration season from 10<sup>th</sup> August till 15<sup>th</sup> November. Throughout these periods, monitoring must take place continuously on a daily basis.

RCREEE developed an ATMP protocol that describes the shutdown criteria and communications protocol, timing of operation (seasonally and daily), number of vantage points, equipment used (optical and communications), and others as applicable.

The ATMP for the Project should take into account Project and site-specific risks. This includes, for example the dam onsite if it is filled with water, which can act as a source of attraction for birds. These will require additional VPs during ATMP implementation.

**(iv) Vertebrate carcass fatality searches during Operation**

A Good International Industry Practice (GIIP) standard is the Post-Construction Fatality Monitoring program (PCFM) program has to be designed and implemented according to the IFC-EBRD-KfW (2023) guidelines.

The PCFM program will assess the effectiveness of SDOD and shutdown mitigation measures and allow a precise and accurate fatality estimation of vertebrate's mortality estimates using the GenEst fatality estimator.

PCFM reporting, including fatality rate estimates, has to be reported after each migratory season. In addition, it is recommended that a comparative assessment between the fatality monitoring results and the outcomes of the pre-construction ESIA is undertaken.

An Adaptive Management Plan (AMP) should review the mitigation measures implemented in case the impacts deviate from the established fatality thresholds.

## Residual Impacts

Provided these measures are implemented to Good International Industry standards, evidence from operational wind projects in the Gulf of Suez operating this level of mitigation suggests that the significance of residual impact can be reduced to minor.

The following identifies the mitigation and monitoring measures to be applied during operation phase.

### 8.6.3 Overall Conclusions related to Avifauna

- The Soaring Bird Migration monitoring analysis did not reveal any difference between NIAT and any of the wind projects in the central area of the GoS.
- Differences in bird numbers are related to the different monitoring efforts applied in 2021, 2022 and 2025-2026. As expected, the migration pattern differs between spring and autumn, in term of species composition and species-specific numbers, with fewer birds and species in the autumn.
- Globally, there is consistency between years and between spring and autumn seasons. Migration is constant across seasons and years. Variations would be due to methodological differences (time invested), personal skills of the field observers, or yearly species specific migration influences, which exceed the boundaries and scale of the NIAT project: The migratory conditions throughout the entire RVRSF could have a stronger effect than the site-specific conditions, mainstreaming the birds through the GoS.
- Some species migrate individually, others in small or large flocks and some in very few flocks but with a very high number of individuals. Quantitative (numbers) and qualitative (species) patterns remain over years and seasons. These results are also reinforced by data from the ongoing Strategic study.
- Despite the three years difference between the first assessments (2021-2022) and the current ones, there is sufficient information to inform mitigation against collision with wind turbines. It should not differ from the mitigation applied in neighbouring projects. We advocate for Shut Down on Demand (SDOD) with observers on site. This method also has beneficial effect, providing local communities with skills and employment.
- The total numbers of birds recorded should not be used to perform Cumulative Effects Analysis or for Critical Habitat triggering thresholds. Raw counts depend on monitoring times, and all are relative measures. Data should be standardized prior to producing assessments. The lack of proper data management affects the robustness of analyses and validity of conclusions.
- Flocking behaviour was analysed, and it was clear that eagles rather migrate in small groups, as do harriers and small falcons, which migrate almost individually, while only a limited number of species migrated in large flocks. These are intrinsic characteristics of the biology of the species involved.
- There are no specific time slots preferred by all species simultaneously. They may change depending on species-specific conditions, not only at the site, but also elsewhere (e.g., the sites where the birds have been roosting the night before.) It is well known, for example that the arrival of birds at one site sometimes depends on the conditions at the place of departure.
- The CRM was investigated for the 150 m proposed tip heights. The assessment indicated significant differences within species and between years which comprise the bulk of the migration counts. This means that the numbers/proportions at risk differ between years for the most abundant species. In other words, the number of birds at risk height per species may differ significantly between two years providing opposite results, and therefore data should not be used to estimate collision for one year as it could differ significantly during the second year. In addition, time spent at collision height differed



between years. The outcomes of the CRM should be interpreted as an order of magnitude, not as the actual number of predicted fatalities.

- The survey did not identify any key, important or significant habitat for breeding. Given the homogeneous landscape characteristics of the area, all species pass over the Project area, as the habitat is largely unsuitable for breeding – mainly due to the lack of trees or cliff shelters.
- The key and most important mitigation measure is the implementation of the ATMP in accordance with the established protocol under the “Executive Framework for Strategic Cumulative, Environmental & Social Assessment & Program of Ornithological Monitoring and Active Turbine Management for Wind Energy Developments in Gulf of Suez.”
- The dumpsite acts as a clear stopover area for migratory birds. Therefore, it is important that the dumpsite is completely closed, and removed, before commencement of the operational phase of the Project. In addition, should the dam store any water during the operational phase, the ATMP should take into account and require specific additional monitoring at this area as well as additional shutdown measures.

## 8.7 Bats

This section identifies the anticipated impacts on bats from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

### 8.7.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the contractors for installation of the wind turbines and the various Project components, including substation, transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Such activities are limited to the relatively small individual footprints of these facilities and the actual area of disturbance is relatively minimal. Nevertheless, such activities would likely result in the alteration of the site’s habitat and thus potentially impacts bats, particularly through loss of hunting habitats for bats as well as roosting sites.

However, such impacts on bats created during the construction phase would be of a long-term duration as they would result in a permanent change in the natural biodiversity of the site. However, such impacts are expected to be of negative nature, low magnitude, and low sensitivity and therefore not significant due to the reasons provided below.

- Based on both the literature review and the dedicated acoustic survey (Amr, 2026), all bat species recorded or expected within the Project area are listed as Least Concern according to the IUCN Red List (IUCN, 2020). However, two recorded species — *Hypsugo ariel* and *Taphozous nudiventris* — are listed as Vulnerable (VU) in the Egyptian Mammal Red List (Basuony et al., 2010).
- The Project site is not considered a feeding area for bats. The acoustic survey confirmed very low nocturnal insect activity due to the arid nature of the site and absence of vegetation cover; only ground-dwelling insects were observed. Of 75,581 files analysed across nearly five months of continuous monitoring, bat calls were confirmed on only two days, indicating extremely limited and likely transient bat presence.
- No caves or suitable bat roosting structures were identified within the Project site during field surveys conducted as part of the acoustic survey programme (Amr, 2026).

Taking the above into account, no mitigation measures are expected to be required.

### 8.7.2 Potential Impacts during the Operation Phase

The potential impacts from the Project during operation are mainly related to risk of bat collisions with rotors of the operating wind turbines.

Many reports have corroborated the findings of bat collisions with wind turbines; this includes reports in Germany (Dürr 2001; Trapp *et al.* 2002; Dürr & Bach 2004), Sweden (Ahlén, 2002) and Spain (Alcalde, 2003; Camiña 2012). Evidence that turbines do not only kill bats from local populations but also from populations at far distance were established (Voigt *et al.*, 2012).

In reference to the EUROBATS Guidelines for Considerations on Bats in Wind Farm Projects (Rodrigues *et al.*, 2014), some species with distribution ranges in the Project area and vicinity are documented to be vulnerable to collisions with wind turbines. *Pipistrellus* spp. are known to be at high risk of collision; two species of this genus — *Pipistrellus kuhlii* and *P. rueppellii* — have distribution ranges in the area based on literature. *Cnephaeus bottae* is documented to occur in the area and is known to be of medium collision risk. The vulnerability of the remaining species to wind turbine collision is unknown.

However, the dedicated acoustic survey (Amr, 2026) recorded bat activity on only two occasions across the entire study period of nearly five months, confirming that bat activity at the Project site is extremely limited. Neither *Pipistrellus kuhlii*, *P. rueppellii*, nor *Cnephaeus bottae* were detected during the acoustic survey. Only *Hypsugo ariel* and *Taphozous nudiventris* were confirmed, both as transient visitors with very limited activity. This significantly reduces the assessed risk of bat collision with wind turbines at this site.

Such impacts are anticipated to be of a long-term duration as negative nature, medium magnitude, and low sensitivity and therefore of minor significance due to the reasons provided below.

- Risk of bat collision with wind turbines is expected to be very low given the extremely limited bat activity confirmed during the dedicated acoustic survey (Amr, 2026), with bat calls detected on only two days out of nearly five months of continuous monitoring. All bat species recorded are listed as Least Concern globally (IUCN, 2020), though *Hypsugo ariel* and *Taphozous nudiventris* are listed as Vulnerable in the Egyptian Mammal Red List (Basuony *et al.*, 2010).
- The Project site is not a bat feeding area. Flying insect activity was confirmed to be very low during field surveys, with only ground-dwelling insects observed. The absence of foraging conditions significantly reduces the likelihood of sustained bat presence at rotor height.
- No roosting sites for bats were identified within the Project site during field surveys. The two recorded species are considered transient visitors rather than resident or regularly foraging bats within the Project area.

#### Mitigation and Monitoring Measures

Given the very limited bat activity confirmed during the pre-construction acoustic survey, the risk of bat collision with wind turbines is considered low and no specific bat mitigation measures are required at this stage. Nevertheless, the following monitoring measures are recommended:

- Post-construction carcass search surveys, as outlined in the wider biodiversity monitoring programme (refer to Section 8.6.2), shall include bats. Surveys should be conducted at regular intervals during the first two years of operation to verify the low collision risk predicted.
- If carcass search surveys identify bat fatalities at a rate that suggests an unanticipated level of impact, additional mitigation measures shall be determined,

- Annual reporting on bat fatality monitoring results, with adaptive management measures implemented as required based on findings.

## 8.8 Archaeology and Cultural Heritage

This section identifies the anticipated impacts on archaeology and cultural heritage from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

It is important to note that there are no anticipated impacts during the operational phase of the Project.

### 8.8.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the contractors for installation of the wind turbines and the various Project components, including substation, transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Although such activities are limited to the relatively small individual footprints of these facilities and the actual area of disturbance is relatively minimal, if such activities are improperly managed, and had there been any archaeological remains present on the surface of the Project site, they could have been damaged or disturbed as a result of construction activities. However, the archaeological baseline assessment discussed earlier concludes that there are no archaeological sites or remains within the Project site. Therefore, there are no anticipated impacts from the Project.

In addition, there is a chance that throughout such construction activities, archaeological remains buried in the ground are discovered. Improper management (if such sites are discovered) could potentially disturb or damage such sites which could potentially be of importance. Such potential impacts are of a short-term duration as they are limited to the construction phase, and are irreversible as should sites be discovered then inappropriate management could result in disturbance and/or damage, in which such an impact would be of medium magnitude. The impacts will be of a negative nature and low sensitivity given that the likelihood of such impacts is considered low. Given all of the above, such an impact is considered to be of minor significance.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by the contractors during the construction phase:

- As required by the SCA (refer to Figure 56), during excavation activities, SCA must be notified to check if they will provide any observers to oversee the process and ensure that no underground archaeological remains of importance are unearthed and/or disturbed.
- Throughout the construction phase, and as the case with any Project development that entails such construction activities, there is a chance that potential archaeological remains in the ground might be discovered. It is expected that appropriate measures for such chance find procedures are implemented. Those mainly require that construction activities be halted and the area fenced along with proper signage, while immediately notifying the Ministry of Tourism and Antiquities/Red Sea and Suez Antiquities Inspection Office. No additional work in this area will be allowed before the Ministry/Inspection Office assesses the found potential archaeological site and grants a clearance to resume the work. Construction activities can continue at other parts of the site if no potential archaeological remains were found. If found, same procedures above apply.

Following the implementation of these mitigation measures, the significance of the residual impact would be reduced to not significant.

### Monitoring Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Wind Farm contractors during the construction phase:

- Submission of formal letter of communication with SCA; and
- For chance find procedure, inspection of actions taken in case of new discoveries, including fencing, limiting access to site, and contacting the Ministry of Tourism and Antiquities/ Red Sea and Suez Antiquities Inspection Office. Report should be prepared and submitted to the Ministry in such a case which details the above.

## **8.9 Air Quality and Noise**

This section identifies the anticipated impacts on air quality and noise from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

### **8.9.1 Potential Impacts during the Construction Phase**

Site preparation activities which are to take place onsite by the contractors for installation of the wind turbines and the various Project components, including substation, transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Such activities are limited to the relatively small individual footprints of these facilities and the actual area of disturbance is relatively minimal. Nevertheless, such activities will likely result in an increased level of dust and particulate matter emissions, which in turn will directly and temporarily impact ambient air quality. If improperly managed, there is a risk of nuisance and health effects to construction workers onsite. To a lesser extent it may affect nearby surrounding receptors from windblown dust, such as nearby petroleum activities. In addition, construction activities will likely entail the use of vehicles, machinery and equipment (such as generators, compressors, etc.) which are expected to be a source of other pollutant emissions (such as SO<sub>2</sub>, NO<sub>2</sub>, etc.) which would also have minimal direct impacts on ambient air quality.

In addition, all the above activities will likely include the use of machinery and equipment such as generators, hammers, compressors, etc. and which are expected to be a source of noise and vibration generation within the Project site and its surroundings. If improperly managed, there is risk of nuisance and health affects to construction workers onsite and to a lesser extent to the nearby surrounding receptors (such as nearby petroleum activities).

The above impacts are anticipated to be temporary and of short-term nature as they are limited to the construction period only. Such impacts are of a negative nature, and will be noticeable and therefore of medium magnitude. However, the impacts will be dispersed and are reversible as air quality would revert back to baseline conditions after construction works is completed and thus the receiving environment is considered of low sensitivity. Given the above such an impact is considered of minor significance.

### Mitigation Measures

The following identifies the mitigation measures to be applied by the contractors during the construction phase:

- Based on inspections and visual monitoring undertaken, if dust or pollutant emissions were found to be excessive due to construction activities, the source of such emissions should be identified and adequate control measures must be implemented;
- Comply with the Occupational Safety and Health Administration (OSHA) requirements and the Egyptian Codes to ensure that for activities associated with high dust and noise levels, workers are equipped with proper Personal Protective Equipment (e.g. masks, eye goggles, breathing masks, ear muffs, etc.);
- Apply basic dust control and suppression measures which could include:
  - Regular watering of roads for dust suppression;
  - Proper planning of dust causing activities to take place simultaneously in order to reduce the dust incidents over the construction period.
  - Proper management of stockpiles and excavated material (e.g. watering, containment, covering, bundling).
  - Proper covering of trucks transporting aggregates and fine materials (e.g. through the use of tarpaulin).
  - Adhering to a speed limit of 15km/h for trucks on the construction site.
- Develop a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment to be used throughout the construction phase for early detection of issue to avoid unnecessary pollutant and noise emissions.
- Based on inspections and visual monitoring undertaken, if noise levels were found to be excessive from construction activities, the source of such excessive noise levels should be identified and adequate control measures must be implemented; and
- Apply adequate general noise suppressing measures. This could include the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery, developing a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.

Following the implementation of these mitigation measures, the significance of the residual impact would be categorized as not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the contractors during the construction phase:

- Inspection and visual monitoring of the works should be carried out at all times. In addition, periodic inspections should be conducted at nearby sites (e.g. such as nearby petroleum activities) to determine whether harmful levels of dust and noise from construction activities exist; and
- Reporting of any excessive levels of pollutants/dust or noise and the measures taken to minimize the impact and prevent it from occurring again.

### **8.9.2 Potential Impacts during the Operation Phase**

The main impacts foreseen during the operation phase are that related to the noise generated from the operating wind turbines and its potential impact on the health and safety of the nearby surrounding receptors.



Given that such impacts are directly related to public health and safety, such impacts have been discussed in details in “Section 8.12” along with other relevant impacts such as shadow flicker.

## 8.10 Infrastructure and Utilities

This Section identifies the anticipated impacts on infrastructure and utilities from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

### 8.10.1 Potential Impacts on Road Networks during the Planning and Construction Phase

Wind turbines are manufactured in factories and transported to the installation site where they are assembled. Wind turbine components have big dimensions and weight and their transport poses a challenge to the existing roads and infrastructure. The Project’s wind turbine blades have a length of around 72.5m and are usually transported in one piece. Tower components can have a transport height of up to 5m. Nacelles are also usually transported in one piece and can have a weight of more than 70 tonnes.

Components for wind energy projects are usually transported by sea from the manufacturing country to the country of installation and are then loaded in existing ports to trucks which manoeuvre their way through existing roads to the installation site.

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, the trucks hauling the various heavy Project components may damage the existing roads, highways and bridges, utility lines (e.g. electricity lines), and could also be a public safety concern for other vehicles on the road.

Taking all of the above into account, the anticipated impacts on road networks are considered of short-term duration during the Project construction phase. Such impacts are of a negative nature, and if such impacts are improperly managed, then they are expected to be of high magnitude and medium sensitivity. Given the above impact is considered of moderate significance.

#### Mitigation Measures

It is recommended that contractors (especially OEM) develop a Traffic and Transport Plan before commencement of any transportation activities to ensure that the transportation process is properly and adequately managed and does not pose a risk of damage to the existing roads, highways, overpasses whilst ensuring public safety. The Plan must analyse and study the entire route for transportation of the Project components from the port till the Project site. The assessment must take into account worst case scenarios for transportation of Project components for blade lengths, tower sections, etc. The study must investigate any constraints which need to be considered along the highways leading to the Project site such as bridges, overhead utility cables, slants in roads, etc. and identify additional measures which need to be taken into account (bypasses, adjustments to roads, etc.)

The Plan must take into account the following:

- The Plan must be developed in accordance with relevant local traffic and transportation legislations related to traffic loads and weights, dimensions, speed limits, etc.
- The plan must consider, to the extent possible, the proper planning of generated trips of trucks to ensure they are spread over the course of a work day and hours of day, and which also take into account peak and non-peak commute hours on the highway;

- As part of the Plan, the contractors must establish coordination with relevant entities to take into account any specific requirements that should be considered and ensure they are aware of the transportation requirements and details related to the Project.

Following the implementation of these mitigation measures, the significance of the residual impact would be reduced to not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Contractor during the construction phase:

- Submission of Traffic and Transport Plan with proof of coordination with the authorities discussed above for works required as part of the Study.
- Documenting coordination with relevant entities

### **8.10.2 Potential Impacts on Civil and Military Aviation during the Planning and Construction Phase**

Any tall structure could impact aircraft safety if located near airports or known flight paths. In addition, such structures could potentially interfere with certain electromagnetic transmissions associated with air transport, for example primary radar and secondary surveillance radar. Wind turbines have the potential to impact the surveillance systems used to detect and identify aircraft approaching, overlying or leaving Egyptian airspace and for which a Recognized Air Picture (RAP) is produced.

Inappropriate management of planning activities and site locations (e.g. siting of turbines) and construction activities (e.g. excavations) could disturb such aviation practices.

Such issues are generally managed through appropriate setback distances (if applicable) and in addition, regulatory authorities generally include requirements for wind farm developments related to visibility of turbines to include navigational lights and blade paintings

Nevertheless, if such issues are improperly managed and not taken into account as part of the planning phase, they could affect aircraft safety. Therefore, such impacts are considered of long-term duration, of negative nature, and of low magnitude given impact is related to inappropriate management of activities, however given its importance it is considered of high sensitivity. Given all of the above, the impact is considered of minor significance.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer during the planning phase:

- Establish coordination with NREA to ensure that the clearance that has been provided by the Ministry of Defence for the area includes in particular approvals from civil and military aviation entities. In addition, based on the that adhere to any specific navigational safety requirements (e.g. navigational lights, blade paintings, etc.)

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Developer during the construction phase:

- Securing formal non-objection letters from relevant entities

### 8.10.3 Potential Impacts on the Petroleum Facilities during Construction

As noted earlier, there are six (6) petroleum facility units located within the Project area along with road networks connecting such units. In addition, based on the requirements of the Coordination Agreement between NREA and General Petroleum Company, there are specific requirements to be considered for the detailed design of the Project.

Inappropriate management of planning activities (e.g. siting of turbines) and construction activities (e.g. excavations) without coordination with GPC could damage and/or disturb such facility.

Taking all of the above into account, the anticipated impacts are considered of short-term duration during the Project construction phase. Such impacts are of a negative nature, and if such impacts are improperly managed, then they are expected to be of medium magnitude and medium sensitivity due to the potential damage to the facilities. Given the above impact is considered of minor significance.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer during the planning phase:

- Establish coordination via NREA with the General Petroleum Company's head office in Cairo to discuss and determine any specific requirements to be taken into account for the detailed design of the Project as well as coordination agreement requirement during the construction and operation phase (e.g. avoidance of such areas, buffer distances to be considered, etc.)

Following the implementation of these mitigation measures, the significance of the residual impact would be reduced to not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Developer during the planning phase:

- Documenting coordination with relevant entities

### 8.10.4 Potential Impacts on Electricity Lines during the Planning and Construction Phase

As noted earlier, two electricity line runs north-south direction within the Project area. The electricity lines are under the responsibility of the EETC.

Inappropriate management of planning activities (e.g. siting of turbines) and construction activities (e.g. excavations) could damage and/or disturb such electricity lines.

Taking all of the above into account, the anticipated impacts on electricity networks are considered of short-term duration during the Project construction phase. Such impacts are of a negative nature, and if such impacts are improperly managed, then they are expected to be of medium magnitude and medium sensitivity due to potential damage to the OHLs. Given the above impact is considered of minor significance.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer and/or contractors during the planning and construction phases:

- Establish coordination with EETC to discuss and determine any specific requirements to be taken into account for the established electricity networks within the Wind Farm (e.g. avoidance of such areas, buffer distances to be considered, etc.)

- Ensure the developer follows and meets the Right of Way (RoW) buffer area as required by the “Electricity Law 87/2015”.
- Avoid placing turbines or other infrastructure elements in the OHTL buffer areas or Right of Way (ROW), which is 25m.

Following the implementation of these mitigation measures, the significance of the residual impact could be reduced to not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Developer and contractors during the planning and construction phases:

- Documenting coordination with relevant entities

#### **8.10.5 Potential Impacts on Water Resources during Construction and Operation**

It is expected that the Project throughout the construction and operation phases will require water for potable usage (drinking, showering, etc.) and non-potable usage (e.g. cleaning of machinery and vehicles).

The Project is expected to require around 80,000m<sup>3</sup> throughout the construction phase (for a total duration of 30 months) – equivalent to around 90m<sup>3</sup>/day. This will include around 60,000m<sup>3</sup> for construction requirements (concrete works, minimize dust, cleaning of requirements, etc.) as well as 20,000m<sup>3</sup> as potable water requirements (drinking, washing, etc.).

These values are indicative estimates developed by the ESIA team based on typical water consumption rates for similar wind farm projects and standard construction practices, as detailed design information and confirmed water demand figures are not yet available from the Developer.

Similarly, during the operation phase, water will mainly be required for potable use of onsite staff at the Wind farm. Nevertheless, such requirements are expected to be minimal and insignificant.

As discussed earlier, based on consultations with Ras Ghareb Water Company, there are no existing or planned water connections to the Project area. Water will be supplied through water trucks and tankers from Ras Ghareb and stored onsite through water tanks.

Based on the above it is clear that the water requirements for the Project during construction and operation are unlikely to entail any constraints on the existing users. However, the involved entities are required to coordinate with Ras Ghareb Water Company to secure water requirements for the Project most likely through tankers from a private contractor.

Taking all of the above into account, the anticipated impacts on the local water resources and utilities are considered of short-term duration during the Project construction phase and of long-term duration during the operation phase. Such impacts are of a negative nature, and are expected to be of low magnitude and of low sensitivity given the temporary nature of such impacts during construction and minimal water requirements of the Project during operation. To this extent, the impact is considered not significant.

#### Additional Requirements

The following identifies additional requirements to be applied by the contractors during the construction and operation phases:

- Coordinate with the Ras Ghareb Water Company to secure the water requirements of the Project.

### 8.10.6 Potential Impacts on Waste Utilities during Construction and Operation

The Project is expected to generate the following waste streams during the construction and operation phases:

- Wastewater during construction and operation to include black water (sewage water from toilets and sanitation facilities) and grey water (from sinks, showers, etc.). Wastewater during the construction phase from the Project can be assumed by taking into account an 80% wastewater generation factor for potable water requirements which will amount to around 16,000m<sup>3</sup> throughout the construction phase. Wastewater generated during operation is expected to be minimal and insignificant. Wastewater will be stored onsite though enclosed septic tanks and collected by tankers from the Project to the closest WWTP.
- Solid waste during construction and operation from the Wind Farm will include construction waste (mainly during construction to include dirt, rocks, debris, etc.) as well as general municipal waste (such as food, paper, glass, bottles, plastic, etc.). Solid waste quantities generated are not expected to be significant and are likely to be easily handled by closest landfill facility.
- Hazardous waste during construction and operation from the Wind Farm will include routine waste generated from such activities to include spent oil, lubricants, paint cans, solvents, etc. Hazardous waste quantities generated are not expected to be significant and are likely to be easily handled by closest authorized facility.

Taking all of the above into account, the anticipated impacts on waste utilities are considered of short-term duration during the Project construction phase and of long-term duration during the operation phase. Such impacts are of a negative nature, and are expected to be of low magnitude and of low sensitivity given the relatively minimal quantities generated and ease of management by relevant authorities. Given the above impact is considered not significant.

#### Additional Requirements

The following identifies the additional requirements to be applied by the contractors during the construction phase and Project Operator during the operation phase respectively:

- Coordinate with the Ras Ghareb Water Company and obtain list of authorized contractors for collection of wastewater from the site to the Ras Ghareb WWTP.
- Coordinate with the Ras Ghareb City Council to hire a competent private contractor for the collection of solid waste from the site to the Ras Ghareb Landfill.
- Coordinate with Environmental Management at Ras Ghareb City Council to obtain list of authorized contractors for collection of hazardous waste from the site to the closest approved facility for final disposal.

### 8.10.7 Potential Impacts on Telecommunication and Television & Radio Links during the Planning and Construction Phase

Wind turbines during the construction and operation phase could impact telecommunication, TV and Radio infrastructure. For example, construction activities could damage/disturb underground communication cables (if present within the area), while rotating turbines during operation could disrupt Line of Sight (LoS) connections between telecommunication transmission towers.

Such issues are generally managed through appropriate setback distances (if applicable) from such infrastructure elements. Nevertheless, if such issues are improperly managed and not taken into account as part of the planning phase, they could affect such elements. Therefore, such impacts are considered of long-term duration, of negative nature, and of low magnitude given impact is related to inappropriate management of



activities, however given its importance it is considered of high sensitivity. Given all of the above, the impact is considered of minor significance.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer during the planning phase:

- Establish coordination via NREA with NTRA to provide information on the Project (to include location and specifications of turbines in specific) and include any specific requirements to be considered as part of the detailed design to include setback distances if required for telecommunication, infrastructure (e.g. from LoS connections)

Following the implementation of these mitigation measures, the significance of the residual impact could be categorized as not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Developer during the planning phase:

- Securing formal non-objection letter from NTRA

### **8.10.8 Potential Impacts on Water Dams during Construction**

As noted earlier, there is a water dam located within the Project area at the eastern side known as the Wadi Aldarb Dam. The dam is under the responsibility of Ras Ghareb Local Unit.

Inappropriate management of planning activities (e.g. siting of turbines) and construction activities (e.g. excavations) could damage and/or disturb such dams.

Taking all of the above into account, the anticipated impacts on the dams are considered of short-term duration during the Project construction phase. Such impacts are of a negative nature, and if such impacts are improperly managed, then they are expected to be of medium magnitude and medium sensitivity due to the potential damage to the dams. Given the above impact is considered of minor significance.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer during the planning phase:

- Consider the following requirements in project design: (i) any construction work should be avoided in the areas behind and in front of the dam, because these areas are the most vulnerable to flood risks; and (ii) a minimum distance of 20 m on the right side and the left side of the dam must be avoided for the maintenance works of the dam and its artificial lake.

Following the implementation of these mitigation measures, the significance of the residual impact would be reduced to not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Developer during the planning phase and which include:

- Documenting coordination with relevant entities

### 8.10.9 Potential Impacts on Dumpsite during the Planning and Construction Phase

As mentioned earlier in “Section 7.9.6”, a dumpsite along with a burning area for the solid waste are located within the Project area. This informal dumpsite serves the inhabitants of Ras Ghareb city as an open area used for solid waste disposal and is managed by the Ras Ghareb Local Unit. However, based on consultations with the Local Unit, it was stated that the dumpsite will be relocated to another alternative site that was being studied at the moment (in 2021).

The construction of the Project doesn’t impose significant impacts on the dumpsite, nevertheless, the presence of the dumpsite in the Project area entails significant impacts on Avifauna, as well as on the community and workers’ health and safety during the planning, construction and operation phases, additional impacts on this matter are discussed earlier, refer to “Section 8.6”.

Taking all of the above into account, the anticipated impacts of the dumpsite are considered of long-term duration during the Project construction and operation phases. Such impacts are of a negative nature, and if such impacts are improperly managed, then they are expected to be of medium magnitude and medium sensitivity due to their proximity to the Project site. Given the above impact is considered of minor significance.

#### Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer/contractors during the planning and construction phases:

- Establish coordination with Ras Ghareb Local Unit to enforce dumpsite closure prior to the operations phase commencement. Closure of the dumpsite should take into account and consider that it does not affect avifauna in particular as discussed further under “Section 8.6”. As discussed earlier, this is currently underway.

Following the implementation of these mitigation measures, the significance of the residual impact would be reduced to not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Developer/contractors during the construction phase and which include:

- Documenting the full closure process

### 8.11 Occupational Health and Safety and Worker Accommodation

This section identifies the anticipated impacts from the Project throughout its various phases on occupational health and safety. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

This section presents the assessment of potential impacts on occupational health and safety collectively during the construction and operation phases of the wind farm, given that they are similar in nature during both phases.

Throughout the construction and operation phases there will be generic occupational health and safety risks to workers due to potential accidents. The following risks are generally associated with wind farm development projects:

- Slips and falls;
- Working at heights;

- Working with powered and hand-held tools;
- Struck-by objects;
- Moving machineries;
- Working in confined spaces and excavations;
- Exposure to chemical, hazardous or flammable materials;
- Working in sunny conditions and high temperatures;
- Exposure to electric shocks and burns when touching live components;
- Occupational Health and Safety (OHS) risks from work with nearby operations, particularly the oil rigs and petroleum storage facilities

Such impacts are considered of short-term duration during the construction phase and of long-term duration throughout the Project operation phase, of a negative nature, and are expected to be of medium magnitude and medium sensitivity as in extreme cases they could entail permanent impacts (e.g. permanent disability). Nevertheless, such impacts are generally controlled through the implementation of general OHS best practices. Given the above such an impact is considered of minor significance.

### Mitigation Measures

#### Occupational Health and Safety

It is expected that the contractors will prepare an Occupational Health and Safety Plan (OHSP) regarding the Project's construction, installation and commissioning works as well as the general construction site operations. In addition, they are expected to develop an OHSP tailored to the Project's operation phase.

The objective of the OHSP is to ensure the protection of 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 accidents which may injure personnel or damage property of the contractors.

The OHSP for the construction and operation phase should be Project and site specific and must take into account the national requirements mainly the Law No. 4 of 1994 and Egyptian Labour Law No. 14 of 2025, as well as their implementing regulations and relevant ministerial decrees related to occupational health and safety. In addition, it must also be compliant with the IFC PS2, EBRD ESR 2 and EIB's ESS 9 (Occupational and Public Health, Safety and Security) which recognize the importance of avoiding or mitigating adverse health and safety impacts on workers and require the development of a project-specific health and safety plan that is in accordance with GIIP.

In general, the OHSP should address the following components:

- Identify roles and responsibilities of the personnel involved within the Project to include the EHS manager, construction manager, supervisor, and other subcontractors' responsibilities;
- Identify in details information in relation to formulation of safety committees, communication protocols, first aid personnel and facilities, first aid training programs, occupational health and safety culture, quality system, reporting requirements, competence and job safety training, safety inspections, recruitment procedures, safety audits, risk assessment, etc.;
- Identify in detail the hazards which may be associated with various activities to take place and the various measures to be implemented to reduce such risks including the requirements for Personal Protective Equipment (PPE). This includes for example hand tools, access equipment, lifting equipment, mobile working equipment, etc.;

- Establish training requirements for workers to comply with health and safety procedures and protective equipment;
- Include specific procedures and protocols related to venomous species onsite, including but not limited to undertaking awareness sessions on potential presence of key species, measures to be undertaken in case they are found, ensuring medical resources are available to handle incident.

The contractors are expected to adopt and implement the provisions of the OHSP throughout the Project construction and operation phases.

#### Emergency Preparedness and Response

The contractors are also expected to prepare and implement an Emergency Preparedness and Response Plan for the Project construction and operation phase.

The objective is to establish a series of organizational, operational and preventive measures in the event of an emergency that are adapted to the circumstances of such situations, which in turn will ensure the safety of workers and property within the specific Project site. The plan should take into account the following:

- Inclusion of requirements for an emergency responder team that includes at a minimum first aiders and firefighters that receive appropriate and certified training
- Inclusion of requirements to undertake emergency drills in coordination with external emergency response services if required (e.g. civil defence, nearest hospital, etc.)
- Identify in detail emergency procedures to be implemented, including first response, alerting emergency contacts, site evacuation, communicating with external emergency services, etc.
- Identification in detail emergency control measures, including but not limited to: (i) fire, (ii) personnel accidents, (iii) spillage, (iv) sandstorms, (v) heat strokes, (vi) war conflicts/security deterioration and others.
- Identification of location of assembly points onsite
- Identification of emergency signs to be implemented onsite
- Identification of roles and responsibilities for implementation of the plan to include establishment of an emergency committee and assigning roles to an emergency manager

#### Worker Grievance Mechanism

The contractors are also expected to prepare and implement a worker grievance mechanism for the Project construction and operation phases. The Grievance Mechanism will be based on the Developer's Complaints Management Procedure and will have the objective of ensuring a robust and comprehensive procedure to capture, document, resolve and close out any worker complaint. The mechanism should take into account the following:

- Identification of a step-by-step process and guideline to ensure that every complaint/grievance made by workers are registered, documented and fully addressed
- The overall outline/structure of the grievance mechanism will be as follows:
  - Workers will be allowed to lodge grievances through various platforms and channels, including the Developer's online Complaints Management Platform, grievance boxes distributed onsite, telephone, face to face meetings with responsible personnel, workers representatives and unions. Contact details for all such channels will be identified and provided in detail.

- Anonymous logging of grievances will be allowed.
- All grievances will be recorded and a case handler will be assigned and who will be determined at a later stage based on the Developer's Complaints' Management Procedure.
- All grievances will be handled in the shortest possible period. The first approach will be to inform the worker within the first 24 hours after receiving the grievance. The worker will be informed within 5 working days on whether or not the grievance is eligible.
- Once a resolution has been agreed or a decision made, the case handler will monitor the implementation of the response.
- After the implementation of an agreed resolution has been verified the grievance close-out will take place. It will entail reaching a unanimous agreement, clearly communicated to avoid misunderstandings.
- A close-out report will be prepared with evidence to support closure (e.g. photos).

### Worker Accommodation

It is not clear at this point whether there will be any onsite accommodation for workers. Nevertheless, should the contractors opt for onsite accommodation unit for workers, it must conform to the national requirements. In addition, it should also confirm to international best practices requirements – this includes mainly the “Workers’ accommodation: process and standards” (EBRD/IFC Guidance Note, 2009). The document provides guidance notes on general living facilities, room facilities, medical facilities, management of accommodation units, etc. Where workers will be housed in rented accommodation, similar requirements (based on the same standards) must apply as related to number of workers per apartment, personal space, welfare facilities, and others.

Following the implementation of these mitigation measures, the significance of the residual impact would be reduced to not significant.

### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the contractors during the construction and operations phases:

- Develop and implement OHSP, EPRP, Workers Accommodation Management Plan, and Grievance Mechanism Procedure;
- Inspection to ensure the implementation of the provisions of the Occupational Health and Safety Plan and assess compliance with its requirements;
- Regular Reporting on the health and safety performance onsite in addition to reporting of any accidents, incidents and/or emergencies and the measures undertaken in such cases to control the situation and prevent it from occurring again;
- Regular emergency drills to be undertaken for different types of identified emergencies;
- Regular inspections of emergency equipment, including fire extinguishers, first aid kits, spill kits, etc.;
- Inspection of workers accommodation to ensure its compliance with the requirements of “Instructions for Prevention of Health Nuisances from Workers Accommodation No. (1) For the year 2013” and “Workers’ accommodation: process and standards” (EBRD/IFC Guidance Note, 2009).



## 8.12 Public Health and Safety

This section identifies and assesses the anticipated impacts from the Project activities on public health and safety during the various phases to include planning and construction phase and operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

### 8.12.1 Potential Impacts from Noise from Wind Turbines during Operation

Wind turbines produce noise during operation from mechanical and aerodynamic sources. Mechanical noises are mainly limited from the machinery in the nacelle of the turbine (gearbox, generator, auxiliary equipment, etc.) while aerodynamic noise is generated from the movement of air around the turbine blades and tower.

Propagation of the sound from a turbine is primarily a function of distance, but it can also be affected by the placement of the turbine, surrounding terrain, and atmospheric conditions. In addition, noise levels depend greatly on the level of operation of the turbines (percentage of rated power). Nevertheless, in some cases, background/ambient sound already exceeds the sound produced by any wind turbine (e.g., high wind speeds, surrounding activities, etc.). In this case, the sound from the wind turbine blends into the background sound, simply becoming part of the present soundscape without the notice of nearby receptors.

As required by the IFC EHS Guideline for Wind Energy, the following is noted in relation to noise assessment for wind farms:

- Receptors should be chosen according to their environmental sensitivity (human, livestock, or wildlife).
- Preliminary modelling should be carried out to determine whether more detailed investigation is warranted. The preliminary modelling can be as simple as assuming hemispherical propagation (i.e., the radiation of sound, in all directions, from a source point). Preliminary modelling should focus on sensitive receptors within 2,000 meters (m) of any of the turbines in a wind energy facility.
- If the preliminary model suggests that turbine noise at all sensitive receptors is likely to be below an LA90 of 35 decibels (dB) (A) at a wind speed of 10 meters/second (m/s) at 10 m height during day and night times, then this preliminary modelling is likely to be sufficient to assess noise impact; otherwise, it is recommended that more detailed modelling be carried out, which may include background ambient noise measurements.

The IFC EHS Guideline for Wind Energy is based on “the Assessment and Rating of Noise from Wind Farms” (ETSU-R-97). ETSU can be regarded as relevant guidance on good practice, it contains a methodology for generating noise limits for a wind turbine and wind farms. ETSU-R-97 is referenced by the United Kingdom (UK) Government as a best practice guide for UK Legislation. The assessment procedure of ETSU-R-97 consists of the following steps for the screening assessment:

- Determine a study area;
- Identify potentially affected properties;
- Predict noise levels from all turbines (existing and proposed) and determine a noise contour boundary of 35dB(A);
- Identify if any noise sensitive receptors are within this boundary.

Taking the above requirements into account, a screening assessment was undertaken for the Project. An initial screening assessment was carried out in 2021 based on the preliminary Project layout. In 2026, a detailed noise modelling assessment was undertaken based on the updated turbine layout, current Project configuration, and identified NSRs.

### **Screening Assessment - 2021**

The screening assessment was based on the following:

- Noise prediction calculations using SoundPLAN 9.0 software according to the International Organization for Standardization (ISO) 9613 'Acoustics – Attenuation of Sound During Propagation Outdoors' (International Organization for Standardization -ISO, 1996). ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources
- ISO 9613-2 calculates predicted noise levels with the major assumption that the sources are located upwind from the Noise Sensitive Receiver locations (NSR) as this is the worst-case scenario. Therefore, directivity and attenuation due to metrological factors such as wind speed and wind direction upwind from a source are not taken into account
- Screening was based on a worst-case noise scenario (W10 = 10m/s) as required by the guidelines. Since the proposed wind turbines for the Project operate at a constant maximum sound power output of 106.3 dBA between 10 m/s and 14.5 m/s, worst cases would be defined as operation within wind speeds which exceed 10 m/s.
- As there is no data provided on uncertainty values or correction factors, a 2 dB correction has been applied in accordance with the IAO Good Practice Guide
- Determining the extent of the 35 dB(A) contour boundary emitted from the wind turbine generators (WTG)
- Determining if there are any noise sensitive receptors within the calculated contour boundary;
- Model calculation and parameter setting to include the following:

**Table 73: Model Calculation and Parameter Setting**

Model Parameter	Parameter Setting / Standard
Calculation Standard	(ISO) 9613 'Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Calculation Method' (ISO, 1996) Application as per IOA GPG
Wind Speed	10 m/s
Ground Absorption Coefficient	0.5
Receiver Height	10 m
Meteorological Data	Humidity 70% Air Pressure 1013.3 mbar T = 25°C
Atmospheric Attenuation Coefficients (dB / km)	63Hz 125Hz 250Hz 500Hz 1kHz 2kHz 4kHz 8kHz 0.1 0.3 1.1 2.8 5.0 9.0 22.9 76.6

The study is based on the following information:

- General arrangement and layout drawings of the wind farm, including topography.
- Wind turbine supplier data (vendor noise data) as provided by the Developer
- Noise Sensitive Receiver locations (NSR) as identified in "Section 7.1" earlier. Review of identified receptors indicate that the nearest NSR is Ras Ghareb City located 8km to the southeast. As discussed within the land use section (refer to "Section 7.2") it was concluded that the Project site in particular is uninhabited and vacant with no indication or evidence of any physical or economical land use activities. There are several ongoing petroleum activities, army units and wind farms within the surrounding areas (to include 4-5km radius from the site in particular). Such receptors are not considered key sensitive receptors.

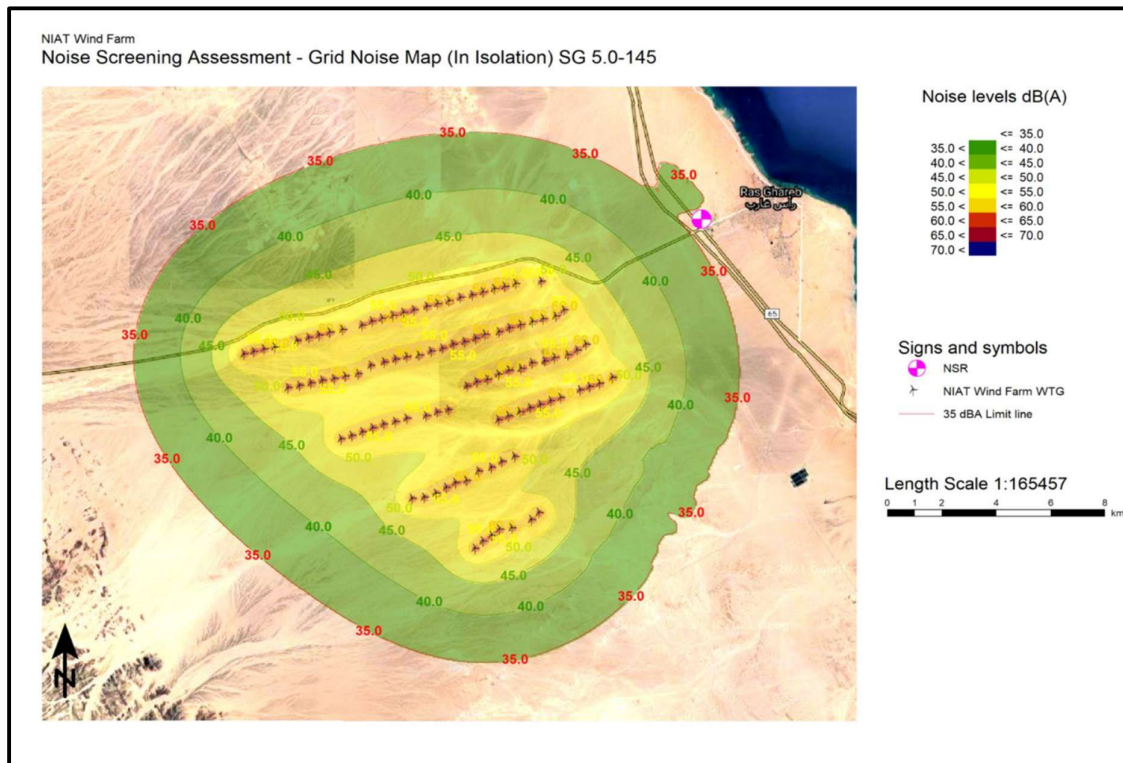
A noise contour map for the worst-case noise scenario has been calculated and is presented in the figure below. The map shows both contour lines and noise propagation level areas or 'zones'. The significance of the noise

contour map is to allow for an overview of noise levels over a geographic area and therefore allows a quick basic analysis of the noise propagation for identification of the specific NSR.

**Table 74: Noise Contour Map Setup Specification**

Parameter Description	Noise Map Parameter
Wind Speed (W10)	10 m/s
WTG Operation	Worst Case – All WTGs operating
Mapping Grid Resolution	25 x 25 m
Mapping Result Range	35 - 70 dB(A)

As noted in the figure below, according to the results of the preliminary model undertaken, the nearest NSR (Ras Ghareb City) is outside of the LA90 of 35 decibels (dB) (A) at a wind speed of 10 meters/second (m/s) at 10 m as required by the Guidelines. Based on the results of the noise contour map the predicted contribution noise level at 10 m/s has been estimated at 34.6 dB(A).



**Figure 95: Noise Screening Assessment Results**

**Taking the above into account, such impacts are considered irrelevant and no detailed noise assessment is required.**

### **Noise Monitoring and Assessment – 2026**

#### **(i) Selection of Parameters**

Monitoring was undertaken for noise parameters only, including A-weighted noise levels such as LAeq, LA90, LA10, LA50, and LAm<sub>ax</sub>, as well as frequency-based measurements in 1/3 octave or 1 octave bands ranging from 31.5 Hz to 8,000 Hz. This monitoring forms part of the detailed noise modelling assessment undertaken in 2026, based on the final Project layout and identified NSRs. The selected parameters were based on the following rationale. These parameters were selected based on the following rationale:

- Such parameters are representative of the existing acoustic environment at the identified receptor locations, particularly in relation to worker accommodation units used for rest and sleeping. Statistical noise descriptors (e.g. LA90 and LA10) allow for characterisation of background noise levels and

variability in noise conditions, while LAeq provides an overall representation of noise exposure. L<sub>Amax</sub> supports identification of peak noise events, and frequency-based measurements enable assessment of tonal and low-frequency characteristics relevant to wind turbine noise.

- Such parameters are required to support the operational noise impact assessment of the Project. The selected parameters enable comparison between baseline conditions and predicted operational noise levels, particularly in relation to internal noise exposure within accommodation units, and are consistent with international good practice for environmental noise monitoring.

(ii) Selection of Locations

Five receptors closest to the project boundary have been identified as representative assessment NSRs. The identified receptors are described as follows:

- NSR1, Quarry Worker Accommodation - A residential-style accommodation facility used by site workers, where overnight stays and resting conditions are expected. It is worth noting that no workers live there permanently, it is rather used by workers on shift-basis.
- NSR 2 & 3, Batching Plant - An operational industrial facility with no residential accommodation, understood to be occupied only by a night security guard on a non-residential basis.
- NSR 4, EETC Accommodation - A permanent accommodation building associated with the existing EETC substation, comprising multi story residential use where individuals rest and sleep. Similarly, this accommodation building is used by workers on shift-basis and no workers reside there permanently.
- NSR 5, Army Unit - A facility associated with military use. Due to limited information, it is assumed personnel are likely to be present for extended periods on shift-basis, including rest and sleep.

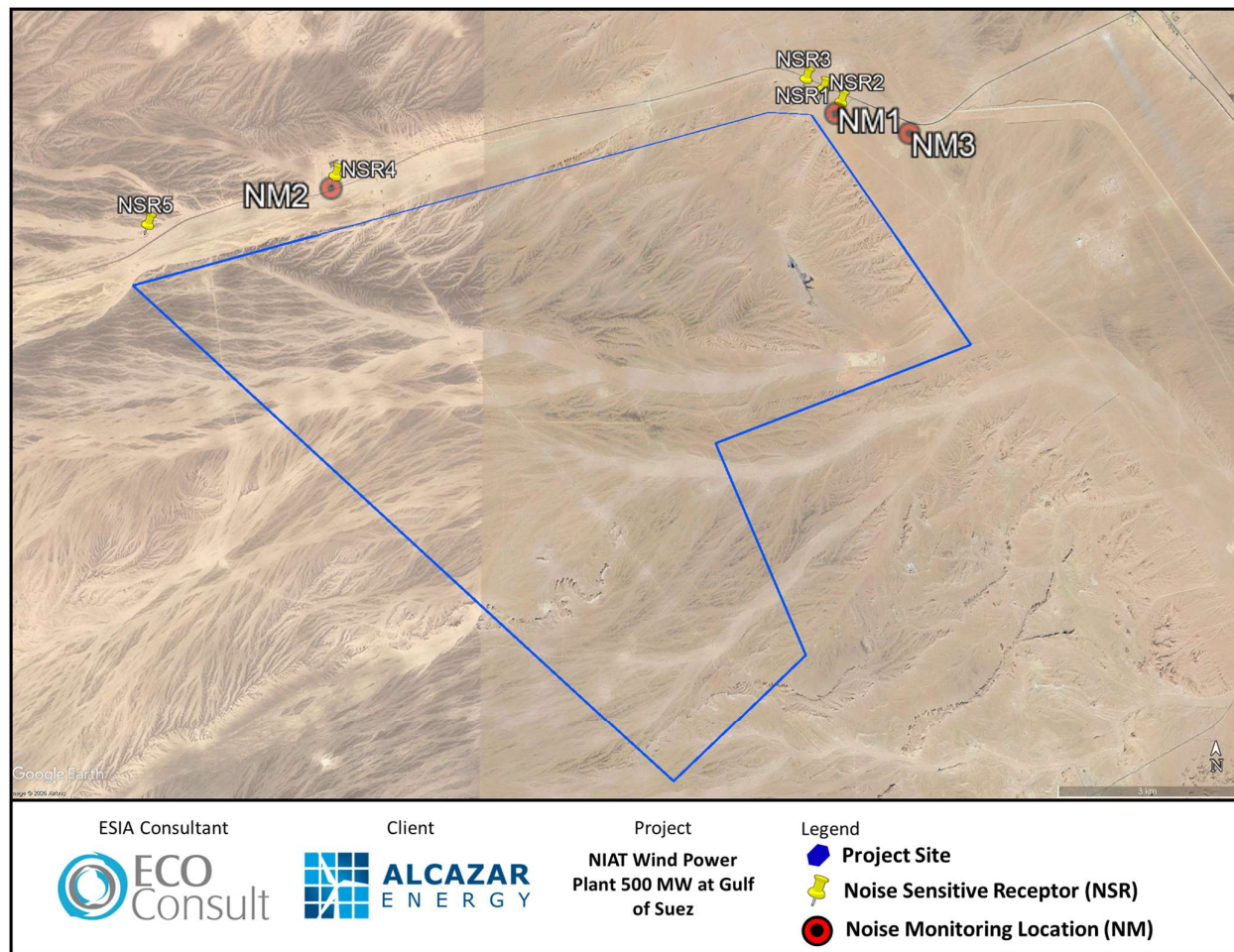
To assess the noise baseline conditions within the Project area, 3 monitoring points were selected as shown in the figure below that were distributed throughout the site. Monitoring was undertaken for 48 hours at each point respectively. A duration of 48 hours was selected to ensure that the baseline survey included a representative range of environmental conditions, including both daytime and night-time periods. The selected monitoring periods were also distributed across weekdays and weekends to account for potential variations in background noise levels.

Table 57 presents the coordinates and location of the Noise Monitoring points and NSRs.

**Table 75: Location of Monitoring Points (NM) and NSRs**

Locations	Latitude	Longitude
NM1	28°20'5.02"N	32°59'57.29"E
NM2	28°19'23.59"N	32°54'49.11"E
NM3	28°18'50.86"N	33° 2'29.47"E
NSR1	28°20'5.18"N	32°59'57.87"E
NSR2	28°20'11.99"N	32°59'46.77"E
NSR3	28°20'17.59"N	32°59'36.31"E
NSR4	28°19'24.04"N	32°54'48.77"E
NSR5	28°18'57.67"N	32°52'55.33"E





**Figure 96: Noise Monitoring Receptor (NSR) Locations**

**(iii) Purpose of the Assessment**

The purpose of this assessment is to evaluate the predicted internal noise levels at nearby NSRs arising from the proposed operations. The assessment focuses on indoor resting and sleeping conditions, which represent the most sensitive receptor use within the study area.

Noise predictions were calculated with SoundPLAN 9.1 software according to ISO 9613-2 with input parameters and limitations stipulated as per Institute of Acoustics (IOA) Good Practice Guide (GPG).

External noise levels have been predicted using noise modelling techniques, and these have been used to derive corresponding internal noise levels through the application of representative façade sound insulation values. The results are then assessed against relevant internal noise criteria, including those set out in BS 8233:2014.

**(iv) Legislative and international requirements**

A review of international best practices for Wind Turbine Noise has been undertaken to inform the assessment methodology. Given the nature of the identified receptors, which comprise worker accommodation and institutional facilities, the focus of the assessment is on internal noise conditions rather than external residential amenities. The key documents considered in this assessment are:

- The World Bank Group / International Finance Corporation Environmental, Health, and Safety Guidelines for Wind Energy.



- BS 8233:2014 ‘Sound Insulation and Noise Reduction for Buildings’, which provides recommended internal noise levels for sleeping environments and is used as the primary benchmark for assessing potential effects on rest and sleep within the identified receptors.
- ETSU-R-97 ‘The Assessment and Rating of Noise from Wind Farms produced by the Energy Technology Support Unit (ETSU) for the UK Department of Trade and Industry. This standard is referenced for general context on wind farm noise assessment methodologies, although it has not been adopted as the primary assessment framework due to the non-residential nature of the identified receptors.

### ***IFC EHS Guidelines on Wind Energy***

The IFC EHS Guidelines on Wind Energy provide high-level guidance on the assessment of environmental noise impacts associated with wind energy developments. The recommended noise limits for residential receptors are 55 dB LAeq during the daytime and 45 dB LAeq during the night-time period.

Key relevant principles include:

- Receptors should be chosen according to their environmental sensitivity (human, livestock, or wildlife).
- All modelling should take account of the cumulative noise from all wind energy facilities in the vicinity having the potential to increase noise levels.
- Adoption of a proportionate assessment approach based on the nature of the receptors and potential impacts.

The above principles support the approach adopted in this assessment, which focuses on receptors where potential impacts on internal conditions may occur.

### ***BS8233 ‘sound insulation and Noise Reduction for Buildings***

BS 8233:2014 provides guidance on appropriate internal and external noise levels for residential buildings, with particular emphasis on the protection of internal living conditions.

For sleeping environments, BS 8233:2014 recommends that internal noise levels in bedrooms at night should not normally exceed 30 dB LAeq,8h for good conditions. BS8233 further recognises that, in some circumstances, it may not be possible to achieve this level, and that internal noise levels of up to 35 dB LAeq,8h may be considered acceptable. These guideline values are intended to minimise the potential for sleep disturbance.

In the context of the proposed NIAT and RASGHA Wind Farm, the identified receptors comprise worker accommodation and institutional facilities, where the primary noise sensitivity relates to internal resting and sleeping conditions rather than external amenity. As such, the internal noise criteria presented in BS 8233:2014 are considered appropriate for assessing potential operational noise impacts.

Accordingly, predicted external noise levels from the wind turbine generators will be converted to internal noise levels using façade attenuation assumptions, and assessed with reference to the BS 8233:2014 guidance values.

### ***ETSU-R-97 “The Assessment and Rating of Noise from Wind Farms” (1997)***

Published in September 1996, ETSU Report ETSU-R-97 was a research report produced by the ETSU. ETSU can be regarded as relevant guidance on good practice, it contains a methodology for generating noise limits for a wind turbine and wind farms. ETSU-R-97 is referenced by the UK Government as a best practice guide for UK Legislation.

In the context of the proposed NIAT and RASGHA Wind Farm, the identified receptors comprise worker accommodation and institutional facilities, which are not considered representative of long-term residential receptors. As such, the ETSU-R-97 methodology has not been adopted as the primary assessment framework. Despite this, ETSU-R-97 is referenced for general context in relation to wind turbine noise characteristics and typical assessment practices.

### **ISO 9613-2:2024 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation**

ISO 9613-2:2024 describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (as described in ISO 2024) under meteorological conditions.

#### **Noise Survey – 2026**

The results of the baseline surveys are presented in Table 76 below.

**Table 76: Noise Baseline Survey Results (Daytime and Night-time)**

ID	Period		Noise Limit (dB(A))	Measured Noise Level (dB(A))				Exceedance of Noise Limit?
				L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>Amin</sub>	L <sub>A90</sub>	
NM1	27/02/26 Weekday	Day	55	69.9	113.9	22.1	57.9	Yes
		Night	45	57.4	91.4	26.8	52.1	Yes
NM1	01/03/26 Weekend	Day	55	61.0	96.3	28.2	52.3	Yes
		Night	45	57.8	91.3	29.4	48.3	Yes
NM2	02/03/26 Weekday	Day	55	63.3	96.9	21.6	76.3	Yes
		Night	45	61.1	101.6	29.8	51.9	Yes
NM2	03/03/26 Weekend	Day	55	68.2	109.6	27.9	73.3	Yes
		Night	45	67.3	92.1	34.3	54.8	Yes
NM3	04/03/26 Weekday	Day	55	51.0	89.8	28.6	45.4	No
		Night	45	49.1	83.5	29.8	38.6	Yes
NM3	05/03/26 Weekday	Day	55	54.2	88.2	28.5	47.6	No
		Night	45	52.7	84.4	30.1	46.8	Yes

The baseline survey is presented for contextual understanding of the existing acoustic environment. However, the assessment of wind turbine noise has been undertaken independently using predictive modelling and internal noise criteria.

It is important to note that the measured exceedances observed during the survey period are primarily influenced by wind-induced noise. This is not considered to be a concern in the context of the proposed development. The site has been selected for wind energy generation due to its favourable wind resource, and it is therefore expected that elevated ambient noise levels associated with wind conditions will be a defining characteristic of the baseline environment.

On this basis, the use of predictive modelling to assess wind turbine noise, independently of wind-influenced baseline measurements, is considered appropriate.

#### **Modelling Assumptions and Limitations**

The following assumptions have been made for the modelling assessment, and wherever possible, a conservative approach has been taken:

- ISO 9613-2 calculates predicted noise levels with the assumption of moderate downwind conditions of propagation, therefore, attenuation due to meteorological factors such as wind speed and wind direction are not taken into account.

- Due to the surrounding area being a mix of hard and soft ground surfaces, an absorption coefficient of 0.5 has been assumed.
- The assessment has been undertaken on an isolated basis, considering only the contribution from the proposed NIAT and RASGHA wind farm. A cumulative assessment including the surrounding wind farms in the wider area has not been undertaken as part of this study. The primary objective is to establish the standalone noise contribution of the proposed development and understand the NIAT and RASGHA farm is the dominant noise source at the respective NSRs.

### **Screening Assessment – 2026**

The screening assessment was based on the following:

- Noise prediction calculations using SoundPLAN 9.1 software according to the International Organization for Standardization (ISO) 9613 'Acoustics – Attenuation of Sound During Propagation Outdoors' (International Organization for Standardization -ISO, 1996). ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources
- ISO 9613-2:2024 calculates predicted noise levels with the major assumption that the sources are located upwind from the NSR as this is the worst-case scenario. Therefore, directivity and attenuation due to meteorological factors such as wind speed and wind direction upwind from a source are not taken into account.
- Screening was based on a worst-case noise scenario (W10 = 10m/s) as required by the guidelines. Since the proposed wind turbines for the Project operate at a constant maximum sound power output of 106.3 dB(A), worst case is defined as operation at wind speeds exceeding 10 m/s.
- A +2 dB correction has been applied to account for measurement uncertainty, in line with manufacturer guidance and the IOA Good Practice Guide.
- Determining the extent of noise contour boundaries emitted from the wind turbine generators (WTGs).
- Determining whether any noise sensitive receptors fall within the calculated contour boundaries.
- Model calculation and parameter setting to include the following:

Model Parameter	Parameter Setting / Standard								
Calculation Standard	(ISO) 9613 'Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Calculation Method' (ISO, 2024) Application as per IOA GPG								
Wind Speed	10 m/s								
Ground Absorption Coefficient	0.5								
Receiver Height	1.5 m								
Meteorological Data	Humidity 70% Air Pressure 1013.3 mbar T = 25°C								
Atmospheric Attenuation Coefficients (dB / km)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
	0.1	0.3	1.1	2.8	5.0	9.0	22.9	76.6	

The study is based on the following information:

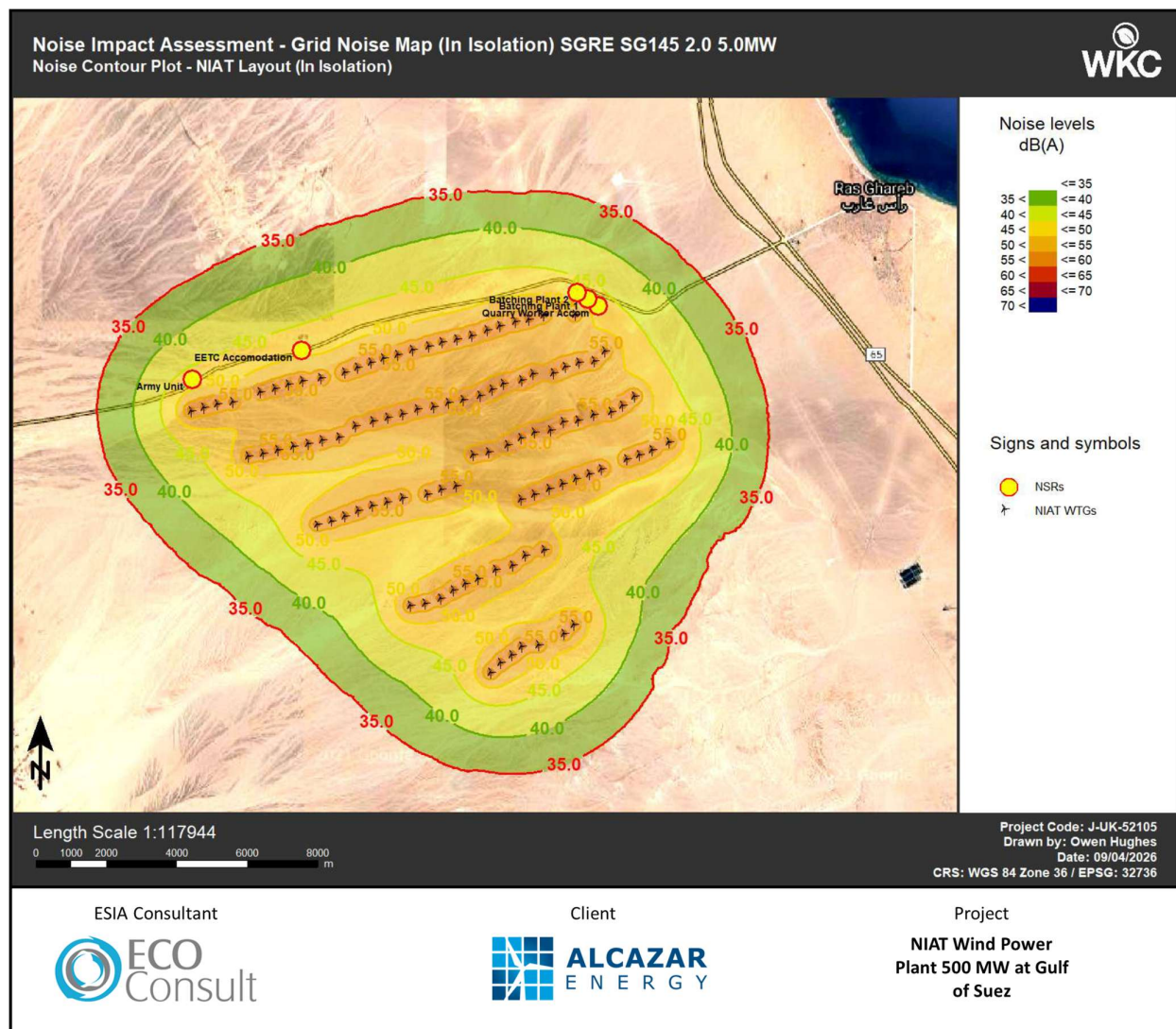
- General arrangement and layout drawings of the wind farm, including topography.
- Wind turbine supplier data (vendor noise data) as provided by the Developer

- NSR as identified, comprising five receptors: Quarry Worker Accommodation (NSR1), Batching Plant 1 (NSR2), Batching Plant 2 (NSR3), EETC Accommodation (NSR4), and Army Unit (NSR5). The Project site is largely uninhabited and vacant, with surrounding areas characterised by petroleum activities, army units, and existing wind farms. Such receptors are not considered key sensitive receptors.

Noise contour maps for the worst-case noise scenario have been calculated for the assessment and are presented in Figure 97. The significance of the noise contour maps is to allow for an overview of noise levels over a geographic area and therefore allows a quick basic analysis of the noise propagation for identification of the specific NSRs. Table 71 below displays the configuration for the grid noise map calculations.

**Table 77: Noise Contour Map Setup Specification**

Parameter Description	Noise Map Parameter
Wind Speed (W10)	10 m/s
WTG Operation	Worst Case – All WTGs operating
Mapping Grid Resolution	25 x 25 m
Mapping Result Range	35 - 70 dB(A)



**Figure 97: Noise Contour Map for NIAT Wind Farm Layout - W<sub>10</sub>: 10 m/s**

#### Predicted Noise Results at NSRs

Based on the results of the noise contour map and the identification of the NSR, Table 78 below displays the predicted noise level results outside the window at the NSRs.

**Table 78: Predicted Contribution Noise Levels at NSRs from NIAT Wind Farm (W<sub>10</sub>)**

NSR	Classification	Predicted Contribution Noise Level at 10 m/s Wind Speed (W <sub>10</sub> ) – dB(A)
NSR1	Quarry Worker Accommodation	47.5
NSR2	Batching Plant 1	48.5
NSR3	Batching Plant 2	48.2
NSR4	EETC Accommodation	48.8
NSR5	Army Unit	47.7

The results show that under these conditions, predicted noise levels at the NSRs range from 47.7 dB(A) to 48.8 dB(A). The highest level is predicted at NSR4 at 48.8 dB(A) and the lowest level is predicted at NSR1 at 47.5 dB(A).

#### Internal Noise Assessment

BS8233:2014 provides guidance on appropriate internal noise levels within buildings, with specific criteria for sleeping environments.

For sleeping environments, BS 8233:2014 recommends that internal noise levels in bedrooms at night should not normally exceed 30 dB LAeq,8h for good conditions. BS8233 further recognises that, in some circumstances, it may not be possible to achieve this level, and that internal noise levels of up to 35 dB LAeq,8h may be

considered acceptable. These guideline values are intended to minimise the potential for sleep disturbance.

Given that the identified receptors comprise worker accommodation and institutional buildings, where the primary noise sensitivity relates to internal resting and sleeping conditions, the BS8233 internal noise criteria are considered appropriate for this assessment.

The receptors considered for internal noise assessment comprise temporary and permanent accommodation buildings, including worker accommodation and institutional buildings. In the absence of detailed construction specifications for the identified NSRs, typical construction assumptions have been adopted based on observations from the site visit.

The accommodation units generally comprise simple masonry or blockwork structures with standard openings and no evident acoustic treatment. In practice, the overall façade sound insulation performance is influenced not only by the wall construction, but also by openings, ventilation conditions, and potential air leakage.

The adopted value of 20 dB is therefore considered a conservative and representative assumption of real-world building performance, reflecting conditions where windows or openings may be partially open during occupancy.

The predicted internal noise levels are summarized in the table below:



**Table 79: Predicted Internal Noise Levels at each NSR**

NSR	Classification	Predicted Contribution Noise Level at 10 m/s Wind Speed ( $W_{10}$ ) – dB(A)	Façade Sound Insulation dB(A)	Predicted Internal Noise Level (dB(A))	BS8233 Internal Noise Criteria dB(A)
NSR1	Quarry Worker Accommodation	47.5	20	27.5	30 - 35
NSR2	Batching Plant 1	48.5	20	28.5	30 - 35
NSR3	Batching Plant 2	48.2	20	28.2	30 - 35
NSR4	EETC Accommodation	48.8	20	28.8	30 - 35
NSR5	Army Unit	47.7	20	27.7	30 - 35

In accordance with BS 8233:2014, the recommended guideline value for internal noise levels in bedrooms during night-time is an exceedance of 30 - 35 dB LAeq,8h. The predicted internal noise levels at all assessed NSRs range from 27.5 dB(A) to 28.8 dB(A). As such, all receptors are predicted to comply with the BS8233 guideline value for internal resting conditions.

On this basis, the proposed development is considered to achieve acceptable internal noise conditions in accordance with BS8233. A façade sound insulation value of 20 dB has been adopted, representing a conservative assumption of typical building performance of the NSRs.

Taking the above into account, and given that the predicted internal noise levels comply with the applicable internal noise criteria, no additional mitigation measures are considered necessary.

#### Additional Requirements

In terms of noise management, the following is required:

- The Developer will be required to implement a Stakeholder Engagement Plan (SEP) that includes a stakeholder grievance mechanism. The SEP is provided as a standalone document.
- As part of the SEP and prior to the operation phase, the Developer will be required to undertake direct consultations with the residents of the sensitive receptors identified and explain in detail the noise impacts and the results and outcomes of the assessment. In addition, the Developer should also explain the stakeholder grievance mechanism.
- In the case that the residents do submit grievances related to noise, the Developer should consider measures to eliminate such impacts could include installation of vegetative buffer, retrofit insulations, any other barriers around the property as applicable. This should be done in agreement and consultation with the residents of the property.

#### **8.12.2 Potential Impacts from Shadow Flicker from Wind Turbines during Operation**

Shadow flicker occurs when the sun passes behind the wind turbine and casts a shadow several hundred meters away from the turbine's location. As the rotor blades rotate, shadows pass over the same point causing an effect known as 'shadow flicker'. Shadow flicker only occurs under specific environmental conditions which must also align for flicker to occur which include position and height of the sun, wind speed, direction, cloudiness, and position of the turbine to a sensitive receptor.

Excessive shadow flicker can be a source of nuisance and could create a disturbing indoor environment to the occupants of those buildings especially when casted through windows of buildings that directly face the turbine with no obstructions in sight (trees, hills, etc.).

A companion guide to Planning Policy Statement 22 (PPS22) (2004) and Department for Business, Enterprise and Regulatory Reform (BERR) (2007) indicates that shadow flicker is typically limited to occurring within approximately 10 rotor diameters of a wind turbine; at distances beyond 10 rotor diameters shadow flicker effects are essentially undetectable. Beyond this distance, the shadow is diffused such that the variation in light levels is not likely to be sufficient to cause annoyance. This is also acknowledged in the Queensland Wind Farm Planning Guidelines, which state that the first step in performing a shadow flicker assessment is to determine the extent of shadows from turbines and suggest a distance equivalent to 265 maximum blade chords (the thickest part of the blade) as an appropriate limit. This limit corresponds to around 800 m to 1,325 m for modern wind turbines, which typically have maximum blade chord lengths of 3 m to 5 m (AECOM, 2016). For the Siemens Gamesa SG 5.0-145 turbines with a rotor diameter of 145m, 10 rotor diameters equate to 1,450m. The maximum shadow flicker zone for this Project is therefore expected to extend to a radius of 1,450m from each turbine, within which all five identified sensitive receptors are located.

The IFC EHS Guideline for Wind Energy states that where there are nearby receptors, commercially available software can be used to model shadow flicker in order to identify the distance to which potential shadow flicker effects may extend.

Following the February 2026 site visit, five sensitive receptors were identified within the shadow flicker impact zone of the Project: SR1 — Quarry Workers' Accommodation (~400m from the project boundary); SR2 — Batching Plant 1 (~400m); SR3 — Batching Plant 2 (~400m); SR4 — EETC substation workers' accommodation (~650m); and SR5 — a military facility. All five receptors fall within the maximum shadow flicker impact zone of 1,450m radius.

Figure 98 presents the worst-case scenario results of the shadow flicker assessment at the identified receptors as total hours per year, whereas Figure 99 presents the worst-case scenario results of the shadow flicker assessment at the identified receptors as maximum minutes per day for each of the identified receptors.

Table 80 below details the calculated astronomical maximum shadow flicker for hours per year and minutes per day for each of the identified receptors.

**Table 80: Worst Case Shadow Flicker Values for Identified Sensitive Receivers**

SR	SR Coordinates		Astronomical maximum possible shadow flickering [Hours per year]	Astronomical maximum possible shadow flickering [Minutes per day]
	Latitude	Longitude		
SR1	28°20'5.18"N	32°59'57.87"E	49:56	00:48
SR2	28°20'11.99"N	32°59'46.77"E	12:45	00:27
SR3	28°20'17.59"N	32°59'36.31"E	33:28	00:35
SR4	28°19'24.04"N	32°54'48.77"E	17:57	00:19
SR5	28°18'57.67"N	32°52'55.33"E	17:12	00:20

Figure 98 presents the worst-case shadow flicker map for the NIAT Wind Farm layout in terms of total hours per year, and Figure 99 presents the worst-case shadow flicker map in terms of maximum minutes per day. The maps illustrate the spatial extent of shadow flicker across the Project area and confirm the location of SR1 and SR3 within the exceedance zone.

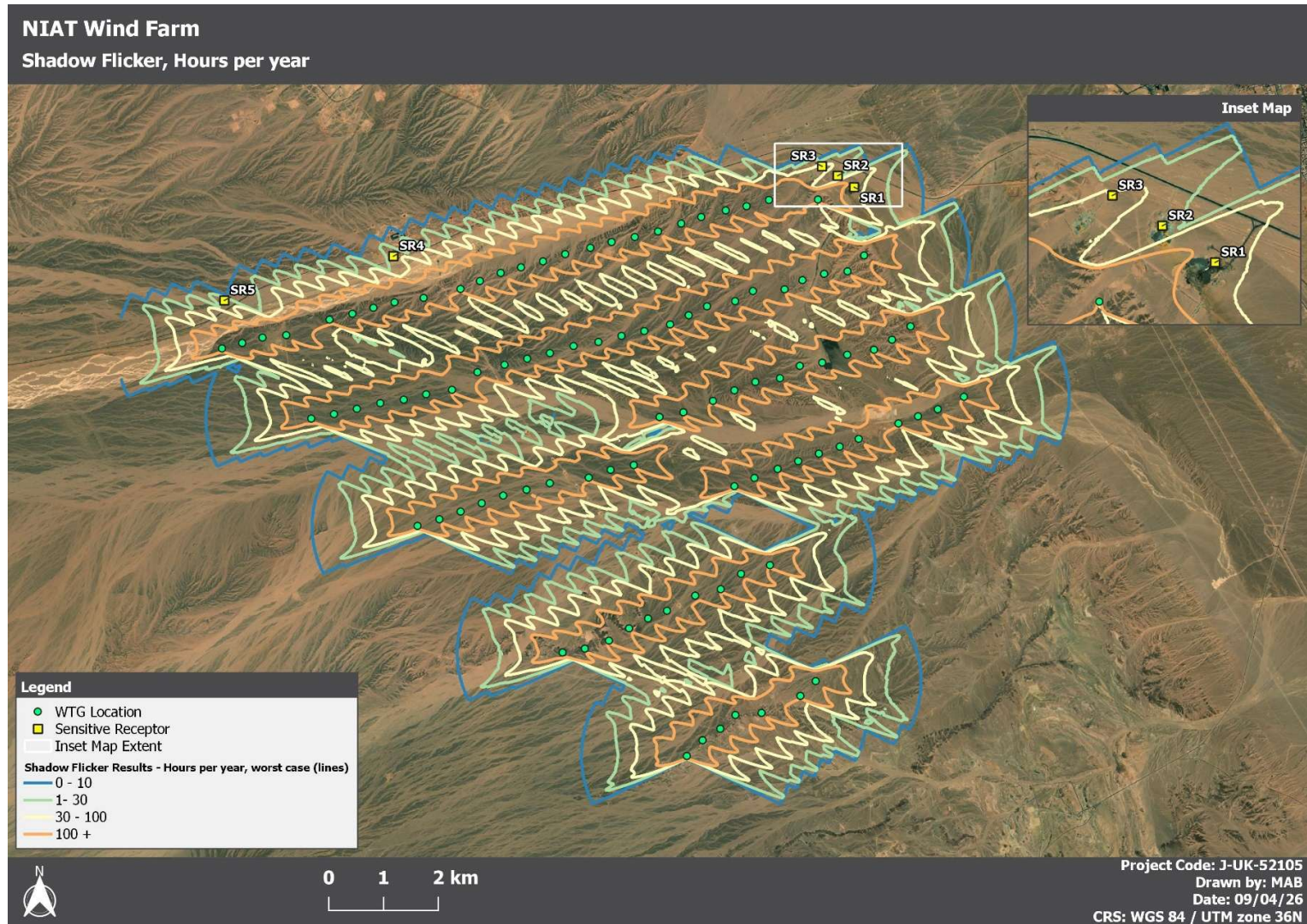


Figure 98: Shadow Flicker Map for Worst Case Scenario (hours per year)



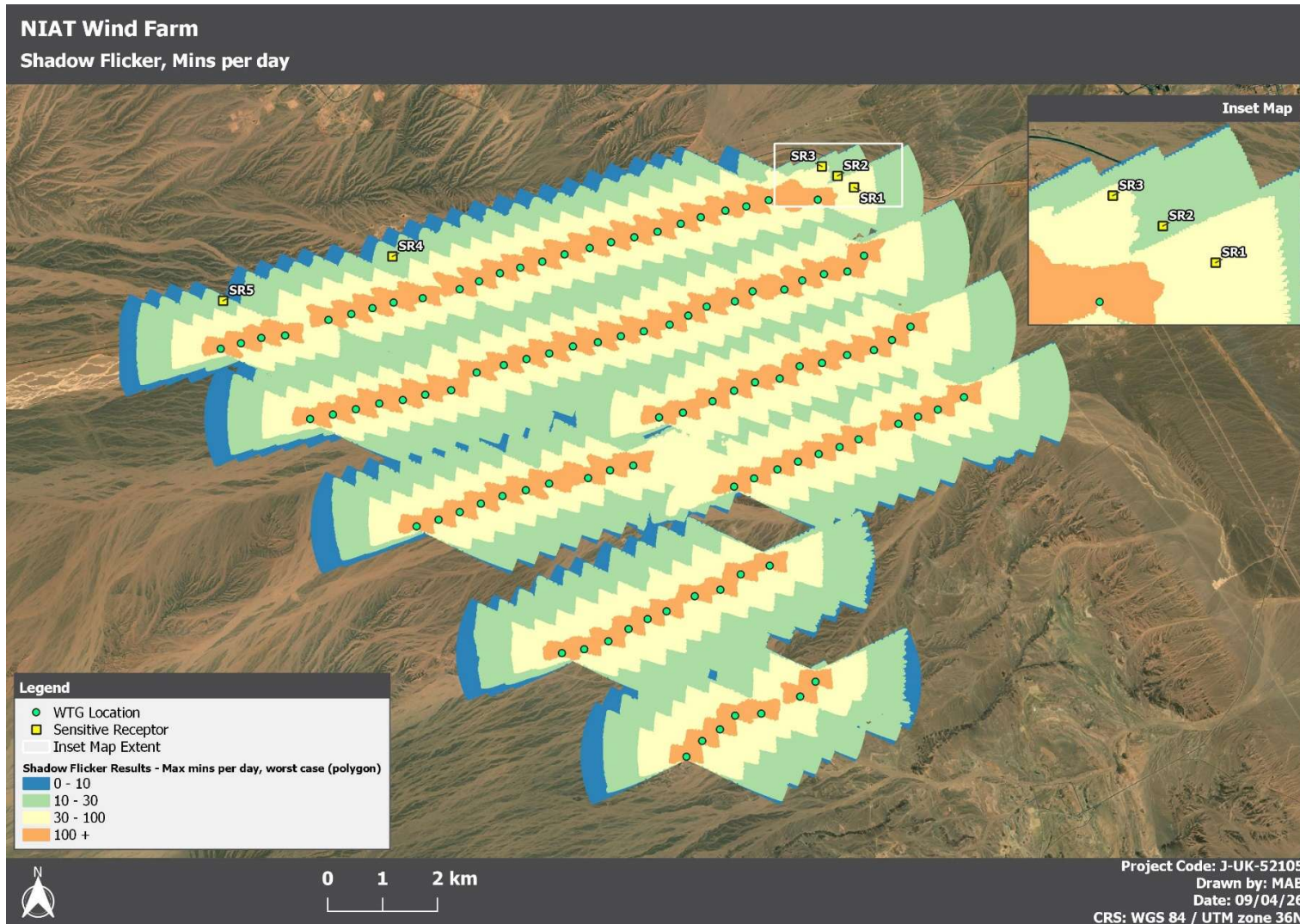


Figure 99: Shadow Flicker Map for Worst Case Scenario (mins per day)

**Table 81: Assessment of Shadow Flicker for 'hours per year' and 'minutes per day' Limitations**

Receiver ID	Latitude	Longitude	Astronomical maximum possible shadow flickering [HH:MM per year]	Limit – Hours per Year	Astronomical maximum possible shadow flickering [Minutes per day]	Limit – Minutes per day	Shadow Flicker Exceedance
SR1	28°20'5.18"N	32°59'57.87"E	49:56	30	00:48	30	Yes
SR3	28°20'17.59"N	32°59'36.31"E	33:28	30	00:35	30	Yes

In total, two of the five identified receptors are predicted to experience exceedances of the guideline levels of 30 hours per year, and 30 minutes per day. It should be noted that the predicted exceedances are based on the worst-case scenario, and the actual shadow flicker is expected to be lower.

SR1 (Quarry worker accommodation) exceeded the guideline level of 30 hours per year by 19 hours and 36 minutes and exceeded the guideline level of 30 minutes per day by 18 minutes. The shadow flicker impact here is assessed as being low due to the temporary nature of the accommodation, and workers being absent from the accommodation during working hours. Any exposure to intermittent shadowing is unlikely to result in adverse effects.

SR3 (Batching Plant 2) exceeded the guideline level of 30 hours per year by 3 hours and 28 minutes and exceeded the guideline level of 30 minutes per day by 5 minutes. As an industrial facility rather than a residential or amenity-based receptor, intermittent shadowing at this location is not expected to result in material adverse effects.

The above impacts are anticipated to be permanent and of long-term nature as they are associated with the operational phase of the Project. Such impacts are of a negative nature, and will be perceptible at SR1 and SR3 under worst-case conditions and therefore of low magnitude. However, the assessment represents a conservative worst-case scenario and actual shadow flicker is expected to be substantially lower in practice, and the affected receptors are temporary or industrial in nature with no permanent residential use, and thus the receiving environment is considered of low to medium sensitivity. Given the above, such an impact is considered of minor significance.

#### Additional Requirements

In terms of shadow flicker management, the following is required:

- To confirm real-case impacts on any workers an occupational risk assessment will be implemented. This will include monitoring worker movement patterns, the duration of workers presence in affected areas, whether tasks are undertaken during sunrise/sunset windows, and whether repetitive flicker may impair safe operation.
- Should occupation nuisance and visual distraction associated with shadow flicker be found to occur the following management practices should be implemented; routine worker activities will not require prolonged static occupation of the affected area during identified peak shadow flicker windows where reasonably practicable, temporary or permanent task stations within the affected zone will be relocated or reoriented where feasible, site supervisors will incorporate shadow flicker awareness into operational health and safety briefings and where fixed external occupation becomes necessary during identified exceedance periods, localised visual screening or shelter provision will be considered.
- The Developer will be required to implement a Stakeholder Engagement Plan (SEP) that includes a community grievance mechanism. The SEP is provided as a standalone document.



- As part of the SEP and prior to the operation phase, the Developer will be required to undertake direct consultations with the residents of the 2 sensitive receptors identified and explain in detail the shadow flicker impacts and the results and outcomes of the assessment that indicated exceedance of allowable limits. In addition, the Developer should also explain the community grievance mechanism.
- In the case that the residents at SR1 do submit grievances related to shadow flicker (based on the assumptions identified above (i.e. window orientation and occupancy), the Developer should consider measures to eliminate such impacts, which could include installation of window blinds, installation of vegetative buffers, any other barriers around the property as applicable. This should be done in agreement and consultation with the residents of the property.

### 8.12.3 Potential Impacts from Trespassing of Unauthorised Personnel

Such impact is mainly related to public access of unauthorized personnel to the various Project components. Such access could result in safety issues such as unauthorized climbing of the turbine, safety hazards from substations (electric shock, thermal burn hazards, exposure to chemicals and hazardous materials, etc.), unauthorized climbing of the transmission tower and others.

Such impacts are considered of long-term duration throughout the Project operation phase, of a negative nature, and are expected to be of medium magnitude and high sensitivity given that it entails potential public safety concerns which in extreme cases could entail permanent impacts (e.g. death or permanent disability). Given the above such an impact is considered of moderate significance.

#### Mitigation Measures

The following presents the mitigation measures that are to be implemented by the contractors during the operation phase of the Project:

- A Security Risk Assessment should be developed for the Project, which should include some or all of the below measures, among other:
  - Each turbine to be fitted with locked doors to prevent unauthorized access to the turbines;
  - Substation area to be completely fenced with concrete walls to prevent unauthorized access;
  - Onsite guards to patrol the entire to ensure the safety and security of the Project as well as preventing unauthorized access to any of the Project components.
  - Ensure that all onsite guards are adequately trained to deal with unauthorized trespassing incidents.
  - Post informative signs on the turbines and substation about public safety hazards and emergency contact information. Signs, especially warnings, need to be pictorial as well as written to ensure they are understood by those unable to read
  - Give preference to Bedouin community members from the Al Hamadin and Tabbna families for security and guarding roles, consistent with the established Ghafra system in the area and the findings of the February 2026 stakeholder consultation.

Following the implementation of these mitigation measures, the significance of the residual impact would be reduced to not significant.

#### Monitoring and Reporting Requirements

The following presents the mitigation measures that are to be implemented by the contractors during the operation phase of the Project:

- Develop and implement Security Risk Assessment

- Document evidence of implementation, such as number of patrols and locations of security posts

#### 8.12.4 Potential Impacts from Worker Influx during Construction

During construction of the Project, a relatively significant number of workers will be expected onsite (up to around 1000 workers at peak construction). However, as discussed earlier, at this point it is still unclear how many of these workers will be expatriates, Egyptians and/or from local communities and it is still unclear where accommodation of these workers will take place.

Nevertheless, in case where migrant workers are used, or even nationals who would move to the relatively small town of Ras Gharib, the influx of workforce to the area could result in certain community health, safety and security impacts which are discussed below.

##### Risk of Diseases

Influx of workers may introduce new reservoirs of diseases such as vector-related diseases, water-borne diseases, etc. In addition, there is also a risk of spreading communicable diseases, included sexually transmitted ones. The risk of catching or exchanging communicable diseases (e.g. Hepatitis B, Hepatitis C, and HIV/AIDS) and the lack of awareness on transmission disease can represent a high risk to workers and community health and safety. This could also include risks from COVID-19 in case of a new outbreak.

##### Inappropriate Code of Conduct

Other risks from worker influx include inappropriate code of conduct by workers towards local communities which might result in hostilities and resentment. Such inappropriate conduct could include sexual harassment and may also include disrespecting the culture and traditions, as well as social norms of the area and local communities.

##### Increase in Social Vices

Population influx could result in an increase of social vices including alcoholism, drug abuse, and other.

Such impacts are considered of short-term duration during the construction phase, of a negative nature, and are expected to be of medium magnitude and medium sensitivity. Given the above such an impact is considered of minor significance.

##### Pressure on Housing, Services, and Local Infrastructure

The influx of workers during the construction phase may place pressure on local housing, services and infrastructure within Ras Ghareb City. This may include:

- Increased demand for housing and accommodation, potentially resulting in reduced availability of units and increased rental prices;
- Increased pressure on local transportation systems, including availability and cost of transport services;
- Increased demand for food supply and local services, which may lead to price inflation; and
- Increased pressure on local healthcare facilities, particularly in relation to access to medical services for both workers and local communities.

These impacts were highlighted during the stakeholder engagement with Ras Ghareb City Council in 2026, see Section 4.5.

Such impacts are considered of short-term duration during the construction phase, of a negative nature, and are expected to be of high magnitude and medium sensitivity. Given the above such an impact is considered of moderate significance.

### Mitigation Measures

The contractors are expected to prepare a worker influx plan to be implemented for the construction phase of the Project. The plan must take into account the following:

- Medical examination program. All workers must be subject to a preliminary medical examination before commencement of any job tasks in accordance with local applicable requirements. In addition, routine medical examination for workers (semi-annually) must be undertaken. Such medical examinations must be undertaken at certified centres. Copies of medical examination results of all workers must be retained onsite.
- Details and procedures for ensuring and maintaining hygienic conditions onsite at all times specifically related to toilet and washing facilities, eating areas, etc.
- Development of a code of conduct for workers which takes into account appropriate behaviour by workers at all times, religious customs, traditional cultures and social norms in the area. In addition, it must include specifically requirements for social vices including gender-based violence, sexual harassment, alcoholism, drug abuse, etc.
- Induction training and awareness raising sessions on risks associated to the most common contagious diseases (e.g. influenza virus), communicable diseases, general measures for hygiene, code of conduct expected to be implemented and other as appropriate.
- It is recommended to have workers housed in an accommodation camp instead of in the town of Ras Ghareb to minimise pressure on the local housing market.

Preparation and implementation of a Worker Accommodation Plan Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Contractor:

- Submission of the Worker Influx Plan
- Submission of Worker Accommodation Plan

### **8.12.5 Potential Impacts from Security Personnel**

Inappropriate management of security issues and incidents by security personnel towards local communities could result in resentment, distrust and escalation of events. Such impacts are considered of short-term duration during the construction phase and long-term duration during the Project operation phase, of a negative nature, and are expected to be of medium magnitude and medium sensitivity. Given the above such an impact is considered of minor significance.

### Mitigation Measures

The contractors are expected to prepare a Security Management Plan to be implemented for the construction and operation phases of the Project.

The plan must identify appropriate measures for hiring, rules of conduct, training, equipping, and monitoring of security personnel to control and manage such issues. The plan must adhere to: (i) IFC PS 4 (Community Health, Safety and Security); and (ii) EBRD ESR2 (Labour and Working Conditions); and (iii) EIB ESS 9 (Health, Safety and Security), all of which identify requirements for security personnel. This includes, in specific, requirements to ensure security personnel are guided by the Voluntary Principles on Security and Human Rights in terms of hiring, rules of conduct, training, equipping and monitoring of such personnel. They also require reasonable

inquiries that those providing security measures are not implicated in past abuses, will ensure they are trained adequately in the use of force (and firearms if applicable) and appropriate conduct towards the workers and the local community. Force should only be used when strictly necessary, and to an extent proportional to the threat.

Following the implementation of these mitigation measures, the significance of the residual impact would be reduced to not significant.

#### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the contractors:

- Development and implementation of the Security Management Plan

### **8.12.6 Potential Impacts from Blade and Tower Glint of Wind Turbines during Operation**

Blade or tower glint occurs when the sun strikes a rotor blade or the tower at a particular orientation. This can impact a community, as the reflection of sunlight off the rotor blade may be angled toward nearby residences.

However, as discussed previously, there are no key sensitive receptors located within the surrounding area of the wind farm, save for the few identified industrial receptors, which could potentially be impacted by blade and tower glint. In addition, according to the IFC EHS Guidelines on Wind Energy (IFC, 2015), blade glint is a temporary phenomenon for new turbines only, and typically disappears when blades have been soiled after a few months of operation. Furthermore, they note that contemporary blades and towers have low-reflectivity, semi-matte surface finishes that suppress specular reflection.

Taking all of the above into account, such impacts are considered of short-term duration as they will occur only temporarily rather than throughout the operation phase of the Project and of a negative nature. However, given that there are no sensitive receptors located within the surrounding areas and the only temporary occurrence (if occurring at all) such an impact is considered of low magnitude and low sensitivity. Given the above, such an impact is considered not significant.

#### Mitigation Measures

The following presents the mitigation measures that are to be implemented by the OEM:

- Consideration should be given to the use of non-reflective finishes to ensure potential impacts are not significant.

Following the implementation of these mitigation measures, the significance of the residual impact would be reduced to not significant.

#### Monitoring and Reporting Requirements

The following presents the mitigation measures that are to be implemented by the OEM during the construction phase of the Project:

- Inspections and visual monitoring to ensure that non-reflective finishes have been used.

### **8.12.7 Potential Impacts from Blade Throw from Turbines during Operation**

There are potential impacts from blade throws from the wind turbines, where if such incidents occur, they could affect the public safety of nearby receptors.

According to the IFC EHS Guidelines on Wind Energy (IFC, 2015), a failure in the rotor blade can result in the ‘throwing’ of a rotor blade – however the overall risk of such an event is extremely low. In addition, if ice accretion occurs in blades, which can happen in certain weather conditions in cold climates, then pieces of ice can be thrown from the rotor during operation, or dropped if the turbine is idling. Ice throws are scoped out of this ESIA given that in general the area does not experience any snow events.

The IFC EHS Guidelines on Wind Energy (IFC, 2015) states a setback distance should be applied between turbines and populated locations. The minimum setback distance is 1.5 x tip height (tower + rotor radius), although modelling suggests that the theoretical blade throw distance can vary with the size, shape, weight, and speed of the blades, and the height of the turbine.

However, as discussed under “Section 7.1” earlier, there are no populated locations within the Project site and surrounding areas, except for the few industrial receptors.

Taking all of the above into account, such impacts are considered of long-term duration as they will occur throughout the operation phase of the Project and of a negative nature. However, given that there are no sensitive receptors located within the surrounding areas and given that the risk is extremely low such an impact is considered of low magnitude and low sensitivity. Given the above, such an impact is considered of not significant.

Taking the above into account, there are no applicable mitigation or monitoring measures to be considered.

### 8.13 Socio-economics

This section identifies the potential impacts in relation to socio-economics during the various Project phases. For each impact, a set of mitigation measures and monitoring requirements are identified.

Given the generic nature of the impacts on socio-economic development for both phases of the Wind Farm Project (construction and operation) those have been identified collectively throughout this section.

During the construction and operation phases of the Wind Farm, the Project is expected to create the following job opportunities:

- Around 1000 job opportunities at peak during the construction phase. This will mainly include skilled job opportunities (such as engineers, technicians, consultants, surveyors, etc.) and unskilled job opportunities (mainly labourers but will also include a number of security personnel).
- Around 50 job opportunities (including direct and indirect) during the operation phase for a duration of 25 years. This will include skilled job opportunities (such as engineers, technicians, administrative employees, etc.) and unskilled job opportunities (such as security personnel, drivers, etc.).

The Developer is committed to maximise local content as much as possible. However, there were no details available on the number of job opportunities targeted to local communities, type of jobs, duration, etc. at the time of writing this study. In addition to the above, the local communities could be engaged in procurement opportunities along different segments of the value chain such as local contractors, local supply of equipment and machinery, cleaning services, etc.

Taking the above into account, the Developer is committed to ensuring that priority for job opportunities and procurement activities where relevant are targeted to the local communities. The above could also entail other indirect positive benefits to the local community from increase in demand for local services, supplies, and businesses. This could include for example possible engagements for supplies and service providers (transportation services, food, etc.). Such demands could improve the existing local economic activities and impact certain sectors, such as wholesale/retail trade.



Taking all of the above into account, this to some extent could contribute to enhancing the living environment of local inhabitants. The creation of job and procurement opportunities in specific is of crucial importance. However, it is important to note that the socio-economic development of the area is not hinged on a single project but rather on implementing collective and coordinated actions, including other development projects and investment within the area.

Nevertheless, proper planning and local community engagement from the start is crucial to understand issues and opportunities which in turn would enable the Project to build true sustainable links which will bring maximum benefits to the local communities. Given the above, such impacts are anticipated to be positive.

### **Recommendations and Required Action**

As the impacts discussed are mainly positive, no mitigation measures have been identified. This section provides recommendations which aim to enhance such positive impacts anticipated from the Project throughout the construction and operation phases to the greatest extent possible.

- Local Recruitment Procedure: the contractors under supervision from the Developer should develop a Local Recruitment Procedure that must identify the percentage of job opportunities targeted for local communities to include skilled and unskilled workers. Such job opportunities shall also take into account employment of local communities in the area around the project to include engineers, including fresh graduates where possible, technicians, labourers, etc. In addition, the procedure must include details on how job opportunities will be advertised as well as a selection process that is fair and transparent and provides equal opportunities for all including females. Prioritising employment from the community is considered a key issue and this should be reflected in the Contract and subsequent subcontracts.
- Local Procurement Procedure: the contractors under supervision from the Developer should develop a Local Procurement Procedure that must identify the procurement opportunities targeted for local communities to include for example local subcontractors, local supplies and services, cleaning services, etc. In addition, the procedure must include details on how procurement opportunities will be announced as well as a selection process that is fair and transparent and provides equal opportunities for all. Prioritising procurement opportunities from the community is considered a key issue and this should be reflected in the Contract and subsequent subcontracts.
- Social Responsibility Program: it is recommended that the Developer implements a social responsibility program which aims to benefit the local communities. In this case, a structured approach should be developed to identify priority development projects which could benefit local communities (e.g. based on a needs assessment if available). Thus, the social responsibility program can prioritise projects for local communities based on available budget, vision, timeline for implementation and other factors.

### **8.14 Human Rights and Supply Chain**

This section identifies the anticipated human rights and gender-related impacts associated with the Project across its construction and operation phases, including impacts arising through the Project supply chain. The assessment has been prepared in accordance with the Equator Principles and the associated Guidance Note on the Implementation of Human Rights Assessments under the Equator Principles (Equator Principles Association, 2020), and is aligned with the requirements of EBRD Environmental and Social Requirements (EBRD, 2025), IFC Performance Standards (IFC, 2012), the EIB Environmental and Social Standards (EIB, 2022), the United Nations Guiding Principles on Business and Human Rights (UN, 2011), and the eight fundamental conventions of the ILO, all of which have been ratified by Egypt (ILO NORMLEX, 2024). The assessment is informed by a desk-based review of national legislation and reporting from the United Nations Development Programme, the World Bank, the ILO, Freedom House, the World Economic Forum, the U.S. Department of State and other reputable sources, supplemented by Project-specific stakeholder consultations undertaken as part of this ESIA and described in Chapter 4. Occupational health and safety risks are addressed in Section 8.11 and are not duplicated in this

section. Community engagement and the Bedouin Ghafra system are addressed in further detail in Section 7.2.3 and are referenced where relevant below.

#### **8.14.1 Human Rights and Gender Context in Egypt**

This subsection presents an overview of the national-level human rights and gender context in Egypt relevant to the Project, drawing on reporting from the United Nations Development Programme (UNDP), the World Bank, the World Economic Forum, Freedom House, the U.S. Department of State, the ILO, UN Women and other reputable sources.

##### **8.14.1.1 Development context**

Egypt is a lower-middle-income country with a population of approximately 116 million (World Bank, 2024). It recorded a Human Development Index (HDI) of 0.754 in 2023, placing it in the high human development category and ranking 100th of 193 countries (UNDP, 2025). Between 1990 and 2023, Egypt's HDI value increased by close to 32%, reflecting gains in life expectancy, education and gross national income per capita. Despite this progress, women's HDI remains around 10% lower than men's, reflecting persistent gaps in access to education, income and health outcomes. Inequality, regional disparity and limited access to quality social services in rural and lower-income areas remain significant development challenges, and the World Bank has noted that recent inflationary pressures and exchange rate depreciation have constrained progress on poverty reduction (World Bank, 2024).

##### **8.14.1.2 Political change and constitutional reform**

Egypt has undergone significant political change since the 2011 popular uprising. A new Constitution was adopted by referendum in 2014, and constitutional amendments adopted by referendum in 2019 extended the presidential term from four to six years, allowed the sitting President to serve until 2030, expanded the role of the military in protecting the "constitution and democracy", and reintroduced an upper house of parliament (the Senate) (Freedom House, 2026). The 2014 Constitution affirms the principle of equality between citizens (Articles 9 and 53), guarantees personal freedoms and freedom of belief (Article 64), and recognises the right of workers to form and join trade unions (Articles 75–77). In practice, however, civic and political space has narrowed significantly since 2013, and Egypt's implementation of these constitutional guarantees is the subject of substantive criticism by international human rights bodies. A national dialogue between the Government and opposition groups, initiated in 2023, has produced limited reforms including amendments to the Code of Criminal Procedures preliminarily approved in late 2024 (Freedom House, 2026).

##### **8.14.1.3 Political and civil rights**

Egypt is classified as "Not Free" in Freedom House's most recent Freedom in the World assessment, with an aggregate score of 18 out of 100 (6 of 40 for political rights and 12 of 60 for civil liberties) (Freedom House, 2026). The assessment documents restrictions on freedom of assembly, freedom of expression, the operating environment for civil society organisations and independent media, and political opposition. The 2019 NGO Law constrains the activities of non-governmental organisations deemed to threaten national security or public order. Civic space for independent political participation, public protest and trade union activity is constrained, and pretrial detention has been used extensively. Religious minority groups, including Coptic Christians (approximately 10% of the population), face documented incidents of sectarian tension and restrictions on religious practice (Freedom House, 2026).

##### **8.14.1.4 Economic and social rights**

The most recent official poverty estimate published by the Government of Egypt and the World Bank reported 29.7% of the population below the national poverty line in 2019 (World Bank, 2024). The World Bank has subsequently noted that inflationary pressures, exchange rate depreciation and the wider macroeconomic context are likely to have increased poverty meaningfully since that estimate. Access to quality social services,

including housing, education and healthcare, remains uneven, with rural and lower-income populations disproportionately affected. Child labour remains a concern, with United Nations Children's Fund (UNICEF) and the Government estimating that approximately 7% of children aged 5 to 17 are engaged in child labour (UNICEF, 2023). With respect to human trafficking, Egypt was upgraded to Tier 2 in the 2024 U.S. Department of State Trafficking in Persons Report on the basis that the Government does not yet fully meet the minimum standards for the elimination of trafficking but is making significant efforts to do so, including through increased prosecutions, the operation of a specialised trafficking shelter and dedicated judicial circuits (U.S. Department of State, 2024).

#### **8.14.1.5 Gender and women's rights**

Gender inequality is a material human rights challenge in Egypt. Egypt ranked 139th of 148 economies in the World Economic Forum's 2025 Global Gender Gap Index, placing it among the ten lowest-ranked economies globally, with an overall gender parity score of 62.5% (World Economic Forum, 2025). The Index ranks Egypt 140th of 148 in Economic Participation and Opportunity. Female labour force participation is reported at approximately 15.9% compared with 74.2% for men, and women hold only 7.2% of senior roles. Sexual harassment and gender-based violence remain widespread: a 2013 study by UN Women found that 99% of women sampled across seven governorates reported having experienced sexual harassment (UN Women, 2013), and approximately 27% of ever-married Egyptian women have reported experiencing intimate partner violence (Freedom House, 2026). Domestic violence, female genital mutilation (FGM) and harmful practices persist, and while Egypt has progressively strengthened its legal framework on these issues — including a 2021 amendment to the Penal Code increasing penalties for sexual harassment and FGM — enforcement is uneven and reporting rates remain low. Spousal rape is not criminalised (Freedom House, 2026). Personal status laws based on religious affiliation place women at a disadvantage in marriage, divorce, custody and inheritance matters.

#### **8.14.1.6 Project-Specific Context**

The Project is located within the Ras Ghareb District of the Red Sea Governorate, on a land area of approximately 73 km<sup>2</sup> provided by the NREA, as described in Chapter 2. The total population of the Red Sea Governorate is approximately 381,815, of whom around 47% are women, and the population of Ras Ghareb is approximately 64,474, accounting for around 17% of the Governorate population (Red Sea Governorate Information Centre, 2020). The local workforce in Ras Ghareb is concentrated across the public sector, the oil and gas sector, and fishing. Ras Ghareb City attracts internal migrant workers from neighbouring governorates including Beni Suef, Minya, Assyut, Sohag, Qena and Luxor, the predominant majority of whom are engaged by oil companies operating in the area.

In line with the workforce requirements set out in Chapter 2, the Project is expected to require approximately 1,000 workers at peak during the construction phase, comprising both skilled and unskilled roles, and approximately 50 workers during the operation phase, including security personnel. The Developer has committed to maximising the engagement of local community members for both skilled and unskilled positions, and to transparent recruitment procedures.

The key Bedouin group identified in the Project area is the Tabbna and Hamadin families, as described in Section 5.4 of this ESIA. Stakeholder consultations undertaken as part of this ESIA confirmed that there are no stable Bedouin communities in or near the Project site. Settled Bedouin villages in the wider area are located in Zaafarana and Wadi Dara, at least 50 km from the Project site. Bedouin families do not undertake grazing, agricultural or other key land use activities within or adjacent to the Project site, but are engaged in security, guarding and contracting activities for petroleum and wind power developments in the wider area on the basis of arrangements with developers and contractors.

Land tenure in the wider area is shaped by the customary practice of *Wada' El Yad*, whereby land is occupied without formal legal title and supported by unregistered "Urfi" contracts. Project developers in the area customarily enter into arrangements with the Tabbna and Hamadin families known locally as the Ghafra system, under which payment is made in exchange for security services and area protection. While these arrangements

are an established feature of the local context and are addressed substantively under Section 8.14, they carry potential human rights risks where they may substitute for, or distort, formal community engagement, employment and security arrangements.

Vulnerable groups within the Project context have been identified in Chapter 4 to include women within the local community. Cultural norms in Egypt and within the local communities specifically may limit women's participation in decision-making and their access to employment opportunities relative to men. Notwithstanding these constraints, women in Ras Ghareb lead a number of local civil society organisations, and the Red Sea branch of the National Council for Women is active locally and operates a Women's Complaints Office. These factors are relevant to the design of Project employment, community engagement and grievance mechanisms.

#### **8.14.2 Legal and Labour Framework in Egypt**

Egypt's labour framework was governed for over two decades by Labour Law No. 12 of 2003 and subsequent amendments. On 3 May 2025 the Government of Egypt enacted Labour Law No. 14 of 2025, which entered into force on 1 September 2025 and replaced the 2003 Law in full (Egyptian Government, 2025). The 2025 Law represents a significant reform package, strengthening provisions on dispute resolution, occupational health and safety, worker protection, the recognition of modern work arrangements (including remote, part-time and flexible work), and access to remedy through specialised Labour Courts. Egypt has ratified all eight of the ILO fundamental conventions covering forced labour (C29 and C105), freedom of association and collective bargaining (C87 and C98), equal remuneration and non-discrimination (C100 and C111), and minimum age and the worst forms of child labour (C138 and C182) (ILO NORMLEX, 2024). Notwithstanding these provisions, enforcement of the labour code remains uneven, particularly outside the formal economy, and labour inspection capacity is limited. Key provisions of the 2025 Law relevant to the Project, organised against the requirements of the assessment, are set out below.

##### **8.14.2.1 Minimum wage and working hours**

Labour Law No. 14 of 2025 establishes a National Wage Committee under the Ministry of Planning to set the national minimum wage and the minimum annual increase in line with the cost of living. The 2025 Law also introduces a statutory annual salary increment of at least 3% of the social insurance wage. Maximum working hours are set at 48 hours per week (8 hours per day across 6 days), with at least one hour of break for every 4 hours worked and a 24-hour rest period after 6 consecutive working days. This 48-hour standard exceeds the 40-hour standard recommended under the ILO Forty-Hour Week Convention, 1935 (which Egypt has not ratified). Overtime is permitted but must be compensated at not less than 35% above the regular wage during daytime and 70% above during night-time, with double pay or compensatory time off for work on rest days and public holidays. Workers receive 21 days of paid annual leave after one year of service, increasing to 30 days after ten years of service.

##### **8.14.2.2 Gender discrimination and sexual harassment**

Article 116 of Labour Law No. 14 of 2025 prohibits discrimination on the basis of sex, origin, language, religion, disability, social status, or political or union affiliation in hiring, training, promotion, wages or benefits, and Article 6 explicitly prohibits sexual harassment in the workplace, requiring employers to take preventive measures. Female employees are entitled to paid maternity leave per childbirth, available up to three times during their employment, with reduced working hours during pregnancy, the right to up to two years of unpaid childcare leave and protection against termination during maternity leave. Notwithstanding these legal provisions, in practice female labour force participation in the formal economy remains low (approximately 15.9%) and enforcement of protections against workplace sexual harassment is uneven, as noted under the Gender and women's rights subsection above.

#### **8.14.2.3 Other forms of discrimination**

In addition to sex-based discrimination, Article 116 prohibits discrimination on the basis of religion, disability, social status, political or union affiliation, ethnicity and language. The Egyptian Constitution (Articles 9 and 53) similarly affirms the principle of equality between citizens. In practice, religious minorities (notably Coptic Christians and smaller Christian minorities, Shi'a Muslim and Baha'i communities), persons with disabilities, persons with dark skin from Upper Egypt, and migrants and refugees from sub-Saharan Africa face documented forms of discrimination and unequal treatment in employment and access to services (Freedom House, 2026). Personal status rules vary by religious affiliation, which can result in differential treatment of Christians and other minorities.

#### **8.14.2.4 Child and forced labour**

The minimum age for employment under Labour Law No. 14 of 2025 is 15 years, in line with the ILO Minimum Age Convention, 1973 (No. 138, ratified by Egypt in 1999). Children aged 13 to 15 are permitted to undertake light work that does not affect their health, development or education. Workers under the age of 18 are subject to additional protections, including medical fitness certification, employer registration requirements, restrictions on working hours (no more than six hours per day, no overtime, no work on weekends or public holidays, no work between 7:00 pm and 7:00 am), and prohibitions on hazardous work in line with the ILO Worst Forms of Child Labour Convention, 1999 (No. 182, ratified by Egypt in 2002). Forced labour is prohibited under the Egyptian Constitution and broader legal principles, in line with ILO Conventions 29 and 105 (both ratified by Egypt). However, Labour Law No. 14 of 2025 does not contain an explicit prohibition on the confiscation of employees' passports or identity documents, which represents a gap relative to international good practice and is addressed at Project level through the mitigation measures set out below.

#### **8.14.2.5 Access to justice**

Labour Law No. 14 of 2025 substantially strengthens access to remedy in employment disputes through the establishment of specialised Labour Courts within each court of first instance and court of appeal, effective from 1 October 2025, together with a Mediation and Arbitration Centre at the Ministry of Manpower. The 2025 Law also requires that termination be based on a legitimate reason, that pre-signed resignation forms are invalid, and that disciplinary dismissals require judicial approval. At the national level, the Egyptian National Council for Human Rights, the National Council for Women, and the National Council for Childhood and Motherhood operate complaint hotlines. In practice, however, access to remedy remains constrained by limited labour inspection capacity, lengthy judicial processes and uneven implementation, particularly for vulnerable workers and those in the informal economy. Pretrial detention is reported to be used extensively in non-labour matters and due process protections are inconsistently applied (Freedom House, 2026).

#### **8.14.2.6 Effectiveness of labour unions**

Labour Law No. 14 of 2025 (Articles 198–204) and the 2014 Egyptian Constitution (Articles 75–77) guarantee workers the right to form and join trade unions without prior authorisation, and protect workers from discrimination on the basis of union activity. Egypt has ratified ILO Conventions 87 (Freedom of Association, ratified 1957) and 98 (Right to Organise and Collective Bargaining, ratified 1954). In practice, however, the Government primarily recognises unions affiliated with the state-controlled Egyptian Trade Union Federation (ETUF), and independent union activity is constrained by administrative barriers. Freedom House reports that strikes are not tolerated in practice, that the protest law prohibits gatherings that impede labour and production, and that workers in military-owned enterprises are subject to military trials (Freedom House, 2026).

#### **8.14.2.7 Employment in the informal sector**

Informal employment is estimated at approximately 62% of total employment in Egypt (World Bank, 2024b). Workers in the informal economy fall outside formal labour protections, are typically engaged without written contracts, are not enrolled in social insurance, and are exposed to elevated risks of exploitation, unsafe working conditions and absence of legal recourse. The size of the informal economy is a key driver of labour rights risks



across the Egyptian economy and is particularly relevant to how contractors and subcontractors cascade in construction projects, where informal engagement of unskilled labour is common. The Project will address this risk through the explicit requirement that all workers, including those engaged by subcontractors, are formally contracted and enrolled in social insurance.

### **8.14.3 Initial Human Rights and Gender Risk Assessment**

Drawing on the national context, legal framework and Project-specific context set out above, the following table presents the initial assessment of Project-related human rights and gender risks across the development, construction and operation phases, including risks arising through the Project supply chain. For each risk, the table identifies the affected group, the inherent level of risk before Project-level mitigation, the Project-level mitigation measures to be applied (which translate the requirements of the legal framework into operational requirements for the Contractors, Project Operator and subcontractors), the residual level of risk following mitigation, and the Project management plan in which each set of measures is to be reflected. Risk levels are categorised as Low, Medium or High based on an assessment of the scope, scale, remendability and likelihood of harm. The structure and methodology follow the Equator Principles Guidance Note on Human Rights Assessments. Occupational health and safety risks are addressed in Section 8.11 and are not duplicated in the table.

Without the application of the mitigation measures set out in the table, residual risks would be of medium magnitude and the receptors are considered to be of high sensitivity, such that the residual significance would be moderate. Following the implementation of the mitigation measures, the significance of the residual impact can be reduced to not significant.

Risk	Group Impacted	Risk Level Before Mitigation	Project-Level Mitigation Measures	Risk Level After Mitigation	Reference Plan
<b>Child labour</b> Engagement of workers under the legal minimum age of 15, or engagement of workers aged 15–18 in hazardous activities, in violation of Labour Law No. 14/2025 and ILO Conventions 138 and 182. National-level prevalence of child labour in Egypt remains a concern, particularly in the informal economy.	Workers (children); local community	National: High Inherent: Medium	<ul style="list-style-type: none"> <li>Recruitment of children under the age of 15 strictly prohibited.</li> <li>Workers aged 15–18 only engaged in non-hazardous work, subject to medical fitness certification, parental or guardian consent, and proof of age via official identification (driver's licences not admissible).</li> <li>Workers under 18 prohibited from operating heavy machinery, working at heights, exposure to petroleum products or hazardous materials, lifting heavy loads, underground work, and any other hazardous activities.</li> <li>Working hours for workers under 18 limited to 6 hours per day with mandatory breaks; no overtime, weekend or night work (between 7:00 pm and 7:00 am).</li> <li>Contractual cascade of these requirements to all subcontractors.</li> </ul>	Low	Labour and Working Conditions Management Plan
<b>Forced labour and human trafficking</b> Engagement of workers under conditions of forced labour, debt bondage or human trafficking, including via labour intermediaries or in the supply chain. Egypt remains a Tier 2 country in the U.S. State Department Trafficking in Persons Report and Labour Law 14/2025 does not contain an explicit prohibition on the confiscation of identity documents.	Workers; local community; supply chain workers	National: High Inherent: Medium	<ul style="list-style-type: none"> <li>Forced labour, debt bondage and human trafficking explicitly prohibited in Project documentation, contractor codes of conduct and contractual provisions.</li> <li>Confiscation or retention of workers' passports, identity documents or personal belongings by employers, supervisors or labour intermediaries explicitly prohibited.</li> <li>Recruitment fees not charged to workers, in line with the ILO Employer Pays Principle.</li> <li>Pre-qualification screening of labour intermediaries and recruitment agencies.</li> <li>Worker awareness training on rights and channels for reporting forced labour concerns.</li> </ul>	Low	Labour and Working Conditions Management Plan

<b>Fair wages</b>  Risk that wages paid by the Contractors or subcontractors fall below the national minimum wage, fail to meet basic needs, or involve discriminatory pay differentials. Egypt has a national minimum wage but inflation has eroded its real value and wage discrimination is reported in lower-skilled and informal employment.	Workers; local community	National: Medium  Inherent: Medium	<ul style="list-style-type: none"> <li>• Wages set against a clear and documented salary scale, applied without discrimination, taking into account the local market and sufficient to meet workers' basic needs.</li> <li>• Wages not below the nationally established minimum wage.</li> <li>• Statutory annual increment under Labour Law 14/2025 (at least 3% of social insurance wage) applied.</li> <li>• Equal remuneration for work of equal value provided to female and male workers.</li> <li>• Wages paid on time and through traceable means.</li> </ul>	Low	Labour and Working Conditions Management Plan
<b>Working hours and overtime</b>  Risk of excessive working hours, unpaid or under-compensated overtime, or insufficient rest periods, particularly during the construction peak. Egyptian law allows a 48-hour week (above the ILO 40-hour standard) and overtime practices are reported to be uneven in the informal economy.	Workers	National: Medium  Inherent: Medium	<ul style="list-style-type: none"> <li>• Working hours not to exceed 48 per week (8 per day across 6 days) with at least one hour of break for every 4 hours worked.</li> <li>• 24-hour rest period after 6 consecutive working days.</li> <li>• Overtime voluntary, time-limited, and compensated at the rates required by Labour Law 14/2025 (35% above wage during day, 70% at night, double pay on rest days and public holidays).</li> <li>• Workers notified in writing of weekly schedules, rest days and any changes.</li> </ul>	Low	Labour and Working Conditions Management Plan
<b>Non-discrimination (other forms)</b>  Risk of discrimination in recruitment, promotion, training and remuneration on grounds other than sex, including religion (with implications for Coptic Christian and other religious minority workers), disability, social or family origin, ethnicity, civil status or political affiliation. Article 116 of Labour Law 14/2025 prohibits such	Workers	National: Medium  Inherent: Low–Medium	<ul style="list-style-type: none"> <li>• Recruitment, promotion, training and remuneration on a non-discriminatory basis in line with Article 116 of Labour Law 14/2025.</li> <li>• Local recruitment process inclusive and diverse, open to all community members regardless of religion, ethnicity, disability, civil status or family background.</li> <li>• Recruitment and promotion based on competency and skill, with selection by mixed and diverse panels.</li> <li>• Worker Code of Conduct prohibits discrimination of any form, with disciplinary action for breaches.</li> </ul>	Low	Labour and Working Conditions Management Plan

discrimination but enforcement is uneven.					
<b>Sexual harassment, gender-based violence and women's economic participation</b>  Risk of sexual harassment and gender-based violence and harassment (GBVH) affecting female workers in the workplace and any worker accommodation, barriers to recruitment and advancement of women in a sector with very low female participation in Egypt (15.9% national female labour force participation), and potential GBVH affecting host community women arising from worker influx. Sexual harassment is reported to be widespread in Egyptian workplaces and public spaces.	Workers (women); local community (women)	National: High  Inherent: Medium	<ul style="list-style-type: none"> <li>Female workers receive the same protections as male workers in respect of contracts, wages, working hours, OHS and non-discrimination, plus maternity protections per Labour Law 14/2025.</li> <li>Project-level Sexual Exploitation, Abuse and Harassment (SEAH) and GBVH policy with mandatory training for all workers and supervisors, confidential and survivor-centered reporting channels, and disciplinary measures for perpetrators.</li> <li>Worker grievance mechanism explicitly handles GBVH complaints; trained female and male grievance officers designated.</li> <li>Where worker accommodation is provided, female facilities (sanitary, toilet, prayer, changing, sleeping) are physically separated, secured and lockable.</li> <li>Female workforce participation actively promoted through gender-inclusive job advertising designed in consultation with women's civil society organizations (for example, engagement with the Red Sea branch of the National Council for Women and the Women's Complaints Office.)</li> <li>Worker Code of Conduct prohibits harassment, GBVH and abuse of any kind, with disciplinary action for breaches.</li> <li>Body searches, where required for security reasons, conducted on a gender-sensitive basis.</li> </ul>	Low	Labour & Working Conditions Management Plan; Worker Accommodation Management Plan; Worker Influx Plan
<b>Freedom of association and effectiveness of labour unions</b>  Risk that workers are unable to exercise their right to form or join trade unions and to bargain collectively, or that they face discrimination or retaliation for doing so. While Egypt has ratified	Workers	National: Medium  Inherent: Low	<ul style="list-style-type: none"> <li>Workers' right to form and join workers' organizations and to bargain collectively expressly recognized in the Project Labour and Working Conditions Management Plan, in line with ILO Conventions 87 and 98.</li> <li>Discrimination or retaliation against workers exercising freedom of association or joining union activity expressly prohibited.</li> </ul>	Low	Labour and Working Conditions Management Plan

ILO Conventions 87 and 98 and the 2025 Labour Law guarantees these rights, in practice the Government primarily recognizes unions affiliated with the state-controlled Egyptian Trade Union Federation, and independent union activity is constrained.			<ul style="list-style-type: none"> <li>• Worker representation arrangements communicated transparently to all workers.</li> </ul>		
<b>Right to social insurance and informal employment</b>  Approximately 62% of Egypt's workforce is in informal employment, often without contracts or social insurance coverage. Risk that workers (particularly local hires for unskilled roles, or workers engaged via the subcontractor cascade) are engaged informally and excluded from social protection. This is a primary mechanism by which other rights risks (wage, working hours, termination) materialize in the Egyptian context.	Workers	National: High  Inherent: Medium	<ul style="list-style-type: none"> <li>• All workers, including those engaged by subcontractors, engaged on the basis of a written contract in Arabic, signed by both parties, with a copy retained by the worker. For non-Arabic-speaking workers, contract may also be issued in the worker's language.</li> <li>• Contracts and codes of conduct verbally explained at recruitment in a language workers understand, to ensure illiterate workers are informed of their rights.</li> <li>• All workers enrolled in the Social Insurance system and entitled to annual leave, sick leave and other social benefits as stipulated in Labour Law 14/2025.</li> <li>• Termination only on legitimate grounds related to conduct, performance or operational need, with written justification; pre-signed resignation forms prohibited in line with Labour Law 14/2025.</li> </ul>	Low	Labour and Working Conditions Management Plan
<b>Access to remedy and grievance mechanism</b>  Egypt's labour inspection capacity is limited, and access to formal dispute resolution is constrained for vulnerable workers. The 2025 Labour Law establishes specialised Labour Courts (effective October 2025) and a Mediation and Arbitration Centre, but practical	Workers; local community	National: Medium–High  Inherent: Medium	<ul style="list-style-type: none"> <li>• Project-level worker grievance mechanism aligned with the UNGP effectiveness criteria (legitimate, accessible, predictable, equitable, transparent, rights-compatible, source of learning) — addressed in detail in Section 8.11.</li> <li>• Anonymous lodging of grievances permitted; multiple channels (boxes, telephone, in-person, worker representatives).</li> <li>• Grievances logged and resolved within defined timeframes; disaggregated reporting by sex and grievance category.</li> </ul>	Low	Labour and Working Conditions Management Plan; Stakeholder Engagement Plan



access remains uneven. Risk that workers and host community members lack effective Project-level access to remedy.			<ul style="list-style-type: none"> <li>• Community grievance mechanism via the Stakeholder Engagement Plan accessible to all host community members (see Section 8.14).</li> <li>• Workers informed of their right to access external remedy via Egyptian labour authorities, the National Council for Human Rights, the National Council for Women, and ILO channels.</li> </ul>		
<b>Migrant workers</b>  The Project area attracts internal migrant workers from neighboring governorates, primarily engaged historically by oil companies. Where international migrant workers may be engaged in skilled or technical roles, additional risks apply including document retention, recruitment fees, language barriers, discrimination, and exclusion from grievance channels. Egypt has not ratified the Migrant Workers Convention, 1975.	Workers (internal and international migrant)	National: Medium  Inherent: Medium	<ul style="list-style-type: none"> <li>• Internal and international migrant workers receive employment terms, accommodation standards and grievance access equivalent to those of local workers performing the same role.</li> <li>• International migrant worker employment in conformity with Egyptian laws and regulations, ensuring workers are not vulnerable to exploitation through fear of deportation or arrest.</li> <li>• Migrant workers retain access to personal and travel documents, including passports, at all times.</li> <li>• Access to fair complaint mechanisms without fear of retribution.</li> <li>• Where applicable, accommodation provides adequate personal space and standard of living per EBRD/IFC workers' accommodation guidance.</li> <li>• Costs of any expulsion or repatriation not borne by the worker.</li> </ul>	Low	Labour and Working Conditions Management Plan; Worker Accommodation Management Plan
<b>Community rights, Bedouin engagement and Ghafra arrangements</b>  The Project area lies within an area subject to the Ghafra system, divided between the Tabbna and Hamadin Bedouin families. While there are no economic activities or settlements within the Project site, inappropriate management of community engagement, employment, procurement and security arrangements could give	Local community; Tabbna and Hamadin Bedouin families	Inherent: Medium	<ul style="list-style-type: none"> <li>• Coordination with the Tabbna and Hamadin families undertaken transparently through the Stakeholder Engagement Plan, alongside (and not in substitution of) formal community engagement and grievance mechanisms. Substantive engagement arrangements addressed in Section 8.14.</li> <li>• Local recruitment process transparent and accessible to all community members regardless of tribal affiliation.</li> <li>• Capacity-building and employment opportunities offered to local Bedouin community members within the Project on a documented and equitable basis.</li> </ul>	Low	Stakeholder Engagement Plan; Local Recruitment Procedure; Local Procurement Procedure; See Section 8.13

rise to disputes, exclusion of non-Bedouin community members, or arrangements that bypass formal grievance and engagement channels. Engagement of Bedouin members in security and guarding roles without appropriate contracts and training carries additional human rights risks.			<ul style="list-style-type: none"> <li>• Security personnel engaged under written contracts setting out roles, responsibilities, conduct standards and grievance access; trained on the UN Voluntary Principles on Security and Human Rights and on proportionate use of force.</li> <li>• Stakeholder Grievance Mechanism explicitly accessible to Bedouin community members.</li> </ul>		
<p><b>Supply chain (WTG manufacturing in China and Balance of Plant (BOP))</b></p> <p>The WTG supplier for the Project is Siemens Gamesa Renewable Energy (SGRE), and the wind turbine model is the Gamesa SG 2.6-114 (an onshore turbine). SGRE's most recent disclosures confirm that nacelle assembly takes place in three locations globally — Reinosa (Spain), Camaçari (Brazil) and Tianjin (China) — with the Tianjin facility serving as SGRE's global onshore manufacturing hub, and that SGRE additionally sources blades from third-party manufacturers in China among other countries. The most likely manufacturing location for the Project's onshore turbines is therefore the Tianjin facility, with components and raw materials sourced through tier-2 and tier-3 supply chains in China. Documented sector-level and country-level human rights risks include forced labour exposure in critical mineral and component supply chains</p>	Supply chain workers (WTG manufacturing and upstream critical mineral supply chains); BOP and subcontractor workers	<p>Sector / Country: High</p> <p>Inherent: Medium–High</p>	<ul style="list-style-type: none"> <li>• WTG: Undertake a supply chain mapping exercise to ensure that WTG that none of the suppliers are known to pose any risks related to forced labour or modern slavery.</li> </ul> <p>BOP and major subcontractors: Contractual cascade of all Labour and Working Conditions Management Plan requirements; supplier pre-qualification including human rights criteria; right of access to supplier human rights performance information retained by the Project throughout the lifecycle.</p> <ul style="list-style-type: none"> <li>• Ongoing monitoring of supply chain human rights performance, including periodic re-verification during construction and operation.</li> </ul>	Low–Medium	Labour and Working Conditions Management Plan; Supply Chain Management Plan; see also Supply Chain Considerations subsection below

(notably rare earth elements, copper, manganese, steel and aluminum), constrained freedom of association in China (ILO Conventions 87 and 98 not ratified), and the documented inability of conventional supplier code reliance models to provide adequate assurance in the Chinese operating context. BOP contractor and other major subcontractors introduce additional, separate supply chain human rights risks.					
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#### 8.14.4 Supply Chain Considerations

In line with the requirements of the Equator Principles Guidance Note on Human Rights Assessments, EBRD ESR2 and IFC PS2, this subsection sets out the supply chain context for the Project, the basis for the recommendation on supply chain human rights due diligence (HRDD), and the scope of the recommended due diligence. This subsection addresses the specific Task 10 requirement to determine whether project-level human rights due diligence on the wind turbine generator (WTG) supply chain is necessary.

##### 8.14.4.1 Wind turbine generator manufacturing and supply chain footprint

As set out in Chapter 2, the WTG supplier for the Project is Siemens Gamesa Renewable Energy (SGRE), and the wind turbine model selected is the Siemens Gamesa SGRE SG 5.0-145 (2.0) 5 MW, an onshore turbine. SGRE's most recent disclosures — including its Modern Slavery Statements filed under the United Kingdom Modern Slavery Act 2015 and the Australian Modern Slavery Act 2018, and its parent company Siemens Energy's reporting under the German Supply Chain Due Diligence Act (LkSG) — confirm that SGRE assembles wind turbine nacelles at three locations globally: Reinosa (Spain), Camaçari (Brazil) and Tianjin (China) (Siemens Gamesa Renewable Energy, 2024). The Tianjin facility is SGRE's global onshore manufacturing hub: as reported by SGRE's Asia-Pacific leadership in 2021, the Tianjin plant produced over 2.3 GW of onshore wind turbines in 2020, accounting for more than 30% of SGRE's global production that year, with capacity in the Tianjin and Shanghai-based blade manufacturing facilities described as far exceeding domestic Chinese demand and serving as the company's primary global supply hub (Recharge News, 2021; InfoLink, 2021). SGRE also confirms in its Modern Slavery Statement that it sources blades from third-party manufacturers in China, in addition to Mexico, Brazil, Turkey, India and Poland.

On this basis, the most likely manufacturing location for the SG 5.0-145 (2.0) 5 MW turbines supplied to the Project is the Tianjin facility, with components and raw materials sourced through tier-2 and tier-3 supply chains predominantly within China. Project confirmation of the specific manufacturing facility for the Project's turbines should be requested from SGRE during the contracting process.

##### 8.14.4.2 Country-level human rights context: China

China has ratified six of the eight ILO Fundamental Conventions, including — following the August 2022 deposit of instruments of ratification — the Forced Labour Convention, 1930 (No. 29) and the Abolition of Forced Labour Convention, 1957 (No. 105) (ILO, 2022). However, China has not ratified the Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87) or the Right to Organise and Collective Bargaining Convention, 1949 (No. 98) (ILO NORMLEX, 2024). The only legally recognised trade union in China is the state-affiliated All-China Federation of Trade Unions (ACFTU), and independent trade union activity is constrained. International commentators including the Made in China Journal and the Modern Slavery Policy and Evidence Centre have characterised China's 2022 forced labour ratification as a step that does not by itself address the underlying constraints on independent trade union activity, on civil society engagement on labour issues, or on independent on-the-ground human rights due diligence in the country (Made in China Journal, 2022; Modern Slavery PEC, 2024).

Multiple investigations by United Nations bodies, academic institutions and civil society organisations have presented evidence of human rights abuses, including the use of forced labour, in the Xinjiang Uyghur Autonomous Region (XUAR), with downstream implications for global supply chains. The UN Special Rapporteur on Contemporary Forms of Slavery, in a July 2022 report to the UN General Assembly, concluded that it was reasonable to conclude that forced labour among Uyghur, Kazakh and other ethnic minorities in sectors such as agriculture, manufacturing and construction in XUAR has been occurring (UN Special Rapporteur, 2022). Sheffield Hallam University has published detailed reports on Xinjiang exposure in renewable energy supply chains, particularly solar (Sheffield Hallam University, 2021; 2023). Global Rights Compliance, in a June 2025 report, identified Uyghur forced labour in the mining and processing of critical minerals in XUAR, including minerals used in renewable energy and electronics value chains (Global Rights Compliance, 2025).

#### **8.14.4.3 Sector-level human rights risks in wind turbine manufacturing supply chains**

The Business and Human Rights Resource Centre (BHRRC) has documented over 200 human rights allegations linked to the renewable energy sector in the past decade, with wind and solar accounting for approximately 44% of those allegations — the largest share by sub-sector after hydropower (BHRRC, 2024). Allegations relating to wind specifically include land and water disputes, denial of workers' rights, forced labour exposure in critical mineral and component supply chains, and reputational concerns relating to upstream sourcing.

The wind turbine value chain is exposed to documented human rights risks at multiple tiers. Permanent magnet generators used in modern wind turbines rely on rare earth elements — notably neodymium, praseodymium, dysprosium and terbium — of which China produces over 60% of global supply, with concentration of upstream mining and processing in regions including XUAR (Global Rights Compliance, 2025). Wind turbine towers and structural components rely on copper, manganese, steel and aluminium supply chains, several of which the U.S. Department of Labour lists as goods produced with known incidents of forced or child labour in source countries. Specific allegations have been documented relating to other Chinese wind turbine manufacturers operating from XUAR, including reporting on labour transfer arrangements between Xinjiang prefectures and wind turbine manufacturing facilities elsewhere in China (Tech Transparency Project, 2021; BuzzFeed News, 2021). In December 2020, Xinjiang's largest single export category to the United States was reported to be wind turbines (South China Morning Post, 2021).

These sector-level risks are compounded by structural constraints on independent verification: the Modern Slavery Policy and Evidence Centre, in research published in 2024, concluded that the political and legal environment in China constrains independent on-the-ground human rights due diligence, including on tier-1 manufacturing facilities, with the result that conventional supplier code reliance models cannot provide a level of assurance equivalent to that achievable in jurisdictions where independent audit access is unconstrained (Modern Slavery PEC, 2024).



#### 8.14.4.4 Balance of Plant and other contractors

For the BOP contractor and other major subcontractors, supply chain human rights risks are addressed through contractor pre-qualification, contractual cascade of the Labour and Working Conditions Management Plan requirements, and the cross-cutting mitigation requirements set out below.

The above impacts are anticipated to span both the construction and operation phases and are therefore of short to long-term nature depending on the specific risk. Such impacts are of a negative nature, and without adequate management could result in material harm to workers and surrounding communities, and therefore of medium to high magnitude. However, the Project is subject to a comprehensive framework of risk-specific and cross-cutting mitigation measures aligned with Labour Law No. 14 of 2025, IFC PS2, EBRD PR2, World Bank ESS2, and the ILO fundamental conventions, and the receiving environment benefits from established grievance and oversight mechanisms, and thus the receiving environment is considered of medium sensitivity. Given the above, such an impact is considered of moderate significance, with the potential to be reduced to not significant through the implementation of the mitigation measures described above.

##### Cross-Cutting Mitigation Measures

The risk-specific mitigation measures set out in the table above are to be incorporated into the Project Labour and Working Conditions Management Plan, the Worker Accommodation Management Plan, the Worker Influx Plan, Local Recruitment and Procurement Plan the Stakeholder Engagement Plan, and the Project Grievance Mechanism, as identified in the Reference Plan column. In addition to the risk-specific measures, the following cross-cutting requirements apply throughout the construction and operation phases:

- The Contractors and Project Operator are required to develop and implement a Human Resources (HR) procedure for workers guided by Labour Law No. 14 of 2025, IFC PS2, EBRD ESR2, the EIB ESS8 and the eight ILO fundamental conventions, addressing all of the requirements identified in the table above.
- All requirements set out in the table above and in the HR procedure are to be cascaded contractually to subcontractors and labour intermediaries, with verification of compliance forming part of contractor pre-qualification, mobilisation and ongoing oversight.
- Mandatory worker induction training shall cover the Worker Code of Conduct, the SEAH/GBVH policy, the worker grievance mechanism, and applicable rights under Labour Law No. 14 of 2025 and the ILO fundamental conventions.
- A Project-level human rights focal point shall be designated within the Contractors' and Project Operators' organisations to oversee implementation and reporting.

Following the implementation of these mitigation measures and the risk-specific mitigation measures set out in the table above, the significance of the residual impact can be reduced to not significant.

##### Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Contractors and Project Operators throughout the construction and operation phases:

- Periodic onsite human rights and labour audits of the Contractors, Project Operators and major subcontractors against the requirements of the Labour and Working Conditions Management Plan and applicable lender standards. Audits shall be conducted at least quarterly during the construction phase and at least annually during the operation phase.
- Quarterly reporting on the operation of the worker grievance mechanism and the community grievance mechanism, including the number, type and resolution status of grievances, disaggregated by sex and grievance category.

- Annual reporting on the implementation of the Project SEAH/GBVH policy, including training delivered, incidents reported, and response measures taken.
- Reporting of any human rights incidents, serious labour incidents, or grievances raising substantive human rights concerns to the Lenders within the timeframes specified in the Project finance documentation.
- Annual review of the human rights and gender risk profile of the Project against this assessment, and update of the mitigation measures and management plans as required.

### 8.15 Climate Change Risk Assessment

This section provides a high-level Climate Change Risk Assessment (CCRA) related to the Project development. The CCRA is guided by the “Guidance Note on Climate Change Risk Assessment” (EP, 2023).

The CCRA investigates the relevant climate-related ‘Physical Risks’ defined as risks resulting from climate change which are event driven (acute) or longer-term shifts (chronic) in climate patterns. Acute physical climate risks can include increased severity and frequency of droughts, storms, floods, heat waves and wildfires. Chronic physical climate risks can include sea level rise and longer-term temperature increase.

The CCRA does not include an assessment on ‘Transition Risks’ as indicated in the Guidance Note (which is only required for Projects with combined Scope 1 and Scope 2 emissions of more than 100,000 tons of CO<sub>2</sub> equivalent annually – which is considered irrelevant for this Project as discussed in the section below). Those are risks related to policy, legal, technology, reputation and market changes.

The key physical risks that have been investigated as part of the CCRA and which are relevant for the Project development include the following:

- Sea Level Rise and Riverine Floods
- Urban Flash Floods
- Temperature Increase and Heat Waves
- Extreme Weather Events
- Wildfires
- Infectious Diseases
- Water Scarcity and Drought

#### 8.15.1 Project GHG Emissions

This section aims to provide a high-level estimation on the GHG emissions and avoidance rates from the Project activities.

One of the key positive impacts of the Project, as far as resource efficiency, is that it will be utilizing wind energy to produce electricity. The Project will be of an installed capacity of 500 MW that will contribute to the national grid, reach end users, and help meet increasing electricity demands throughout Egypt – as opposed to meeting such increasing demands through conventional electricity production from thermal power plants.

The Project is expected to provide around 2,450 GWh of electricity per year and is expected to displace more than 925,000 metric tons of CO<sub>2</sub> annually. This has been calculated based on statistics obtained from IFI Dataset of Default Grid Factors<sup>15</sup> (UNFCCC, 2021) which provided a CO<sub>2</sub> generation factor for electricity production in Egypt, and which was estimated at 406 gCO<sub>2</sub>/kWh.

The International Financial Institution (IFI), under the Framework for a Harmonized Approach to Greenhouse Gas (GHG) Accounting, published the document titled “GHG Accounting for Grid Connected Renewable Energy Projects” (IFI, 2019). This document indicates that construction emissions for renewable energy projects may be excluded, as such forms of renewable energy are generally recognized to have low construction and lifecycle emissions.

Nevertheless, to put things into perspective, a research study “Assessing the Lifecycle Greenhouse Gas Emissions from Solar PV and Wind Energy: A Critical Meta-Survey” (Daniel Nugent, Benjamin K. Sovacool, 2013)

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<sup>15</sup> [IFI Default Grid Factors 2021 v3.1 | UNFCCC](#)

screened an extensive number of lifecycle studies covering a broad range of wind and solar photovoltaic (PV) electricity generation technologies to identify 41 of the most relevant, recent, rigorous, original, and complete assessments so that the dynamics of their greenhouse gas (GHG) emissions profiles can be determined.

The study concludes that the average lifecycle greenhouse gas emissions for wind farms averaged around 35 g CO<sub>2</sub>-eq/kWh. The study estimates that around 70% of such emissions are attributed to material cultivation and fabrication (mining, extraction, processing, etc. of final products). Construction activities average 8.4 CO<sub>2</sub>-eq/kWh, while operational activities average 8.4 CO<sub>2</sub>-eq/kWh.

This figure above covers all on-site construction activities including but not limited to transportation of materials, civil works and installation activities, processing of materials, fossil fuels burned in transporting and assembling the system, etc. Similarly, the figure for operation covers all activities to include maintenance, cleaning of modules, replacement of parts, etc.

Based on the above, for this Project, construction activities would amount to around 19,000 tons of CO<sub>2</sub>-eq. Operational emissions associated with maintenance and servicing activities are expected to be minimal in comparison to the annual GHG emissions avoided through renewable electricity generation. Considering that the Project is expected to displace more than 925,000 metric tons of CO<sub>2</sub> annually, such lifecycle emissions are considered negligible.

### **8.15.2 Compatibility with Host Country Climate Change Commitments**

#### **Background on Climate Change and Egypt**

Egypt's journey to combat climate change began with its participation in the Earth Summit in Rio de Janeiro in 1992 and continued through the sessions leading to the Kyoto Protocol in 1998. However, it was not until Prime Minister Decree No. 272 that the Egyptian government initiated the development of policies and strategies to address climate change.

This decree led to the establishment of the National Committee on Climate Change. A year earlier, the National Committee for Crisis Management and Disaster Risk Reduction (NCCMDRR) was formed in response to the Hyogo Framework for Action (HFA) on disaster reduction, established in 2005. Both committees have played a crucial role in shaping Egypt's first strategy for climate change adaptation.

In 2011, the Egyptian government published the "National Strategy for Adaptation to Climate Change and Disaster Risk Reduction." This strategy was developed in alignment with the commitments made during the Copenhagen Summit and the Copenhagen Accord in 2009. It serves as a guide for all sectors in Egypt to address the challenges associated with climate change adaptation and resilience. The National Strategy, which has paved the way for numerous government-led initiatives has three primary goals:

- Increasing the adaptability and flexibility of Egyptians in dealing with climate related risks and disasters
- Enhancing the capacity and resilience to withstand climate related risks
- Reducing climate change inducing factors

These goals were to be achieved through six key actions, with their progress monitored through seven determinants. The Strategy was aligned with the National Strategy for Crisis and Disaster Management in Egypt, published in 2010; however, it was much more comprehensive and specifically focused on climate change risks. Notably, the Strategy was not time-bound and aimed to pave the way for other related policies and initiatives.

In 2016, Egypt published the Integrated Sustainable Energy Strategy (ISES), which outlined the plan for increasing the percentage of electricity generation from renewable energy to 42% by 2035. Furthermore, in 2018, the Egyptian Ministry of Environment released the "Egyptian Strategy for Clean Development

Mechanism,” which articulated actions to ensure that continued development and economic growth in Egypt positively contribute to climate change mitigation efforts.

### **Egypt’s Commitment to Combatting Climate Change**

To date, Egypt has submitted four National Communications (NC) to the United Nations Convention on Climate Change (UNFCCC), which include, among other things, a strategic summary of the country's greenhouse gas (GHG) inventory and current programs aimed at mitigating climate change at the national level. These NCs serve as a continuation of Egypt's commitment to the UNFCCC and highlight the progress made in reducing emissions through various plans and policies, as well as the development of mitigation measures through targeted strategies and programs. The Ministry of Environment, through the Egyptian Environmental Affairs Agency (EEAA), develops the NCs with support from the United Nations Development Program (UNDP). Additionally, Egypt submitted its first Biennial Update Report to the UNFCCC, which encompasses the GHG inventory up to 2015, the progress of climate change mitigation projects, and various mitigation policies and actions implemented by that date.

Over the past decade, Egypt has reinforced its commitment through two significant ministerial decrees. Prime Minister Decree No. 1912 of 2015 established the National Council for Climate Change, which overtook the committee established in 2007. Prime Minister Decree No. 1129 of 2019 further articulated the Council's responsibilities, enhancing its institutional capacity and obligations. The Council is supported by a technical team from the climate change department of the EEAA, responsible for reporting, research, and monitoring.

Egypt became a signatory to the Paris Agreement in April 2016 and subsequently submitted its Nationally Determined Contributions (NDCs) to the UNFCCC, which highlight mitigation measures and adhere to the principle of progression. The first NDCs were submitted in 2017 and became effective in 2020. The main segments of the NDC include:

- National Circumstances (Population Growth, Economic Conditions, National Objectives, Political Context/Social Context)
- National Efforts for Adaptation and Mitigation (Challenges, Intended Actions, Mitigation Policies and Measures)
- New Market Mechanisms
- Need for Strong Economic Approach
- Means of Implementation

Egypt’s 2030 Vision was launched in 2016 as a national agenda that includes the long-term strategic plan for Egypt and for Egypt to meet its Sustainable Development Goals (SDGs) objectives. One of the key 8 objectives of the 2030 Vision, is objective 5 covering “integrated and sustainable ecosystem” that emphasizes on addressing the impacts of climate change. As part of this program, a development plan report is developed for the coming year that includes the government’s priorities for development.

### **NIAT Wind Energy Project**

Aside from obtaining an environmental approval from the EEAA for project implementation, which is based on the ESIA study prepared in accordance with EEAA categorization for projects, there are no energy, water or climate change related permits or certification.

The Project is expected to generate 500 MW through wind power technology that will be connected to the National Grid by a high voltage overhead transmission Line. This Project implementation contributes to and is aligned with a number of programs, policies and strategy objectives that include:



**Table 82: Programs, Policies and Strategy Objectives**

Policy / Strategy / Framework	Relevance to the Project
Integrated Sustainable Energy Strategy ISES – 2015	<ul style="list-style-type: none"> <li>Ensuring the continuous security and stability of the country's energy supply.</li> </ul>
Egypt National Climate Change Strategy (NCCS) 2050	<ul style="list-style-type: none"> <li>Achieving Sustainable Economic Growth and Low-Emission Development in Various Sectors</li> </ul>
Egypt's Third National Communication (2016)	<ul style="list-style-type: none"> <li>Enhancing Energy Security through Diversification and Efficiency</li> </ul>
Egypt Sustainable Long-term and Mid-term development plans (Egypt 2030 Vision)	<ul style="list-style-type: none"> <li>Urban Development and Environmental Enhancement – Increasing the usage of “clean” energy that has minimal impacts on the environment and produces minimal pollution</li> </ul>
Egypt's NDC Mitigation Policies – 2023	<ul style="list-style-type: none"> <li>Renewable Energy Expansion: Achieving a 42% share of renewable energy in the electricity generation mix by 2030.</li> <li>Smart Grid Development: Implementing advanced smart grid technologies and enhancing regional interconnections.</li> <li>Decentralized Energy Promotion: Fostering energy efficiency and supporting small-scale renewable energy systems through comprehensive regulatory frameworks.</li> </ul>
Clean Development Mechanism (CDM) Strategy – 2017	<ul style="list-style-type: none"> <li>To be added to Egypt's Portfolio of CDM projects and will have an active quantified estimated emissions reductions tCO<sub>2</sub> per year under renewable energy projects</li> </ul>

### 8.15.3 Sea Level Rise

A little over one-third of Egypt's coastline borders the Mediterranean Sea, while the remainder extends along the Red Sea and the Gulfs of Suez and Aqaba. These coastal areas are particularly susceptible to sea level rise (SLR) and saltwater intrusion. The shoreline along the Mediterranean Sea is characterized by relatively low elevations, with substantial portions of the Nile Delta situated below sea level, rendering it especially vulnerable. Furthermore, the increasing frequency of intense precipitation events is expected to exacerbate the risk of coastal flooding and related riverbank overflow.

The Project site is located more than 10km west of the Red Sea, at an altitude of about 95 meters above the Red Sea's ground level (refer to the figure below). As discussed in further detail in the section below, the potential rise in water levels in the Red Sea due to climate change remains uncertain. However, any anticipated increase is unlikely to exceed 95 meters in the surrounding area due to the prevailing topographical conditions, as indicated in the figure below. Consequently, such risks are deemed irrelevant for the Project site.

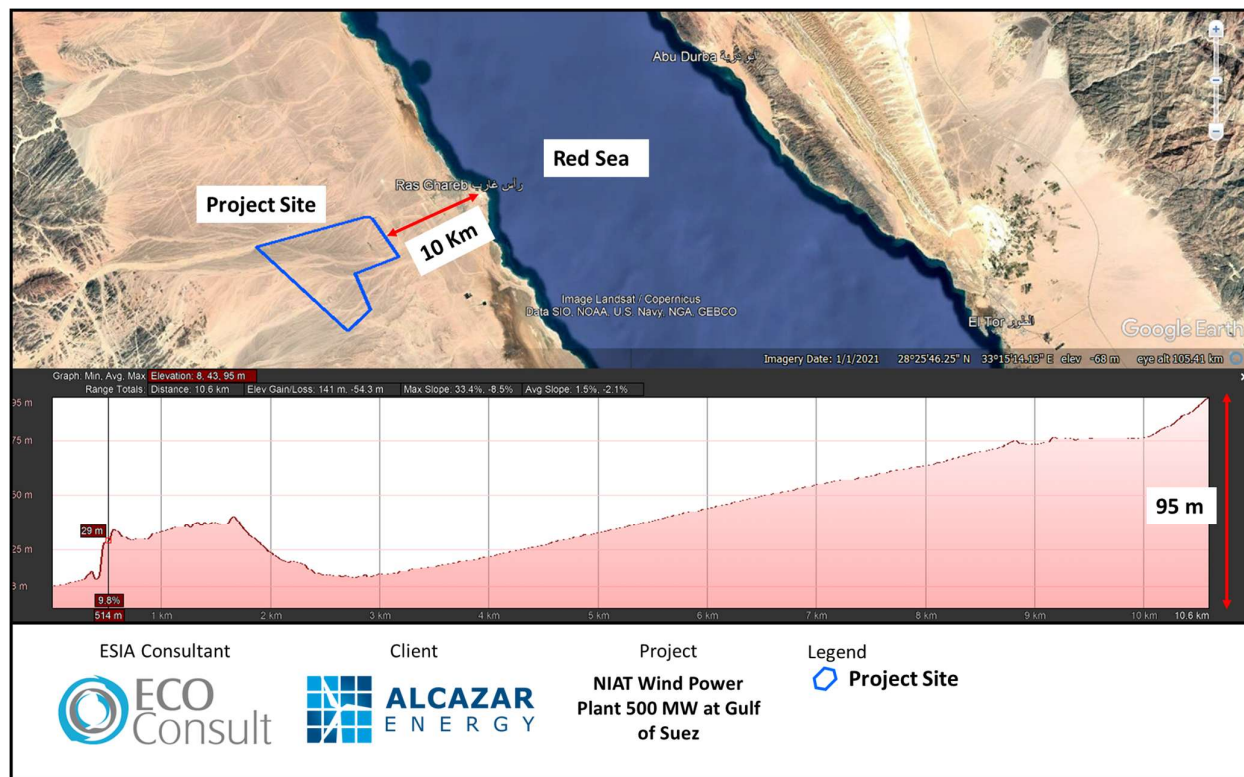


Figure 100: Elevation Profile of Project Site and the Red Sea

#### 8.15.4 Flash Floods

The Developer undertook a flood risk assessment for the Project site. The assessment is provided as a standalone document and evaluates flood risks for return periods ranging from 2 to 200 years, including a 100-year return period incorporating climate change considerations.

Flood hazard maps were developed for the 100-year and 200-year return periods based on established vulnerability classification thresholds (refer to Figure 101 through Figure 104). These maps indicate that most inundated areas within the Project site are characterised by low flood hazard, and are generally considered safe for people, vehicles, and infrastructure, although some areas may pose risks to smaller vehicles.

Higher hazard levels are primarily associated with main wadi channels. In particular, Wadi Abu Had, located outside the Project boundary, is characterised by high to very high flood hazard, with potentially severe conditions near the hydraulic culvert under the Ras Ghareb–Sheikh Fadl Road. In addition, very high (catastrophic) hazard levels are identified within the existing artificial lake due to the large stored water depth, despite relatively low flow velocities.

Flood hazard mapping for Basin (B3) indicates that most areas within the basin are safe, with only limited zones exhibiting elevated hazard levels. Overall, flood hazard levels are primarily influenced by stream flow rate, channel width, existing dam and slope characteristics.

#### Risks and Potential Impacts:

- Wind turbines may be vulnerable to flash floods, particularly if located near main wadi paths, which are prone to high water flow during extreme weather conditions.
- The foundations of wind turbines may suffer from scour and erosion due to water flow, compromising their stability and safety.
- Internal asphalt roads could be at risk of erosion or flooding, especially where they intersect with main stream paths.

### Mitigation Measures:

- Using the depth, velocity, and hazard maps provided below, wind turbine locations have been positioned away from main stream paths to avoid areas with higher flash flood risks.
- Otherwise, constructed dikes around the wind turbine towers should be implemented to prevent any possible risk.

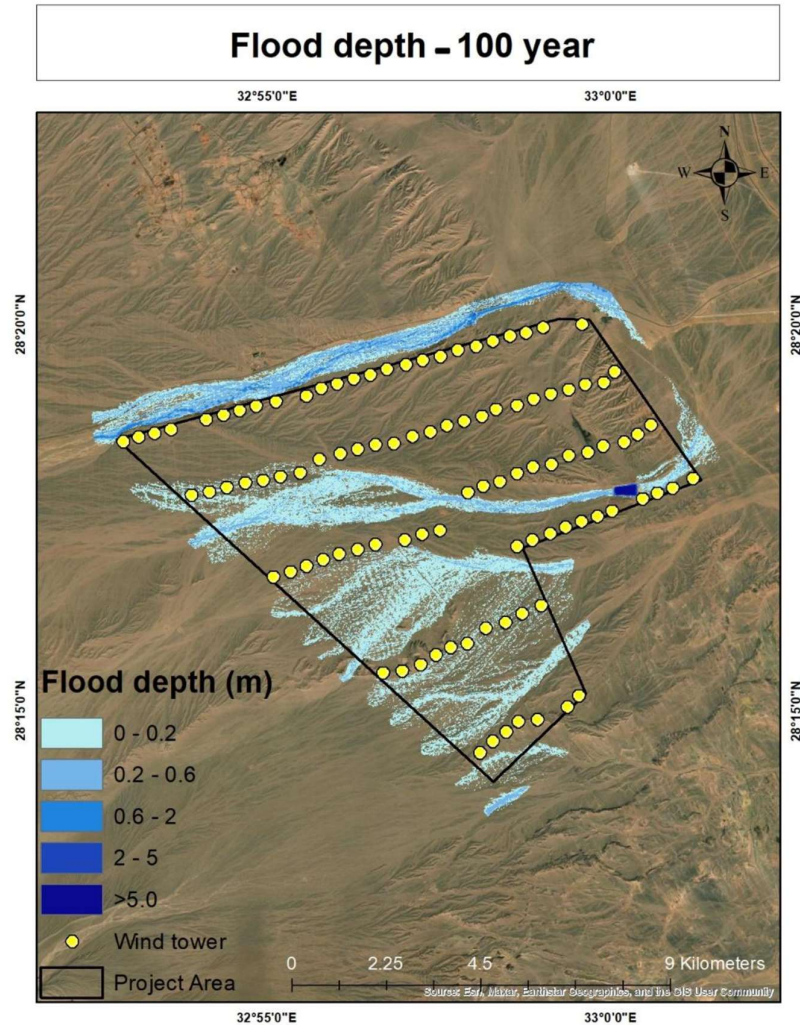


Figure 101: Flood Depth Map for the 100-year Return Period (probability of occurrence is 1%) for the Regional Model

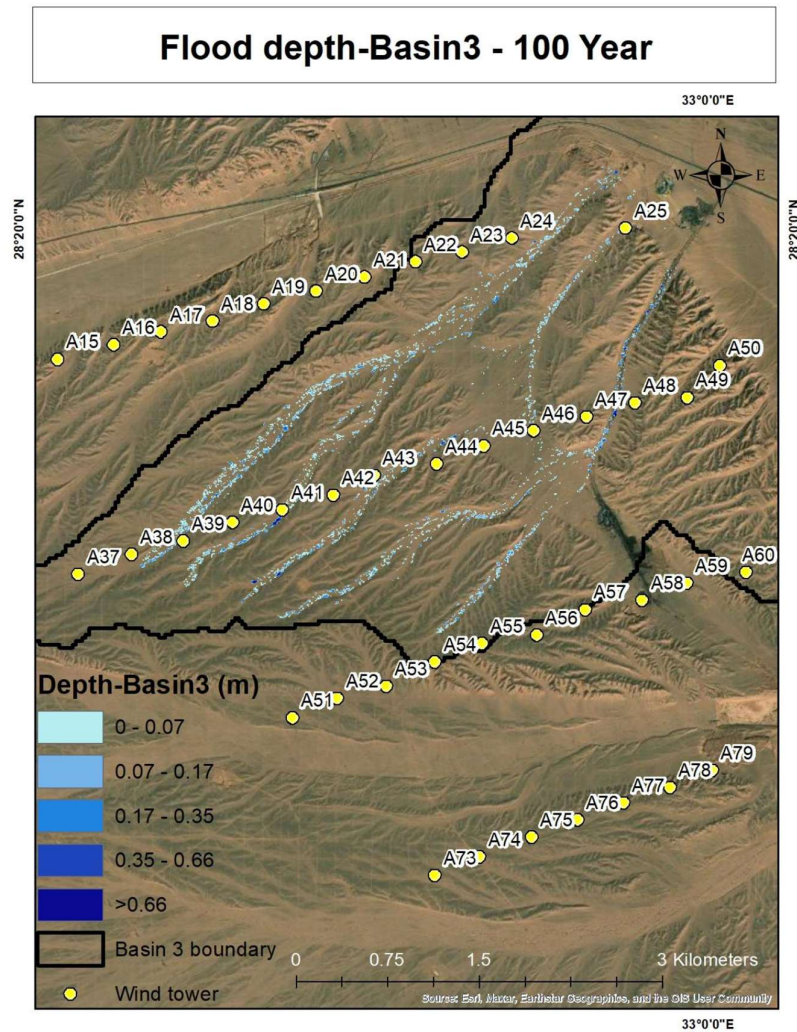


Figure 102: Flood Depth Map for the 100-year Return Period (Probability of occurrence is 1%) for the Local Model of Basin (B3)



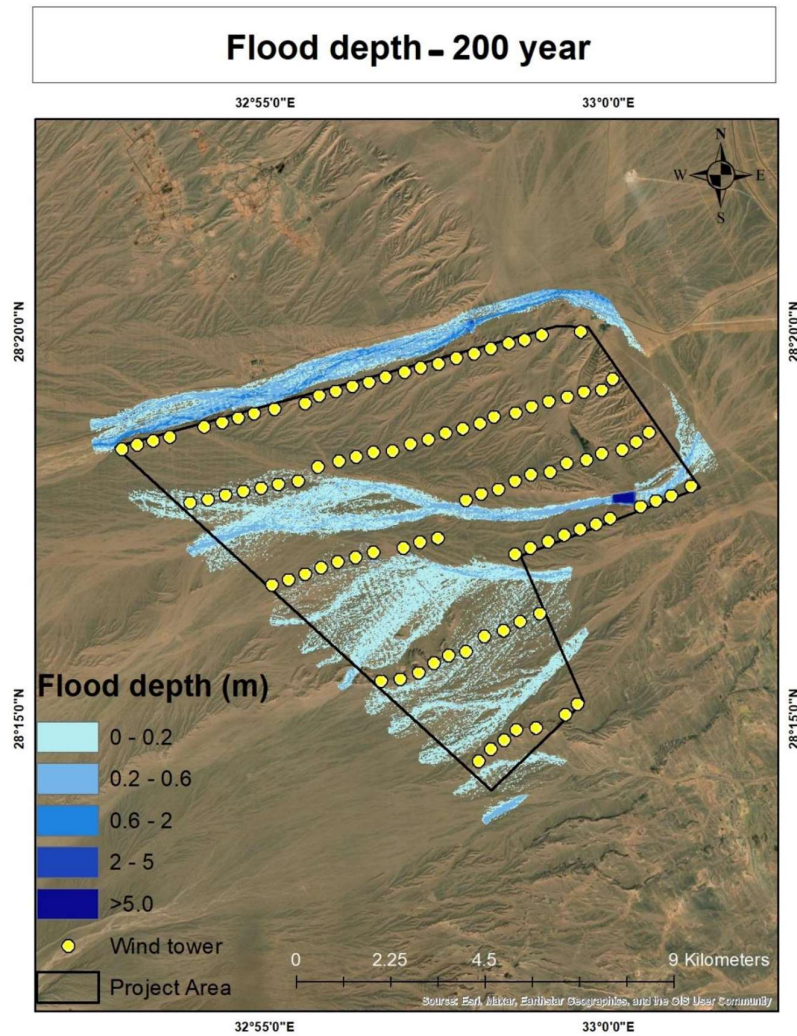
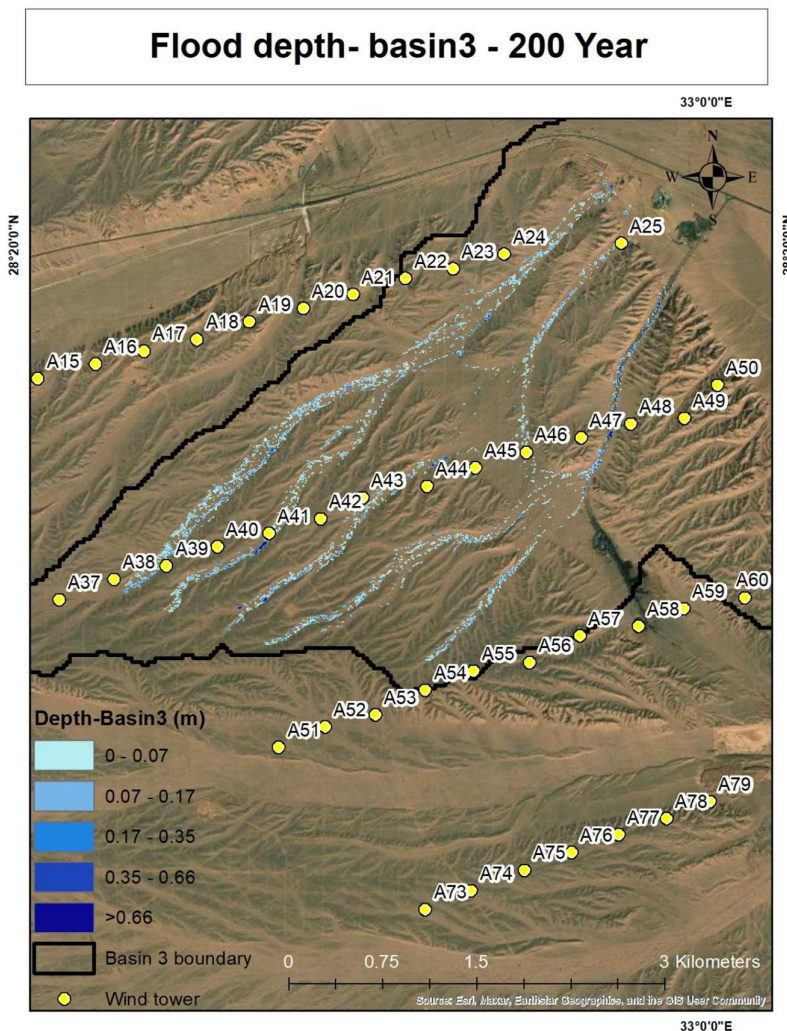


Figure 103: Flood Depth Map for the 200-year Return Period (Probability of Occurrence is 0.5%) for the Regional Model





**Figure 104: Flood Depth of the 200-year Return Period (Probability of Occurrence is 0.5%) for the Local Model of Basin (B3)**

The assessment concludes that:

- Flood hazard within the Project site is generally low across most areas, with inundated zones considered safe for people, vehicles, and infrastructure under typical conditions.
- Elevated flood hazard levels are primarily associated with main wadi channels and drainage paths crossing or influencing the Project site, where flow depth and velocity increase during extreme rainfall events.
- For the 100-year return period, flood hazard remains predominantly low outside the wadis, while within the wadis hazard levels increase and may range from high to very high, depending on local flow conditions.
- For the 200-year return period, a similar pattern is observed, with low hazard across most of the Project site and high to very high hazard levels concentrated within wadi channels and flow paths.
- Specific areas located outside the Project boundary, such as Wadi Abo Had, may experience very high to catastrophic flood hazard, particularly near hydraulic structures (e.g., culverts), due to high flow intensity.

- Localised areas, including artificial storage features (e.g., artificial lake), may exhibit very high hazard levels due to significant water depth, despite relatively low flow velocities.
- Flood hazard levels across the Project area are primarily influenced by flow rate, channel width, and slope characteristics, with higher risks confined to defined drainage pathways.
- Overall, the assessment indicates that while the Project area is exposed to flash flood events typical of the Eastern Desert, flood risks are manageable through appropriate site planning and engineering design measures.

### 8.15.5 Temperature Increase and Heat Waves

The section below is provided from the “Climate Risk Country Profile: Egypt” (World Bank, 2021). Analysis of data from the World Bank’s Climate Change Knowledge Portal (CCKP) shows historical information on temperature in Red Sea for 1991–2020. As shown in the figure and table below, the annual mean temperature for Red Sea is 24.3°C, with average monthly temperatures ranging between 31°C in July and August, and 16°C in January. The figure below presents the spatial variation of observed average annual temperature across Egypt.

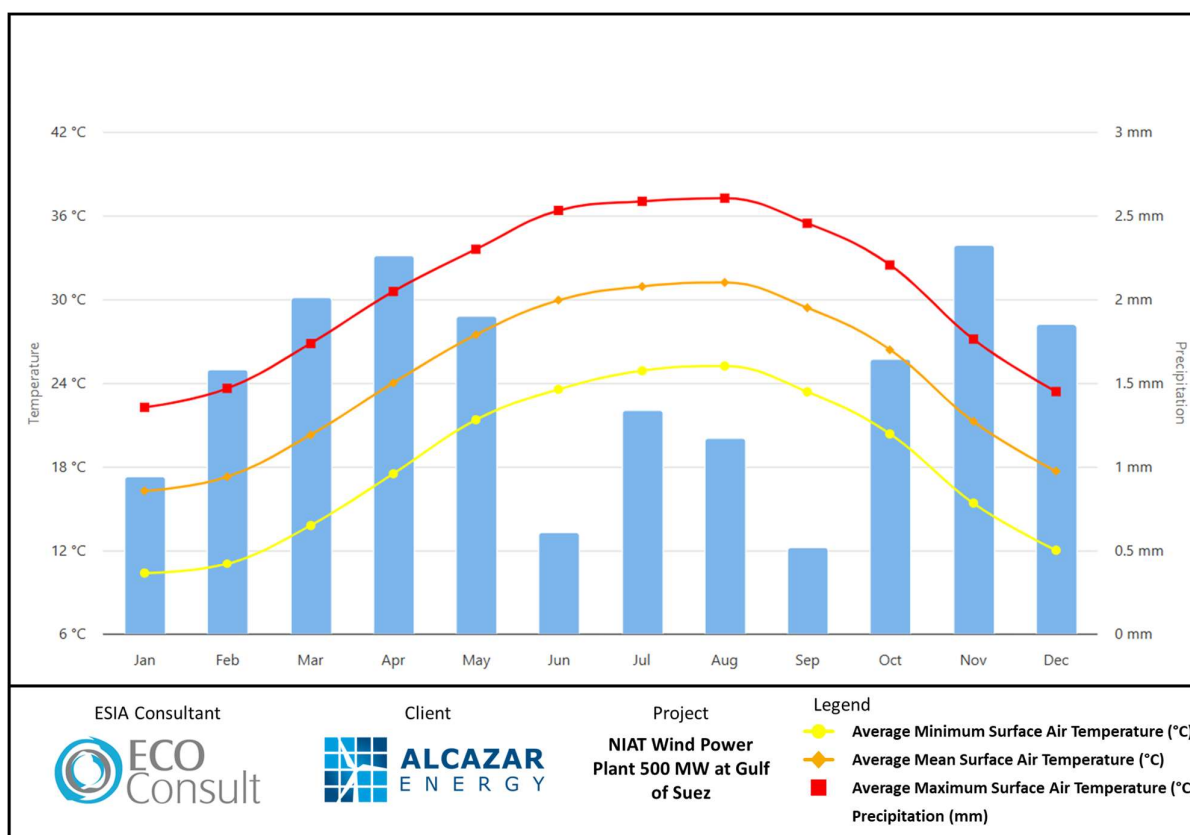


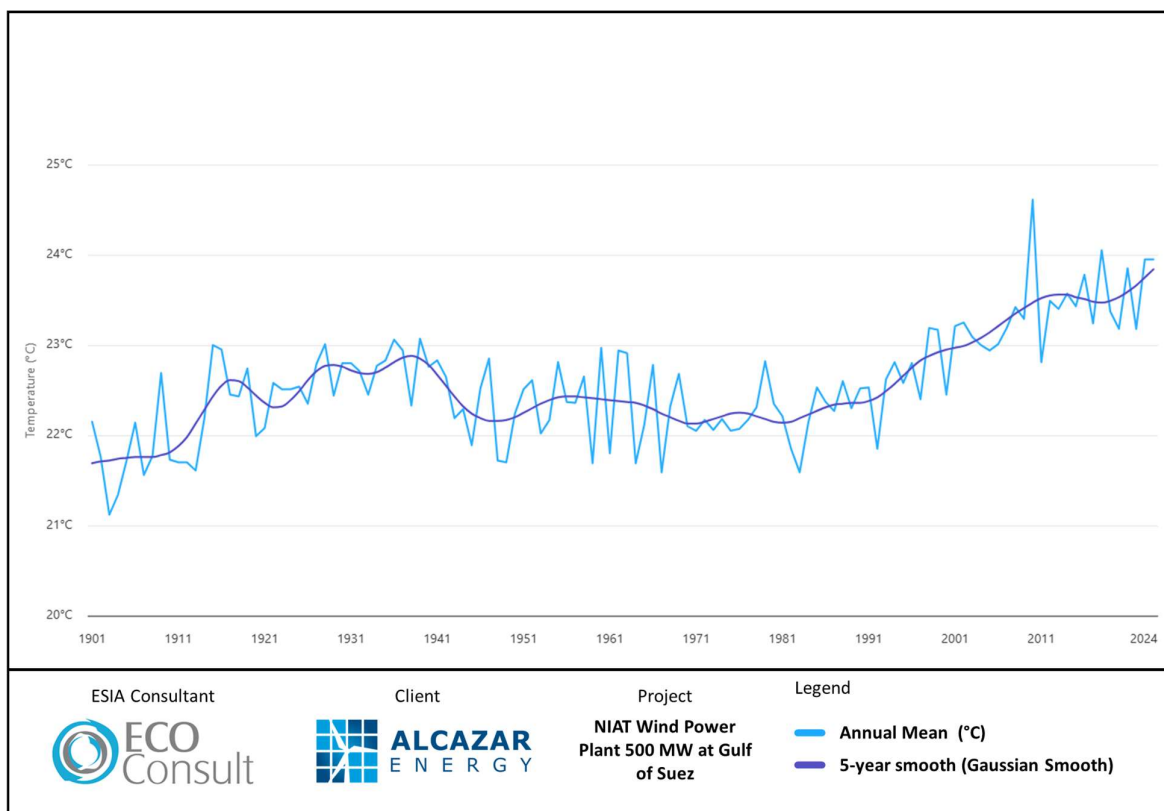
Figure 105: Monthly Temperature and Rainfall of Red Sea for 1991-2020

Table 83: Monthly Temperature and Rainfall of Red Sea for 1992-2020

Month	Average Surface Air Temperature (°C)			Precipitation (mm)
	Minimum	Mean	Maximum	
Jan	10.32	16.27	22.26	0.94
Feb	11.02	17.29	23.62	1.58
Mar	13.79	20.28	26.83	2.01
Apr	17.5	24.01	30.56	2.26
May	21.37	27.46	33.59	1.9

Jun	23.55	29.94	36.37	0.61
Jul	24.88	30.92	37.02	1.34
Aug	25.22	31.21	37.25	1.17
Sep	23.37	29.39	35.45	0.52
Oct	20.35	26.38	32.46	1.64
Nov	15.4	21.25	27.15	2.32
Dec	12.02	17.68	23.39	1.85
<b>Yearly Average</b>	<b>18.23</b>	<b>24.34</b>	<b>30.50</b>	<b>1.51</b>

Based on the figure below it can be concluded that temperatures in Egypt have increased at a rate of 0.1°C per decade on average between 1901– 2024. However, substantially stronger warming was observed over the past 30 years, with average annual temperatures increasing by 0.53°C per decade.



**Figure 106: Observed Temperature for Egypt between 1901 and 2024**

The figures below from the Climate Change Knowledge Portal present the mean and maximum projected temperatures for the next 75 years for Red Sea, considering climate change effects. The figure below shows multiple scenarios where the Shared Socioeconomics Pathways 1 (SSP1) is the most optimistic, and (SSP5) is the worst-case scenario with highest emissions. As noted in the figures below, under SSP5, by 2026 (i.e., around the operational period the Project) the average maximum temperature is projected to be 30.33°C, while the average mean temperature is estimated to be 23.94°C.

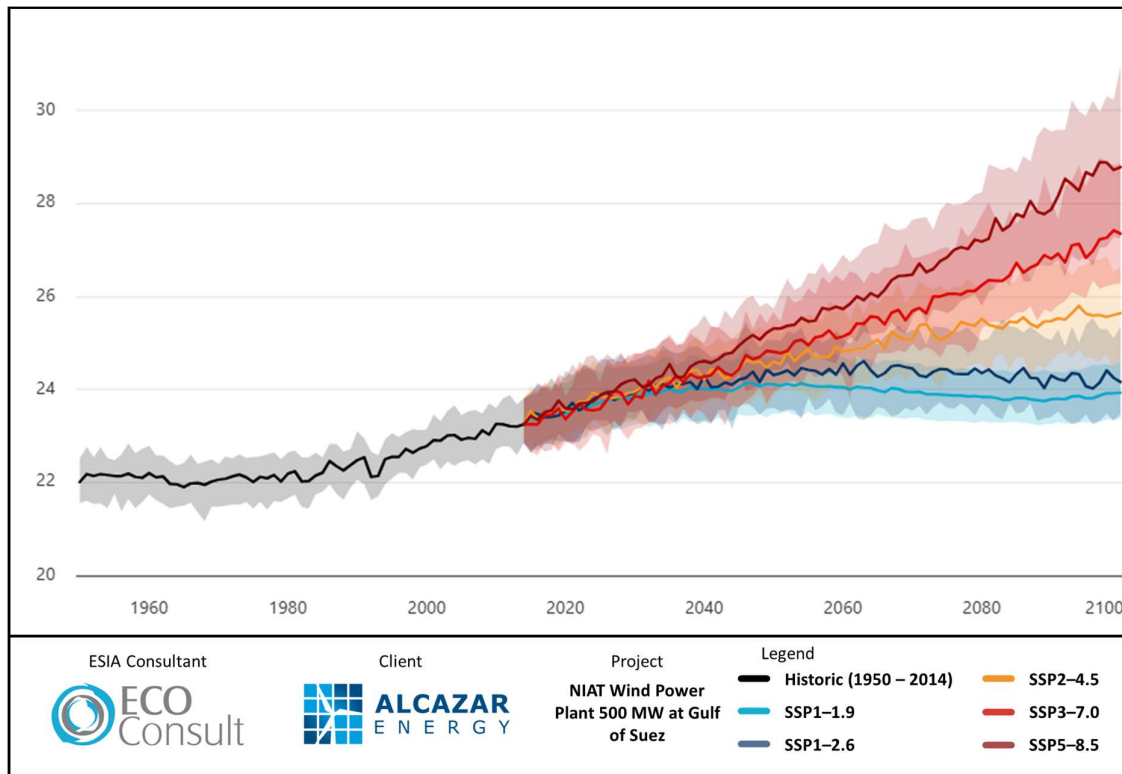


Figure 107: Historic and Projected Mean Temperature in Red Sea

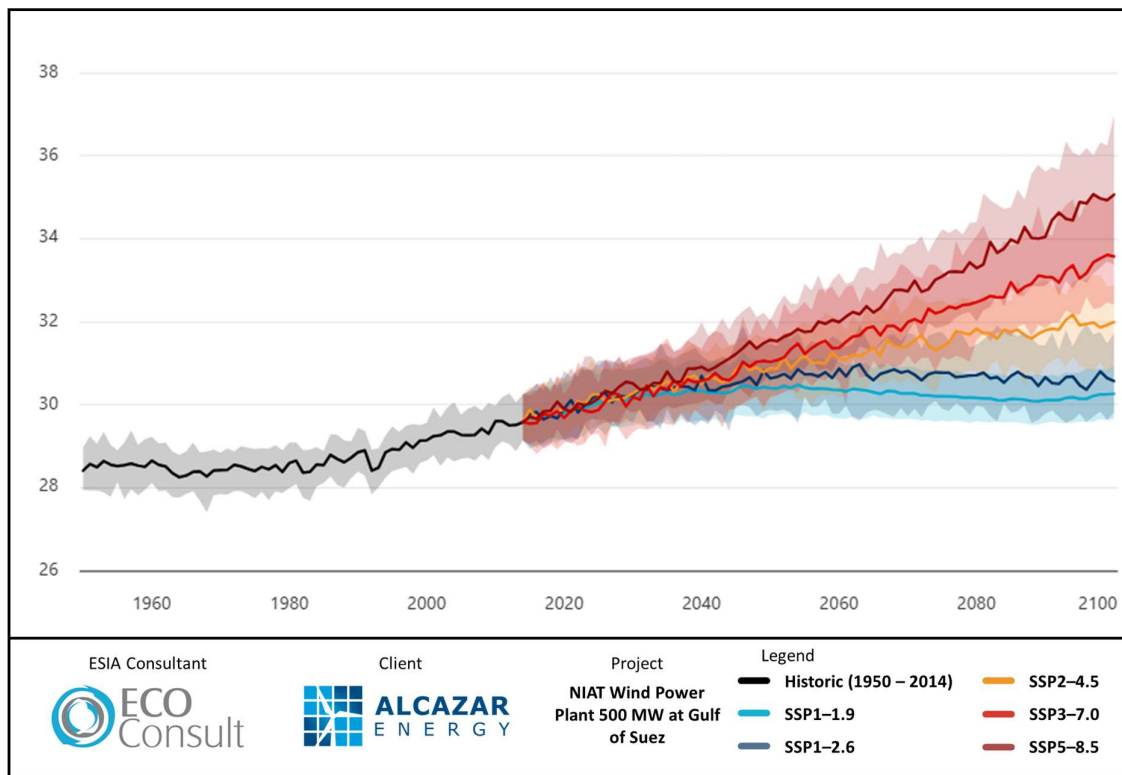


Figure 108: Historic and Projected Maximum Temperature in Red Sea

Rising temperatures are of increasing concern. The annual distribution of days with a high-heat index provides insight into the health hazard of heat. The daily probability of a heatwave is projected to increase in Red Sea

under all emissions pathways. As shown in the figure below under SSP5, the maximum number of hot days surpassing a temperature of 35°C rises to 3.5 days in 2026, representing a 5.7% increase from 2025.

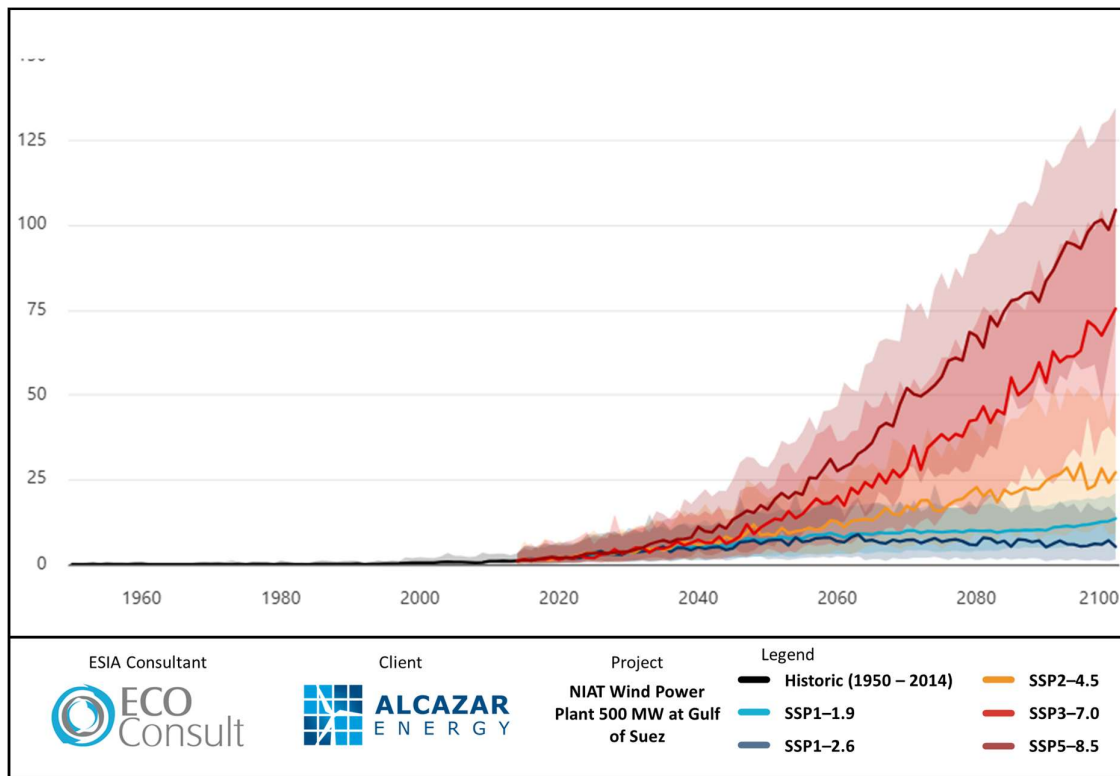


Figure 109: Number of Days with a Heat Index >35°C

Finally, for Ras Gharib, the Think Hazard tool indicates extreme heat as a high-risk hazard level as noted in the figure below.

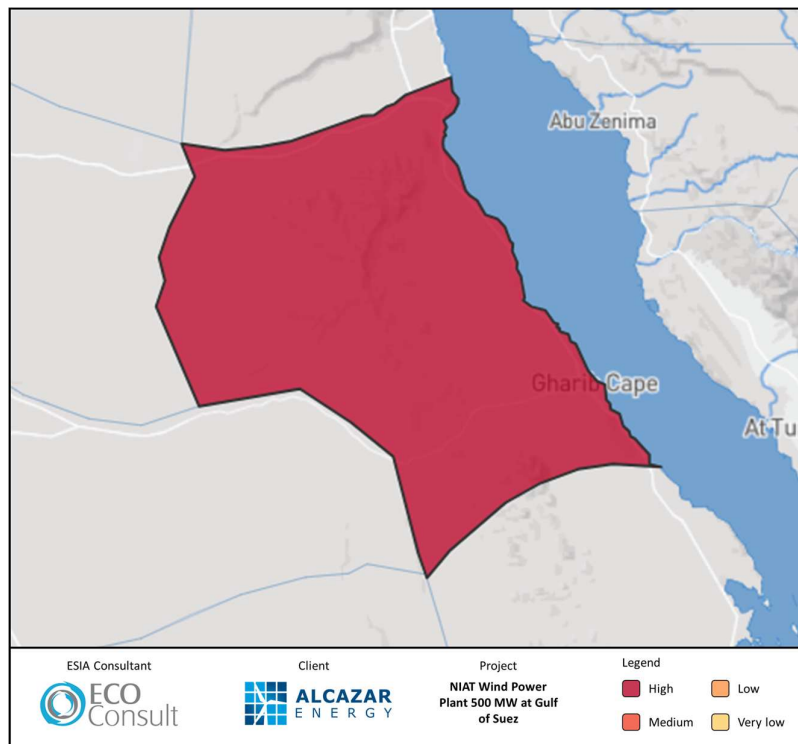


Figure 110: Hazard Level for Ras Gharib for Extreme Heat



### **Damage to Assets and/or Impacts on Project Efficiency**

High temperatures could damage or affect certain Project assets (e.g. cables, blades, etc.) and/or could affect generation capacity. It is assumed that such risks have been taken into account as part of the technical studies of the Project.

### **Impacts on Outdoor Workers/Labourers**

Working in outdoor areas and exposure to high temperatures may entail occupational health and safety risks on workers during the construction and operation phase. The OHSP is to be prepared for the construction and operation phases and should take into account risks from working in sunny conditions and high temperatures. This could include measures such as the following;

- Avoid continuous exposure to the sun during the shift. Temporary shelter and/or similar protections will be defined and provided. Project should comply with limits to heat exposure during working hours;
- Exposed personnel have to wear protective clothing and cover the skin by means of long-sleeved, closely-woven shirts and long trousers;
- If considered necessary, exposed personnel have to use an SPF 30 or higher sunscreen, before going outdoors on skin exposed;
- Provide adequate amount of water per worker (it suggested to drink about 0.5 liters of water before work commencement, drink 1 to 2 cups of water every 20 minutes, for a total of 4 to 8 liters per day or 1 liter per hour);
- Reduce metabolic heat production (heat produced by the body): automation and mechanization of tasks minimize the need for heavy physical work and the resulting build-up of body heat;
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing;
- Define regular breaks in cool, shaded areas;
- Continuous weather monitoring for informed work scheduling; and
- Worker training on recognizing and responding to heat-related illnesses.

In addition, an Emergency Preparedness and Response Plan should be developed by Contractors and Project Operators which should include a section related to heat strokes.

## **8.15.6 Extreme Weather Events**

### **Sand and Dust Storms**

According to the Climate Risk Country Profile: Egypt (World Bank, 2021), future projections indicate that Egypt will experience an increase in the frequency and intensity of extreme weather events, including sand and dust storms. The intensity and occurrence of these storms, which are already common in Egyptian weather, are expected to escalate. Dust and sandstorms are associated with various infectious diseases, such as influenza and pneumonia, as well as non-infectious diseases like asthma and pulmonary fibrosis, thereby posing significant respiratory health risks.

Given this context, Egypt is anticipated to face a moderate future climate related risks from sand and dust storms, which could adversely affect the Project by impacting outdoor workers and labourers. Working in outdoor environments during such storms entails occupational health and safety risks for workers throughout the construction and operational phases. As previously mentioned, an Emergency Preparedness and Response

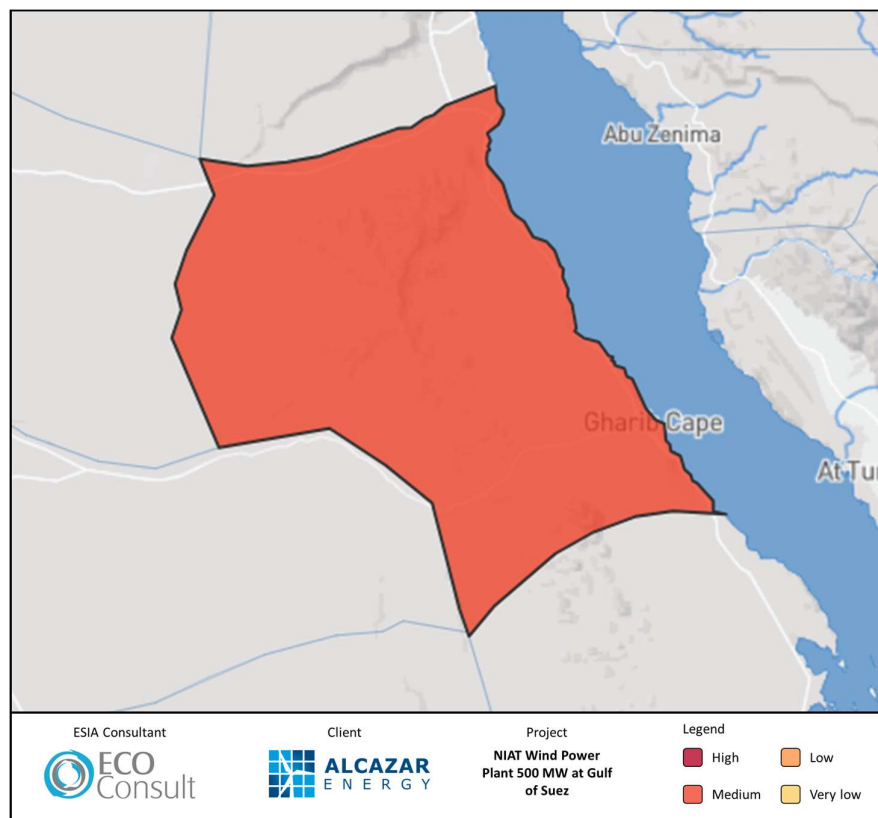
Plan should be developed by the Contractors and Project Operators, which must include a section specifically addressing dust and sandstorms. This section should encompass the following measures:

- All outdoor activities shall be temporarily suspended during sand and dust storms
- All workers must avoid staying in open areas and locate nearest shelter and take safe refuge
- Disposable dust masks shall be distributed and worn by all personnel
- Depending on site conditions and expected forecast, all works onsite could be suspended.

### Earthquakes

In the context of Red Sea Governorate, the Think Hazard tool assesses earthquakes as a medium-risk hazard, as illustrated in the figure below. This indicates a 10% probability of potentially damaging earthquake shaking occurring within the Project area over the next 50 years.

Earthquake hazards are primarily geophysical in nature and are not directly influenced by climate change projections. Therefore, no significant change in earthquake hazard levels is anticipated as a result of future climate change conditions.



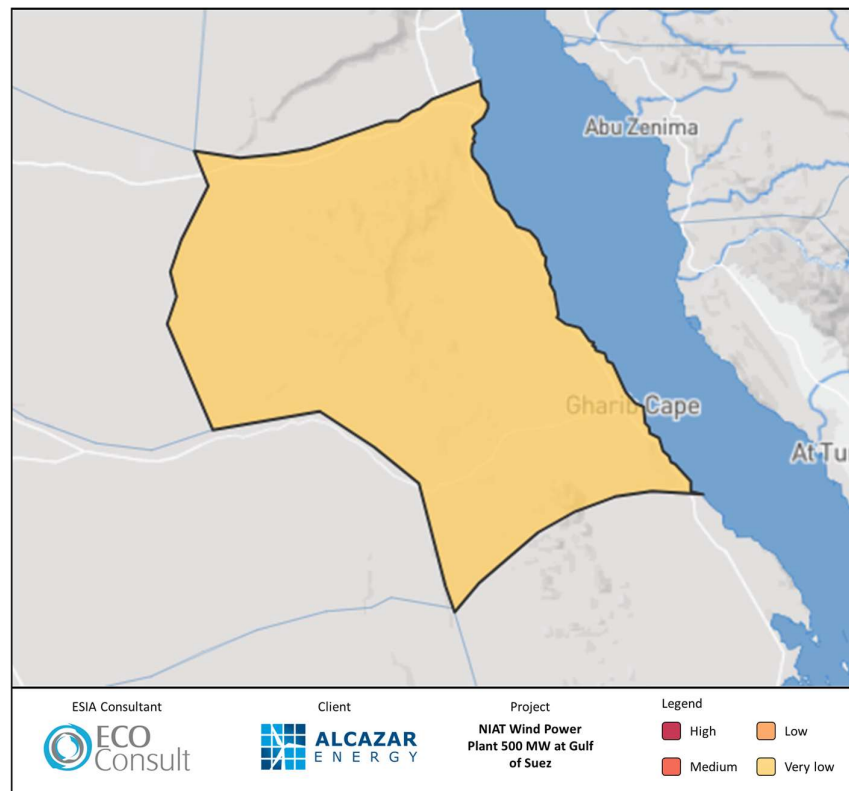
**Figure 111: Hazard Level for Earthquakes for Red Sea**

In addition, as required, detailed design of the Project will be considering seismic factors for the area that should be taken into account for design specifications. Taking the above into account, such risks are considered low and there are no further requirements to be considered.

### Tsunamis

Red Sea is not typically associated with significant tsunami activity, rare tectonic events could theoretically generate waves. However, based on current available regional and global datasets, no meaningful tsunami threat has been identified for the area. In addition, for Red Sea Governorate, the Think Hazard tool categorizes

tsunamis as a very low-risk hazard, as illustrated in the figure below. This classification indicates that there is less than a 2% chance of potentially damaging and life-threatening events occurring within the next 50 years.



**Figure 112: Hazard Level for Tsunamis for Red Sea**

Taking the above into account, tsunami risks are considered irrelevant for the Project site.

#### Other

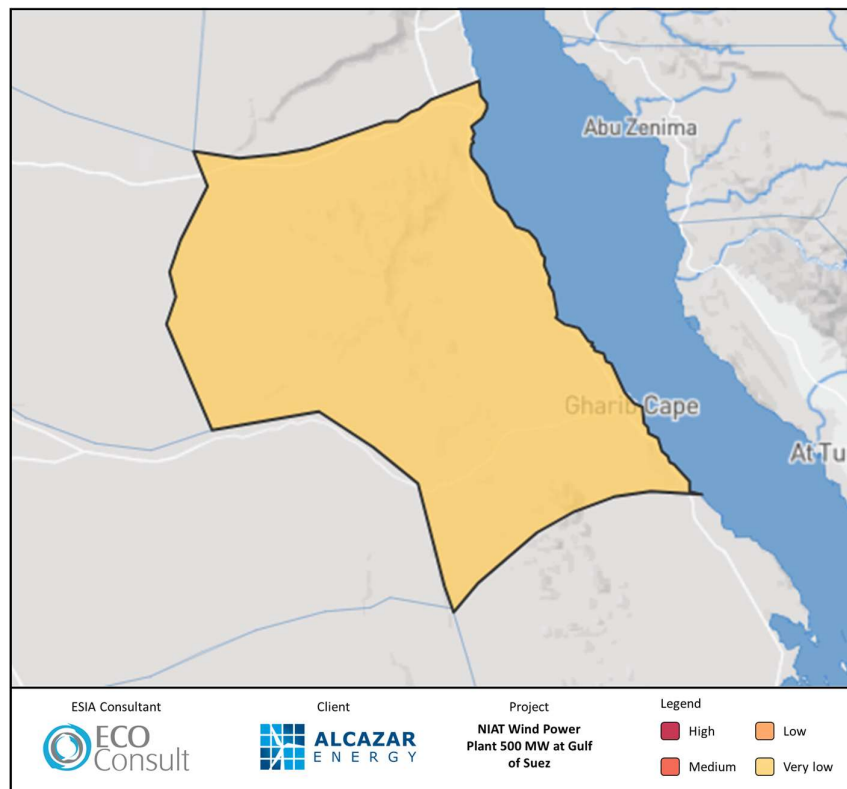
Other known natural disasters are not considered relevant for the Project area such as volcanos and cyclones. In addition, other extreme weather events have been assessed in other sections – this includes heat waves, flood risks, and sea level rise.

#### **8.15.7 Wildfires**

Wildfire is defined as an unplanned, unwanted, and uncontrolled fire occurring in an area with combustible vegetation. As previously mentioned, the Project site and its surrounding region are classified as a desert-like habitat characterized by arid and barren conditions, featuring extremely limited vegetation coverage, primarily consisting of low shrubs that account for less than 1% of the total surface area.

In the context of Red Sea Governorate, the Think Hazard tool assesses the risk of wildfires as a very low hazard level, as illustrated in the figure below.

Taking the above into account, such risks are considered low.



**Figure 113: Hazard Level for Wildfires for Red Sea Governorate**

#### 8.15.8 Infectious Diseases

According to Egypt's Third National Communication Under the UNFCCC (EEAA, 2016), climate change may indirectly impact health by altering the ecological ranges and distribution of vector-borne diseases, waterborne pathogens, and air quality. A well-established body of evidence links climatic conditions with the prevalence of infectious diseases, and direct climate impacts on Egypt could increase the incidence of human parasitic diseases. Specifically, climate change is expected to affect the spread and prevalence of mosquito-borne, fly-borne, and snail-borne parasitic infections.

Egypt is vulnerable to vector-borne diseases such as malaria, lymphatic filariasis, dengue fever, and Rift Valley fever due to favorable climatic conditions and habitats for disease vectors, exacerbated by increasing climate events. For this Project, malaria and dengue fever are particularly relevant health concerns, as they are highly sensitive to climate fluctuations and are anticipated to worsen with ongoing climate change.

The Climate Risk Country Profile: Egypt (World Bank, 2021) further underscores those diseases like malaria, dengue fever, and respiratory infections are acutely responsive to climatic changes and are projected to increase across Egypt.

According to the Centers for Disease Control and Prevention (CDC), Egypt had eliminated malaria and the last locally transmitted case was in 1998. In addition, there have been no cases of malaria in Egypt since June 14, 2014.

Taking the above into account, Egypt is considered at a moderate risk from infectious diseases, which could adversely affect the Project. Key impact is mainly during the construction phase related to influx of 4,000 workers into the area which could increase the risk of spread of new reservoirs of infectious diseases which could also impact local communities. At this point it is still unclear how many of these workers will be expatriates, Egyptian and/or from local communities.

During operation, impacts are considered minimal given the low number of workers involved all of which are expected to be Egyptians. However, due to the period of operation, although considered of low risk, there could be specific risks related to infections disease outbreak such as malaria. Therefore, this should also be taken into account.

Nevertheless, as discussed in the ESIA a worker influx plan should be prepared which takes into account the following:

- Medical examination program. All workers must be subject to a preliminary medical examination before commencement of any job tasks in accordance with local applicable requirements. In addition, routine medical examination for workers (bi-annually) must be undertaken. Such medical examinations must be undertaken at certified centers. Copies of medical examination results of all workers must be retained onsite.
- Details and procedures for ensuring and maintaining hygienic conditions onsite at all times specifically related to toilet and washing facilities, eating areas, etc.
- Induction training and awareness raising sessions on risks associated to the most common contagious diseases (e.g. influenza virus), communicable diseases, general measures for hygiene, code of conduct expected to be implemented and other as appropriate.
- Continuous monitoring with national health officials (e.g. Ministry of Health) and local authorities on updates on health situation within the Governorate in specific and Egypt in general (e.g. for any specific disease outbreaks and control measures to be implemented)
- Screening of expatriate workers for any potential infectious diseases (e.g. malaria)

It is recommended that a similar plan is also undertaken for the operation phase of the Project by the Project Operator.

#### 8.15.9 Water Scarcity and Drought

Based on “Water Saving in Irrigated Agriculture in Egypt” (Lambert, 2017), the current water supply in Egypt is as follows:

- The Nile River supplies about 93% of Egypt’s annual renewable water resources and is Egypt’s main and almost exclusive resource of fresh water. A share of 55.5 billion cubic meters per year (BCM/year) is allocated to Egypt according to the Nile Water Agreement (1959). About 10 BCM/year is lost through evaporation from the Aswan High Dam reservoir (Lake Nasser).
- Groundwater resources: investigations indicate that about 1 BCM of groundwater can be used annually at an economic rate. However current abstraction is estimated to be 2.5 BCM/year. The main abstracts in utilizing this huge resource are the great depth (up to 15mm) of these aquifers and deteriorating water quality at the increasing depth
- The average annual amount of rainfall water that is effectively utilized (by harvesting flash floods mainly) is estimated to be around 1.0-1.5 BCM/year This amount cannot be considered a reliable source of water due to high spatial and temporal variability.

Water demand in Egypt is primarily driven by agriculture, followed by municipal water supply and industrial needs. As noted in Water Scarcity in Egypt: Growing Concerns, and Partnerships (UNICEF, 2023), Egypt faces an annual water deficit of approximately 7 billion cubic meters. To address this shortage, non-conventional water sources, including agricultural drainage, desalinated brackish groundwater or seawater, and treated municipal wastewater, are increasingly utilized. These resources support agriculture, landscaping, and industrial activities



through specialized treatment processes. Currently, desalination is practiced on a small scale, primarily along the Red Sea coast.

**Table 84: Water Balance of Egypt in 2022 (CAPMAS, 2023)**

<b>Water Resource</b>	<b>Volume (billion m<sup>3</sup>/year)</b>
Nile Water	55.50
Deep Groundwater	2.50
Rainfall/flash floods	1.30
Desalination	0.38
<b>Total freshwater resources</b>	<b>59.68</b>
Surface Groundwater	6.33
Reuse of wastewater	15.36
Total reuse	21.69
<b>Total (billion m<sup>3</sup>/year)</b>	<b>81.37</b>

The table above highlights Egypt's heavy reliance on the Nile River as its primary water source, which supports potable water, agriculture, industry, and more. Consequently, Egypt's water availability and resource security are particularly vulnerable to the impacts of climate change on the Nile River.

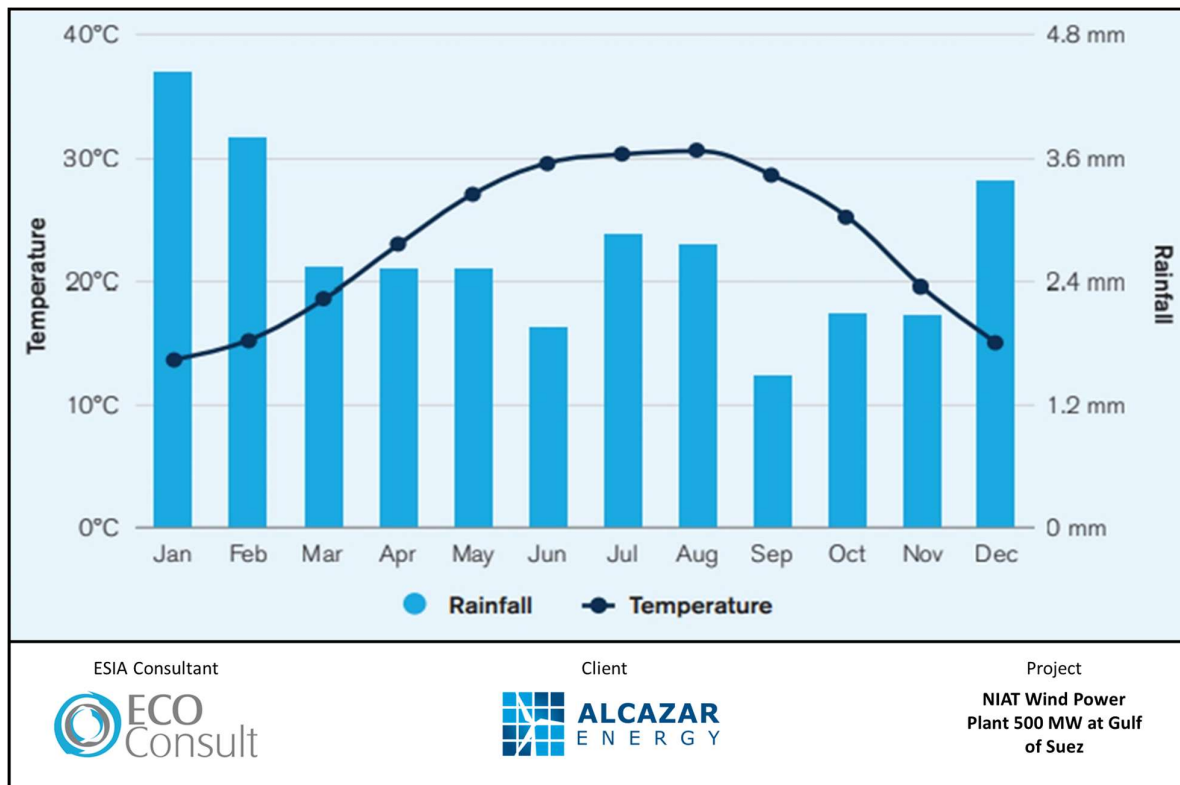
However, the specific impacts of climate change on Nile River flow remain uncertain. Some studies suggest that global temperature increases could heighten evaporation rates within the Nile, leading to reduced water supply and exacerbating water scarcity. In contrast, other research indicates that heightened evaporation in Egypt may increase precipitation in the Ethiopian highlands (upstream), resulting in greater runoff and increased downstream Nile flows.

These divergent scenarios necessitate opposing adaptation strategies: one focused on flood control at the Aswan Dam, and the other on water scarcity and potential drought mitigation. This uncertainty is underscored in the Climate Risk Country Profile: Egypt (World Bank, 2021), which reports potential impacts ranging from a 70% decrease in water availability due to evaporation to a 15%-25% increase in flows from elevated rainfall in the Ethiopian highlands and Blue Nile Basin.

Beyond climate change, the Nile River's water supply faces significant challenges from increased upstream water use, including developments such as Ethiopia's Grand Renaissance Dam on the Blue Nile tributary. Projections of rising temperatures due to climate change, combined with declining rainfall patterns (as further detailed below), are anticipated to heighten the risk and severity of water scarcity and drought across Egypt. These conditions are likely to drive increased water demand, compounded by additional factors like population growth.

Changes in rainfall and evaporation rates will impact other resources beyond the Nile, including (i) rainwater collection systems and (ii) surface water infiltration and groundwater recharge rates. This is expected to decrease the reliability of unimproved groundwater sources and surface water resources during droughts or extended dry periods.

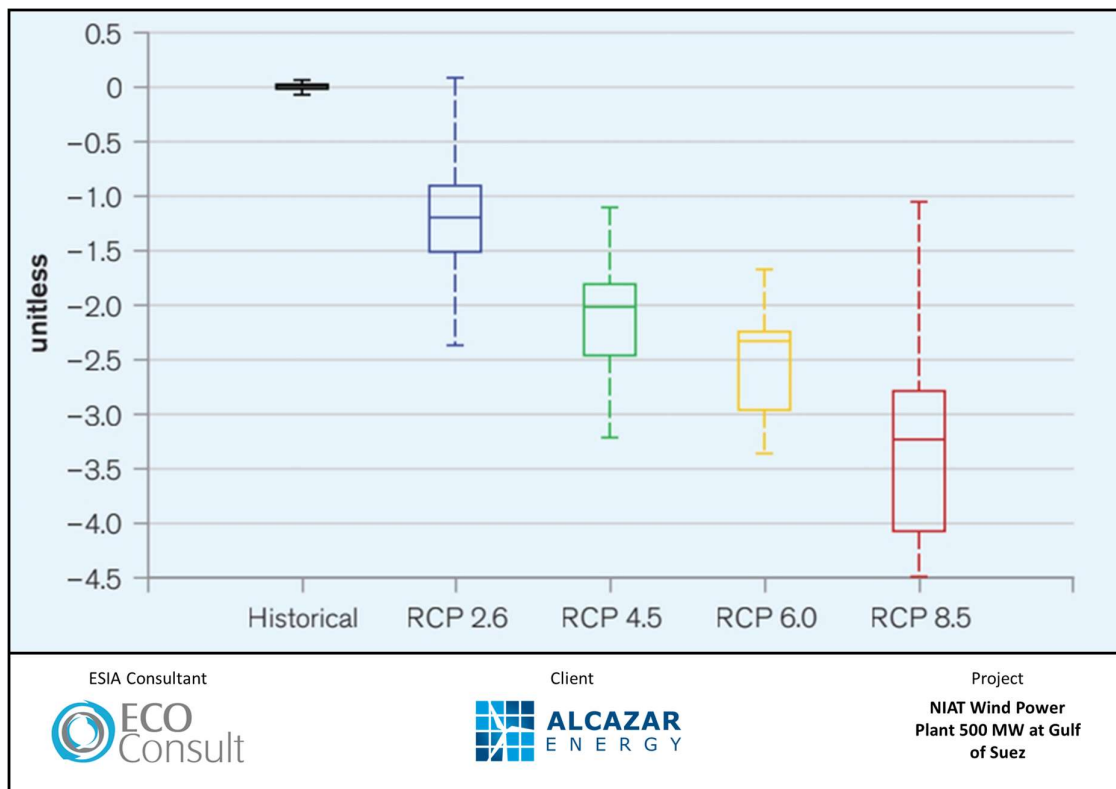
The Climate Risk Country Profile: Egypt (World Bank, 2021) provides comprehensive rainfall data for Egypt, as examined in the following section. Historical rainfall data from the World Bank's Climate Change Knowledge Portal (CCKP) indicate that Egypt's mean annual precipitation is 33.3 mm, with the highest rainfall between December and February and very low precipitation throughout most of the year. The figure below illustrates the spatial distribution of observed average annual rainfall across Egypt



**Figure 114: Average Monthly Rainfall and Temperature of Egypt for 1991-2019**

According to the Climate Risk Country Profile: Egypt (World Bank, 2021), Egypt has experienced a statistically significant 22% reduction in annual total precipitation over the past 30 years, leading to decreased water availability in some regions and extended drought periods. Analysis from the German Climate Service Center (GERICS) global climate models (GCMs) indicates that this trend is expected to continue through the end of the century, with projections suggesting even longer dry spells—potentially increasing by 75 days by the 2080s. Reduced precipitation, combined with higher temperatures, is anticipated to impact evaporation rates, water balance, and overall drought conditions. Annual precipitation is projected to decline by 0.5 mm between 2020-2023 and by 1.9 mm between 2040-2059 under the RCP 8.5 scenario (business-as-usual, assuming no climate mitigation measures), the operational period for the Wind Farm project.

The Climate Risk Country Profile also presents projected values for the Standardized Precipitation Evapotranspiration Index (SPEI), a metric that measures water deficit by accounting for temperature-dependent evapotranspiration, providing insights into pressures on water resources. Negative SPEI values indicate dry conditions, with values below -2 representing severe drought, while positive values suggest increased wet conditions. This index is critical for assessing the quantity and quality of Egypt's water supply. Nationally, Egypt is projected to experience significantly heightened dry conditions and severe drought, especially in the central and northwestern regions by the 2050s and 2090s, respectively, intensifying the water stress across the country.



**Figure 115: Annual SPEI Drought Index in Egypt for the Period 1986 - 2099**

In summary, the following deductions have been reached:

- Egypt's heavy reliance on the Nile River as a primary water resource makes it highly vulnerable to climate change impacts on this resource and its availability. However, climate change impacts on Nile River flow remain uncertain at this stage.
- Beyond the Nile, climate-induced changes in rainfall and evaporation rates will also impact rainwater collection systems and groundwater abstractions, potentially decreasing the reliability of groundwater and surface water sources, especially during droughts or extended dry seasons.
- Projections indicating rising temperatures and declining rainfall rates due to climate change are expected to heighten water scarcity risks and intensify drought conditions across Egypt.
- Egypt is currently exceeding its sustainable water resource capacity, making it essential to explore additional water sources and efficiency measures, independent of climate change impacts. This necessity is further underscored by potential water use increases from upstream countries.

The Climate Risk Country Profile: Egypt (World Bank, 2021) recommends that Egypt consider adaptation measures, which include:

- Diplomatic engagement and agreements with Nile Basin countries, including Ethiopia, Sudan, and Uganda, to facilitate collaborative and sustainable Nile River resource management.
- Adoption and implementation of national adaptation strategies. Egypt has already taken steps to enhance water resource management, as outlined in the Egypt's Third National Communication under the UNFCCC (EEAA, 2016).
  - Water conservation measures for agriculture, industry and municipal supplies,
  - Upgrading water quality and sanitation to minimize pollution,

- Constructing new infrastructure for water collection in flash flood areas, water desalination, and increasing storage of drainage and fresh water in coastal lakes,
- Improving public awareness campaign on water scarcity and water shortage.
- Cooperating with Nile Basin countries to reduce water evaporation and safeguard river flows
- Improve rain harvesting techniques
- Increase abstraction of groundwater both fresh and brackish
- Improve recycling techniques of treated sewage and industrial effluent, desalination and improved water conveyance.

The Arab Republic of Egypt's Intended Nationally Determined Contribution (NDC) under the UNFCCC underscores the nation's recognition of the significant challenges posed by climate change and its commitment to enhancing the sustainable management of its water resources. The report outlines various actions aimed at promoting resilience, which align with previously mentioned strategies, including:

- Increasing water storage capacity
- Improving irrigation and drainage systems
- Modifying cropping patterns and farm irrigation techniques
- Reducing surface water evaporation through the redesign of canal cross-sections
- Developing new water resources through projects in the upper Nile region
- Implementing rainwater harvesting initiatives
- Expanding desalination efforts
- Recycling treated wastewater
- Enhancing the utilization of deep groundwater reservoirs
- Raising public awareness regarding the need to rationalize water use
- Strengthening precipitation measurement networks in the upstream countries of the Nile Basin, promoting data exchange among Nile Basin nations, and developing circulation models to forecast the impact of climate change on local and regional water resources
- Maintaining water levels in Lake Nasser

As evident from the above, the Government of Egypt is aware of such key challenges and is undertaking ongoing efforts to adopt and implement water resilience strategies for water management at the national level, that will include water supply and water demand. The Government of Egypt is working on this through various national and regional entities such as the Ministry of Water Resources and Irrigation (MWRI), water companies, and other.

However, within the Project context, this underlines the importance of emphasizing water conservation and water efficiency. As discussed in the ESIA, the following is required:

- Coordinate with RSWWC to secure the water requirements of the Project given that this is the official entity responsible for water supply in Red Sea Governorate. As discussed, water supply will most likely be through tankers whom in turn will source the water.
- Develop a water management plan for the construction and operation phase. The plan should emphasize on water conservation and efficiency such as the following in particular:

- Utilizing dry-cleaning methods wherever applicable.
- Utilizing water saving fittings where applicable (taps, urinals, toilets, trigger guns, etc.)
- Consider utilizing treated wastewater/grey water for dust suppression and any irrigation requirements as applicable

### 8.16 Summary of Anticipated Impacts

The tables below present a summary of the anticipated impacts during the planning and construction and operation phase of the Project. The information in the tables includes:

- Key and generic environmental attributes (e.g. air quality, noise);
- Impact (textual description);
- Nature of impact (negative or positive);
- Duration (long-term or short-term);
- Reversibility (reversible or irreversible);
- Magnitude (high, medium, or low);
- Sensitivity (high, medium, or low);
- Significance (major, moderate, minor, or not significant);
- Management action – generally management actions describe whether an impact can be mitigated or not. Management actions include: (i) mitigation measures; (ii) compensation measures; (iii) additional requirements which must be implemented at a later stage and which could be required by a governmental entity; (iv) for positive impacts recommendations have been provided which aim to enhance the impact; and
- Residual significance after management actions is implemented (major, moderate, minor, or not significant).



Table 85: Summary of Anticipated Impacts during Planning and Construction

Attribute / Issue	Likely Impact – Planning and Construction Phase	Impact Assessment							
		Nature	Duration	Reversibility	Magnitude	Sensitivity	Significance	Management Action	Residual Significance
Landscape and Visual	Visual and landscape impacts due to presence of elements typical of a construction site such as equipment and machinery.	Negative	Short Term	Reversible	Medium	Low	Minor	Mitigation Available	Not Significant
Land Use	Project could conflict the formal assigned land uses set by the various governmental entities.	There are no anticipated impacts.						No additional requirements	Not relevant
	There are several land uses onsite which if improperly managed could result in potential conflicts and disputes. This includes the Ghafra system of the Bedouin groups and existing nearby petroleum facilities.	Negative	Long Term	Reversible	Medium	High	Moderate	Mitigation Available	Not Significant
Geology, Hydrology and hydrogeology	Potential for flood risks on the Project area.	Negative	Long Term	Irreversible	Medium	High	Moderate	Mitigation Available	Minor
	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities, spillage of hazardous material, random discharge of waste and wastewater.	Negative	Long Term	Could be irreversible	Medium	Low	Minor	Mitigation available	Not Significant
Biodiversity	Improper management of construction activities could disturb/damage habitats and fauna.	Negative	Long Term	Could be irreversible	Medium	Low	Minor	Mitigation Available/Additional Studies	Not Significant
Avi-Fauna (Birds)	Improper management of construction activities could disturb breeding birds and damage relevant habitats	Negative	Short Term	Could be irreversible	Low	Medium	Minor	Mitigation Available/Additional Studies	Not Significant
Bats	Improper management of construction activities could damage habitats and disturb species.	Negative	Long Term	Could be irreversible	Low	Low	Not Significant	No Mitigation Required	Not Significant
Archaeology	Improper management of construction activities could disturb/damage archaeological remains which could be buried in the ground (if any).	Negative	Short Term	Could be irreversible	Medium	Low	Minor	Mitigation Available	Not Significant
Air Quality and Noise	Construction activities will likely result in an increased level of dust, particulate matter and pollutant emissions which in turn will directly impact ambient air quality.	Negative	Short Term	Reversible	Medium	Low	Minor	Mitigation Available	Not Significant
	Possible noise emissions to the environment from the construction activities which will likely include the use of machinery and equipment such as generators, hammers, and compressors and other activities	Negative	Short Term	Reversible	Medium	Low	Minor	Mitigation Available	Not Significant
Infrastructure and Utilities	Road Networks – if transportation activities of the various project components to the site are not properly managed beforehand, they could entail risk of damage to the existing roads and could be of public safety concerns to other users on the road. In addition, if planning activities are not well managed it could damage/disturb existing onsite road networks.	Negative	Short Term	Reversible	High	Medium	Moderate	Mitigation Available	Not Significant
	Civil and Military Aviation – Improper planning and site selection of the Project could impact aircraft safety and/or could potentially interfere with certain electromagnetic transmissions associated with air transport	Negative	Long Term	Reversible	Low	High	Minor	Mitigation Available	Not Significant
	Electricity network – if planning activities are not well managed onsite it could damage/disturb existing onsite electricity network and pylons.	Negative	Short Term	Reversible	Medium	Medium	Minor	Mitigation Available	Not Significant
	Petroleum Facilities – if planning activities are not well managed onsite it could damage/disturb existing the infrastructure of such facilities	Negative	Short Term	Reversible	Medium	Medium	Minor	Mitigation Available	Not Significant
	Water Resources – water requirements of the Project could entail constraints on the existing resources and users.	Negative	Short Term	Reversible	Low	Low	Not significant	Additional Requirements	Not Significant
	Waste Utilities – it is important to ensure that existing utilities would be able to handle the amount of waste, wastewater and hazardous generated from the Project during the construction phase.	Negative	Short Term	Reversible	Low	Low	Not significant	Additional Requirements	Not Significant
	Telecommunication, and TV & Radio Links – Improper planning and site selection of the Project could potentially interfere with certain electromagnetic transmissions associated with telecommunications, and radio/television systems in the area.	Negative	Long- Term	Reversible	Low	High	Minor	Additional Requirements	Not Significant
	Water Dams – if planning activities are not well managed onsite it could damage/disturb existing dams.	Negative	Short Term	Reversible	Medium	Medium	Minor	Mitigation Available	Not Significant
	Dumpsite – if planning activities are not well managed onsite it could damage/disturb existing dumpsite	Negative	Long Term	Reversible	Medium	Medium	Minor	Mitigation Available	Not Significant
Occupational Health and Safety	There will be some generic risks to workers health and safety from working on construction sites, as it increases the risk of injury or death due to accidents.	Negative	Short Term	Could be Irreversible	Medium	Medium	Minor	Mitigation Available	Not Significant
Public Health and Safety	Public access of unauthorized personnel to the various Project components (turbines, substation) could result in various public safety hazards.	Negative	Long term	Could be Irreversible	Medium	High	Moderate	Mitigation Available	Not Significant
	Worker influx could result in certain community health, safety and security impacts including risk of diseases, inappropriate code of conduct by workers towards locals, increase in social vices, pressure on services etc.	Negative	Short Term	Reversible	Medium	Medium	Minor	Mitigation Available	Not Significant
	Inappropriate conduct of security personnel towards local communities could result in resentment, distrust and escalation of events	Negative	Short Term	Reversible	Medium	Medium	Minor	Mitigation Available	Not Significant

Human Rights	Inappropriate management of the workforce could entail several human right risks and violations.	Negative	Short Term	– Reversible	Medium	Medium	Minor	Mitigation Available	Not Significant
Socio-economic Development	The Project is expected at a minimum to provide job opportunities for local communities. This, to some extent, could contribute to enhancing the living environment for its inhabitants, elevate their standards of living, and bring social and economic prosperity to local communities.	Positive	Not applicable.						

Table 86: Summary of Anticipated Impacts during Operation

Attribute / Issue	Likely Impact – Operational Phase	Impact Assessment									
		Nature		Duration	Reversibility		Magnitude	Sensitivity	Significance	Management Action	Residual Significance
Landscape and Visual	Visual impacts concern the turbines themselves (e.g. colour, height, and number of turbines) relating to their interaction with the character of the surrounding landscape.	Could be Negative or Positive	Long Term	–	Reversible		Medium	Low	Minor	No mitigation required	Not significant
Geology, Hydrology and Hydrogeology	Risk of soil and groundwater contamination during the various operational activities from improper housekeeping activities, spillage of hazardous material, random discharge of waste and wastewater.	Negative	Long Term	–	Could be irreversible		Medium	Low	Minor	Mitigation available	Not significant
Biodiversity	Improper management of operation activities could disturb/damage habitats and fauna.	Negative	Long Term	–	Could be irreversible		Medium	Low	Minor	Mitigation Available	Not Significant
Avi-Fauna (Birds)	Wind turbines are associated with impacts on birds from risks of collision on both migratory and resident soaring birds. Such impacts depend on several factors but could affect the population levels of certain species especially those with international/national critical conservation status.	Negative	Long Term	–	Could be irreversible		Medium	High	Moderate	Mitigation Available	Minor
Bats	The potential impacts from the Project during operation are mainly related to risk of bat collisions with rotors of the operating wind turbines.	Negative	Long Term	–	Could be irreversible		Medium	Low	Minor	Mitigation Available / Additional Studies	Not Significant
Infrastructure and Utilities	Water Resources – water requirements of the Project could entail constraints on the existing resources and users.	Negative	Long Term	-	Reversible		Low	Low	Not significant	Additional Requirements	Not Significant
	Waste Utilities – it is important to ensure that existing utilities would be able to handle the amount of waste, wastewater and hazardous generated from the Project during the construction phase.	Negative	Long Term	–	Reversible		Low	Low	Not significant	Additional Requirements	Not Significant
Occupational Health and Safety	There will be some risks to workers health and safety during the operation and maintenance activities of the Project.	Negative	Long Term	–	Could be irreversible		Medium	Medium	Minor	Mitigation Available	Not Significant
Public Health and Safety	Operating wind turbines will produce noise from mechanical and aerodynamic effects. This could be a source of disturbance and nuisance to the receptors and could create a disturbing indoor environment.	There are no anticipated impacts.								No additional requirements	Not relevant
	Operating wind turbines will produce shadow flicker which could be a source of disturbance and nuisance to the receptors and could create a disturbing indoor environment.	There are no anticipated impacts.								No additional requirements.	Not relevant
	Public access of unauthorized personnel to the various Project components (turbines, substation) could result in various public safety hazards.	Negative	Long term	–	Could be Irreversible		Medium	High	Moderate	Mitigation Available	Minor
	Inappropriate conduct of security personnel towards local communities could result in resentment, distrust and escalation of events	Negative	Short-term		Reversible		Medium	Medium	Minor	Mitigation Available	Not Significant
	Blade or tower glint can impact sensitive receptors as the reflection of sunlight off the rotor blade may be angled toward nearby receptors.	Negative	Short Term	–	Reversible		Low	Low	Not Significant	Mitigation available	Not Significant
	Failure in rotor blade can result in the ‘throwing’ of the blade. Although overall risk of such events is extremely low, it could affect the public safety of nearby receptors.	Negative	Long term	–	Could be Irreversible		Low	Low	Not Significant	Mitigation Available	Not Significant
Human Rights	Inappropriate management of the workforce could entail several human right risks and violations.	Negative	Long Term	–	Reversible		Medium	Medium	Minor	Mitigation Available	Not Significant
Socio-economic Development	The Project is expected at a minimum to provide job opportunities for local communities. This, to some extent, could contribute to enhancing the living environment for its inhabitants, elevate their standards of living, and bring social and economic prosperity to local communities.	Positive	Not applicable								

### 8.17 Assessment of Cumulative Impacts

A standalone Cumulative Effects Assessment (CEA) covering biodiversity has been prepared for this Project in accordance with lender requirements. As such, detailed assessment of cumulative impacts is not repeated within this section.

In addition, a Strategic Environmental and Social Assessment – Cumulative Impact Assessment (SESA-CIA) for the Gulf of Suez renewable energy sector is currently under development, with completion expected by the end of 2026. This study is intended to assess cumulative environmental and social sensitivities at a regional level, including large-scale renewable energy development and associated pressures, particularly in relation to biodiversity receptors such as migratory bird species. This study will provide additional regional context to cumulative impact considerations relevant to the Project.

This section provides an assessment of cumulative impacts covering other aspects, mainly based on the outcomes of the 2013 Strategic ESIA. The table below provides the key outcomes of the Strategic ESIA for each attribute, key outcomes of the project-specific ESIA and key additional requirements to be considered.

**Table 87: Assessment of Cumulative Impacts**

E&S Attributes	Outcomes of Strategic ESIA	Outcomes of Project Specific ESIA	Additional Requirements
Landscape and Visual	Key outcome of the Strategic ESIA is related to visibility of the turbines during operation. The Strategic ESIA concludes that due to absence of people living in the area and very few passengers passing through the area, such issues are not considered to be important. No additional requirements have been identified in the Strategic ESIA.	Key impact is related to visibility of the turbines during operation. No key issues of concern given that no key sensitive visual receptors which are anticipated to be impacted from the Project during operation were identified.	No additional requirements to be considered
Land Use	Key outcome is that the Strategic ESIA area is uninhabited and unutilized; therefore, there are no land use impacts related to physical or economical displacement. No additional requirements have been identified in the Strategic ESIA.	Key outcome is that Project site is uninhabited and vacant. However, Bedouins apply a type of customary ownership on the area known as Urfi Contracts and Ghafra System.	Site-specific mitigation and monitoring requirement. Refer to “Section 8.3”.
Geology, Hydrology, Hydrogeology	Key outcome of the Strategic ESIA is recommendation to avoid placing turbines within the beds of major wadi systems where there could be flood risks. In addition, the Strategic ESIA calls for earth roads crossing wadi beds to be built at the same level as the wadi bed to minimize serious damage in the event of flash floods and to avoid creating a bottleneck for discharge. In addition, the Strategic ESIA requires routine measures for waste management during construction and operation.	Preliminary Flood risk assessment was undertaken for the Project site which identifies recommendation to be considered for the detailed design of the Project.  There are routine impacts during construction and operation from improper waste management.	Site-specific mitigation and monitoring requirement for flood risks (refer to Section 8.4).  Site-specific mitigation and monitoring requirement for waste management (refer to Section 8.4).
Archaeology and Cultural Heritage	There are no archaeological and cultural heritage sites within the Strategic ESIA studied area. No additional requirements have been identified for site-specific ESIA’s or for developers.	There are no site-specific archaeology or cultural heritage remains. Therefore, there are no anticipated impacts during construction. There is routine chance find	Site-specific mitigation and monitoring requirement. Refer to “Section 8.8”.

		impacts related to the construction phase.	
Air Quality and Noise	Key outcome is that there are no key issues of concern identified within Strategic ESIA studied area due to absence of sensitive receptors which could be affected by air quality and dust during construction phase.	Site specific survey did not identify any key issues of concern.	Site-specific mitigation and monitoring requirement. Refer to "Section 8.9".
Infrastructure and Utilities	Several infrastructure and utility elements were noted within the Strategic ESIA to include roads, electricity lines, oil exploitation facilities, military posts and other (no key issues of concern identified). Additionally, a waste dumpsite is identified to be within the Strategic ESIA area which requires removal.	Several infrastructure and utility elements have been identified to include waste dumpsite, dam, electricity lines, roads, petroleum facilities, and other which require proper management measures.	Site-specific mitigation and monitoring requirement. Refer to "Section 8.10".
Occupational Health and Safety	No key issues of concern are noted. There are routine impacts during construction and operation on occupational health and safety and the Strategic ESIA identifies additional relevant measures to control such impacts.	No key issues of concern are noted. There are routine impacts during construction and operation on occupational health and safety.	Site-specific mitigation and monitoring requirement. Refer to "Section 8.11".
Public Health and Safety	Key issues include noise and shadow flicker. The Strategic ESIA concludes that due to large distance from any nearby settlement, there are no impacts related to noise and shadow flicker during operation of turbines. No additional requirements are identified in the Strategic ESIA.	Shadow flicker is covered in "Section 8.12.2". As for the noise effect, refer to "Section 8.17.2".	Site-specific mitigation and monitoring requirement for other public health and safety concerns. Refer to "Section 8.12".
Socio-economics	Impacts anticipated are positive in nature.	Impacts anticipated are positive in nature.	Project specific recommendations to enhance positive impacts have been provided. Refer to "Section 8.13".

### 8.17.1 Cumulative Noise Effect from All Wind Farms in the Region

There are four existing wind farms as well as and one additional proposed wind farm present in the surrounding area of the proposed Project location. Therefore, even during the screening assessment as undertaken in "Section 8.12", the assessment should consider all wind turbine noise emissions that have the potential to increase noise levels at noise sensitive receptors.

The key wind farms that could result in cumulative impacts are summarized below.

#### Amunet Wind Farm

Two potential wind farm designs were considered for this Project. For the purpose of the cumulative assessment, the worst-case scenario design has been used in the model. The table below details the basic specifications.

**Table 88: Amunet Wind Farm - Gamesa SG 2.9-114 CS Wind Turbine Generator Specification**

Manufacturer	GAMESA
Model Type	2.9-114
Rated Power	2,900 kW

Rotor Diameter	114 m
Hub Height	63 m
Tower Type	Conical Steel Barrel Tube
Blade Type	Siemens Gamesa – Fibreglass reinforced with epoxy or polyester resin
Generator Type	Doubly-fed induction machine

### Lekela Wind Farm

This project consists of 96 wind turbine generators, each of which also houses a Gamesa SG 2.6-114 IA wind turbine. The table below details the basic specifications.

**Table 89: Lekela Wind Farm - Gamesa SG 2.6-114 CS Wind Turbine Generator Specification**

Manufacturer	GAMESA
Model Type	2.6-114
Rated Power	2,625 kW
Rotor Diameter	114 m
Hub Height	63 m
Tower Type	Conical Steel Barrel Tube
Blade Type	Siemens Gamesa – Fibreglass reinforced with epoxy or polyester resin
Generator Type	Doubly-fed induction machine

### RGWE 250MW Wind Farm

This project consists of 125 wind turbine generators, each of which houses a G97- 2.1 MW max power wind turbine. The table below details the basic specifications.

**Table 90: RGWE 250MW Wind Farm - G97- 2.1MW MaxPower Wind Turbine Generator Specification**

Manufacturer	GAMESA
Model Type	G97-2.1
Rated Power	2,100 kW
Rotor Diameter	97 m
Hub Height	71.5 m
Tower Type	Conical Steel Barrel Tube
Blade Type	Full blade feathering with 3 pitch cylinders
Generator Type	Doubly-fed with coil rotor and slip rings

### RSWE 500MW Wind Farm

This project consists of 191 wind turbine generators, each of which houses a Gamesa SG 2.6-114 IA wind turbine. The table below details the basic specifications.

**Table 91: RSWE 500MW Wind Farm - Gamesa SG 2.6-114 Wind Turbine Generator Specification**

Manufacturer	GAMESA
Model Type	2.6-114
Rated Power	2,625 kW
Rotor Diameter	114 m
Hub Height	63 m
Tower Type	Conical Steel Barrel Tube
Blade Type	Siemens Gamesa – Fibreglass reinforced with epoxy or polyester resin
Generator Type	Doubly-fed induction machine



### Infinity Wind Farm

This proposed project consists of 67 wind turbine generators, each of which houses a Goldwind GW110- 3.0MW wind turbine. The table below details the basic specifications.

**Table 92: Infinity Wind Farm - Gamesa SG 2.6-114 Wind Turbine Generator Specification**

Manufacturer	Goldwind
Model Type	110-3.0
Rated Power	3,000 kW
Rotor Diameter	110 m
Hub Height	65 m

### **8.17.2 Results of Cumulative Noise Effect from All Wind Farms in the Region**

Noise contour maps for the worst-case noise scenario have been calculated for the cumulative assessments and is presented in the figure below. The map shows noise contour lines as well as the noise contour limit line of 35 dB(A).

As noted in the figure below, cumulatively the results of the preliminary model undertaken indicate that the nearest NSR (Ras Ghareb City) exceeds the limit of LA90 of 35 decibels (dB) (A) at a wind speed of 10 meters/second (m/s) at 10 m. Based on the results of the noise contour map the predicted contribution noise level cumulatively at 10 m/s has been estimated at 36.2 dB(A).

However, the IFC EHS Guidelines on Wind Energy recommends that modelling should focus on sensitive receptors within 2 km of the nearest wind turbine. Ras Ghareb is located 6 km from the Project site which is three times the distance that the IFC recommends. In addition, Ras Ghareb is located in a suburb siting and within a junction of two main highways (Highway 65 and El-Shaikh Fadel). With the above taken into consideration, the noise from the wind turbines is highly unlikely to be audible above the background noise level at this location. Therefore, a detailed wind farm noise study may not be required.

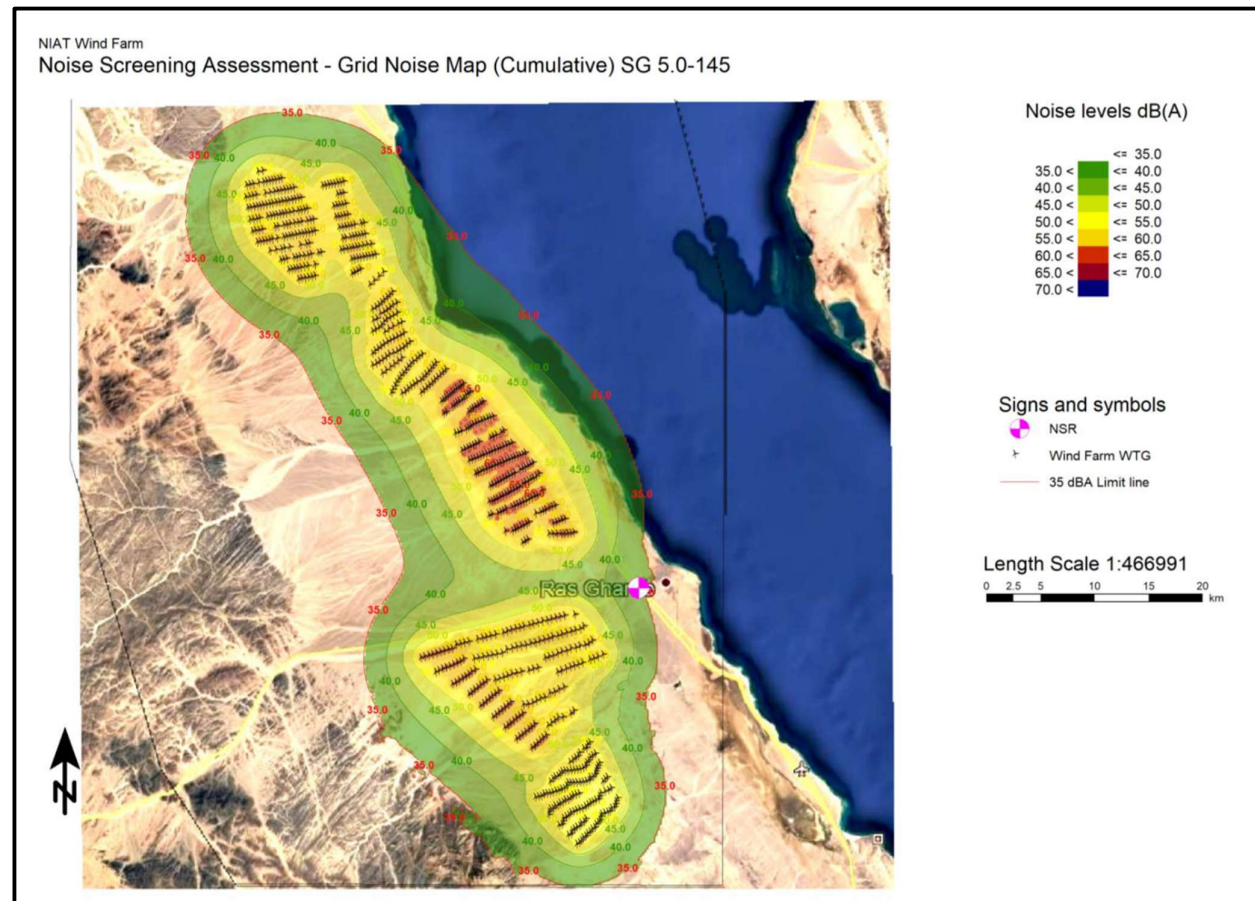


Figure 116: Noise Contour Map for Cumulative Wind Farms Layout

## 9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

### 9.1 Institutional Framework and Procedure Arrangements for ESMP Implementation

Generally, two main pillars govern the successful implementation of any ESMP as well as the Health, Safety, Security and Environment Management System (HSSE-MS) for the project that will be developed at a later stage (as discussed in further details below). These pillars include:

1. Proper identification of roles and responsibilities for the entities involved; and
2. Effective control of the process.

All management practices are interlinked, and this section describes how these two-pillar criteria could be fulfilled, which in turn helps ensure that the overall objectives are met.

#### Staffing Requirements

Defining roles and responsibilities of the involved entities identifies where and when each entity should be engaged, their degree of involvement, and the tasks expected of the entity. This in turn eliminates any overlap of jurisdiction or authority and ensures proper communication and effective management of ESMP and HSSE-MS components.

The table below identifies the staffing requirements that are expected for the Project. This should be expanded further in the HSSE Manual that is required as part of the HSSE-MS (as discussed in further details below). This should include an organisational structure that identifies the lines of authority and roles and responsibilities of all involved entities.

**Table 93: Roles and Responsibilities of Entities Involved in ESMP**

Project Role	Entity	Responsibilities	Staffing Requirements
Project Developer	SPV for NIAT Wind Energy and SPV Alcazar Rasgha for Energy	<ul style="list-style-type: none"> <li>Implement mitigation and monitoring requirements as applicable for such entity as detailed in the ESMP; and</li> <li>Ensure overall compliance of Contractors and Project Operators with the requirements of the ESMP and HSSE MS.</li> </ul>	<ul style="list-style-type: none"> <li>Appoint competent Health, Safety, Security and Environment (HSSE) Manager or as part of Third-Party Employer representative (e.g. Owner's Engineer)</li> <li>Appoint a Community Liaison Officer (CLO)</li> </ul>
OEM and BOP Contractors	OEM: SGRE BOP Contractor: TBD	<ul style="list-style-type: none"> <li>Appoint a competent HSSE team.</li> <li>Implement mitigation and monitoring requirements as detailed in the ESMP and HSSE MS requirements;</li> </ul>	<ul style="list-style-type: none"> <li>For Project nature and duration, this is expected to include at a minimum full-time and onsite HSSE Manager and 1 HSSE officers for every 100 workers.</li> <li>Environmental and Social Manager/Specialist</li> </ul>
Project Operators	TBD	<ul style="list-style-type: none"> <li>Appoint a competent HSSE team.</li> <li>Implement mitigation and monitoring requirements as detailed in the ESMP and HSSE MS requirements;</li> </ul>	<ul style="list-style-type: none"> <li>For Project nature and duration, this is expected to include HSSE Manager (which is required to be full-time onsite at all times)</li> <li>Environmental and Social Manager/Specialist</li> </ul>
EEAA	Granting environmental clearance to the Project	Undertake compliance monitoring as per environmental legislations	N/A

### **Training and Awareness**

An HSSE training plan must be developed and maintained onsite which identifies the type of training that is required for each worker onsite. In addition, signed attendance sheets and training material must be maintained onsite at all times. This should be completed by the contractors and Project Operators as applicable.

Training should include the following as applicable and as highlighted in the table that follows.

- Basic visitor HSSE induction training
- Worker HSSE induction training for all workers onsite, including all contractor and subcontractor workers. This should include OHS issues (e.g. use of PPE, PTW system etc.), environmental (e.g. waste management, pollution prevention, resource efficiency, etc.), and social issues (e.g. labour code of conduct, grievance mechanism, etc.)
- Emergency response training for all workers onsite including all contractor and subcontractor workers
- Specialized training: there are other specific training requirements that must be adhered to. Those are related to specific topics as applicable. This includes for example specific training for working at height, electrical works, etc.
- Tool Box Talks (TBT): regular TBT meetings must be undertaken.

Training	Contractors	Project Operators
Basic visitor HSSE induction training	✓	✓
Worker HSSE induction training	✓	✓
Emergency response training	✓	✓
Specialized training	✓	✓
Tool Box Talks (TBT)	✓	✓

### **Inspection and Monitoring**

HSSE inspection and monitoring must be undertaken to ensure compliance of involved entities with the mitigation and monitoring requirements as detailed in the ESMP and HSSE-MS requirements. This should be completed by the Developer, contractors, and Project Operators as applicable.

Inspection and monitoring should include the following as applicable and as highlighted in the table that follows.

- Daily HSSE inspection and monitoring at the site and preparation of a daily observation report stating therein the corrective measures on observed gaps, unsafe acts and conditions.
- Weekly site inspections to be carried out using a weekly site inspection checklists template based on requirements of the ESMP and HSSE-MS
- HSSE Audits to be undertaken by Developer on contractors to ensure compliance with ESMP requirements and HSSE-MS. The frequency of HSSE audits during construction and operations should be identified in the project's HSSE-MS

Inspection and Monitoring	Developer	Contractors	Project Operators
Daily HSSE Inspection and Monitoring		✓	
Weekly Site Inspections		✓	✓
HSSE Audits	✓		

### **Meetings**

Regular HSSE meetings must be undertaken to discuss HSSE performance onsite, outstanding issues, key issues of concern and other as applicable. Signed attendance sheets and Minutes of Meeting (MoM) must be maintained onsite at all times. This should be completed by the Developer, Contractors, and Project Operators as applicable.

Meetings may include the following as applicable and as highlighted in the table that follows.

- Weekly HSSE meetings
- Monthly HSSE meeting
- Quarterly management HSSE reviews

Meetings	Developer	Contractors	Project Operators
Weekly HSSE Meetings		✓	✓
Monthly HSSE Meeting	✓	✓	✓
Quarterly Management HSSE reviews	✓	✓	✓

### **Reporting**

HSSE reporting will be required to summarize the following:

- Progress in implementing the ESMP and HSSE MS plans as required
- Findings of the monitoring programs, with emphasis on any breaches of the control standards, action levels or standards of general site management
- Outstanding incident report forms
- Relevant changes or possible changes in legislation, regulations and international practices
- Reporting on Key Performance Indicators (KPI).
- Grievances
- Security incidents

Reporting should be submitted to the Developer as applicable by the relevant entities as identified below.

Reporting	Contractors	Project Operators
Reporting	Monthly	Monthly

## **9.2 Environmental, Health, Safety and Social Management System (HSSE-MS)**

The ESIA is considered a key document in assessing and managing environmental and social risks related to the Project. The key output of the ESIA is the ESMP which aims to provide high level mitigations and requirements for managing the environmental and social risks anticipated from the Project.

Throughout the Project's construction and operation phases an HSSE-MS must be implemented by the contractors and all subcontractors as relevant to their scopes, with oversight from the developer. The HSSE-MS must be project and site specific and must build on and take into account the requirements of this ESMP. The development and implementation of an HSSE-MS is considered a key requirement under IFC PS1, EBRD ESR1, and EIB ESS1. In addition, the HSSE-MS must be in line with the all other IFC PSs, EBRD ESRs and EIB ESSs.



Summarised below is the overall framework, structure and key requirements for the HSSE-MS for the key entities involved in the Project.

**Developer**

- Project policies: (i) Environmental Policy; (ii) Social Policy; and (iii) Human Resources
- Stakeholder Engagement Plan (SEP)
- Community Grievance Mechanism
- Active Turbine Management Plan (ATMP)

**Construction Contractors**

- HSSE-MS Manual that should include: (i) (ii) HSSE Organizational Structure and Responsibilities; (iii) HSSE Training Plan; (iv) Monitoring and Reporting Plan; and (v) labour code of conduct
- Water Management Plan
- Waste and Wastewater Management Plan
- Soil and groundwater Management Plan
- Air Quality and Noise Management Plan
- Traffic and Transport Management Plan
- Training Management Plan
- Community Health and Safety (H&S) and Worker Influx Plan
- Occupational Health and Safety Plan
- Emergency Preparedness and Response Plan
- Hazardous Material Management Plan
- Biodiversity Management Plan
- Security Management Plan
- Archaeological and Cultural Heritage Chance Find Procedures
- Worker Grievance Mechanism
- Human Resources Management Plan
- Employment and Procurement Management Plan
- Worker Accommodation Plan

**Project Operators**

- HSSE-MS Manual that should include: (i) (ii) HSSE Organizational Structure and Responsibilities; (iii) HSSE Training Plan; (iv) Monitoring and Reporting Plan; and (v) labour code of conduct
- Water Management Plan
- Waste and Wastewater Management Plan
- Noise Management Plan

- Occupational Health and Safety Plan
- Emergency Preparedness and Response Plan
- Security Management Plan
- Recruitment and Procurement Procedure
- Hazardous Material Management Plan
- Biodiversity Management Plan
- Employment and Procurement Management Plan
- Training Management Plan

### 9.3 Compilation of Environmental and Social Management Plan (ESMP)

The tables below present the ESMP for the: (i) planning and construction, and (ii) operation phase respectively. They include the following:

- The environmental attribute (e.g. air quality) that is likely to be impacted;
- A summary of the potential impact and/or likely issue;
- The identified management measures that aim to eliminate and/or reduce the potential impact to acceptable levels. Management measures include mitigation actions, further requirements, additional studies, etc.;
- Monitoring actions to ensure that the identified mitigation measures are implemented. Monitoring actions include: inspections, review of reports/plans, reporting, etc.;
- The frequency for implementing the monitoring actions, which include: once, continuously throughout the construction/operation period (depending on the mitigation measure identified this could include daily, weekly, or monthly), or upon occurrence of a certain issue;
- Parameters and location of monitoring actions as identified and applicable; and

Responsible entity for implementing the mitigation measures and monitoring actions identified.

Table 94: ESMP for the Planning and Construction Phase

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
Landscape and Visual	Visual and landscape impacts due to presence of elements typical of a construction site such as equipment and machinery.	Ensure proper general housekeeping and personnel management measures are implemented which could include: (i) ensure the construction site is left in an orderly state at the end of each work day; (ii) to the greatest extent possible construction machinery, equipment, and vehicles that are not in use should be removed in a timely manner and kept in locations to reduce visual impacts to the area.	Mitigation	Visual inspections	At construction active areas	Daily / Weekly	Contractor
Land Use	There are several informal land uses onsite which if improperly managed could result in potential conflicts and disputes. This includes the Ghafra system of the Bedouin groups and existing petroleum facilities within the area.	Establish coordination with the Bedouin Groups for inclusion and engagement in employment and procurement opportunities	Additional requirement	Submit agreement with Bedouin groups	Not applicable	Once before commencement of construction	Developer
Geology, Hydrology and hydrogeology	Flood Risks	Ensure that no Project components should be developed within the dam area located within the Project site and which includes the dam, artificial lake area and the incision area preceding the lake area. (Area A)	Mitigation	Implementation	Not applicable	Prior construction to	Developer
		Protection measures need to be identified by the Civil/Design Engineer along with their specifications regarding the areas that are considered as the main trunk streams, where rain water collects from a number of large tributaries scattered around them and therefore the surface run-off in them is slightly larger than the surrounding areas (Area B). This could include for example: (i) simple concrete fences for turbines, substation, buildings, etc. similar to those included within the existing nearby structures (e.g. telecom towers, OHTL towers, etc.) (ii) appropriate foundations for turbine structures; (iii) culverts for asphalt roads; (iv) insulation for underground cables; and other.	Mitigation	Implementation	Not applicable	Prior construction to	Developer
	Solid waste management	Coordinate with Ras Ghareb City Council for the collection of solid waste from the site to the municipal approved landfill (the closest being Ras Ghareb Landfill)	Mitigation	Submit contract	Not applicable	Once before commencement of construction	Contractor
		Prohibit fly-dumping of any solid waste to the land	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste"	Mitigation	Visual inspections	At construction active areas	Once before commencement of construction	
		Distribute a sufficient number of properly contained containers clearly marked as "Construction Waste" for the dumping and disposal of construction waste	Mitigation	Visual inspections	At construction active areas	Once before commencement of construction	
		Implement proper housekeeping practices on the construction site at all times	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill	Mitigation	Submit manifests	Not applicable	Throughout construction period	
	Wastewater management	Coordinate with Ras Ghareb Water and Wastewater Company to hire a private contractor for the collection of wastewater from the site to the closest WWTP	Mitigation	Submit contract	Not applicable	Once before commencement of construction	Contractor
		Prohibit illegal disposal of wastewater to the land or sea	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Ensure that constructed septic tanks during construction and those to be used during operation are well contained and impermeable to prevent leakage of wastewater into soil	Mitigation	Visual inspections	At applicable area	Once before commencement of construction	
		Ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing	Mitigation	Visual inspection	At applicable area	Daily/weekly	

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
		Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP	Mitigation	Submit manifests	Not applicable	Throughout construction period	
	Hazardous Waste Management	Hire approved private contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities	Mitigation	Submit contract	Not applicable	Once before commencement of construction	Contractor
		Ensure that hazardous waste is disposed in a dedicated area that is enclosed, of hard surface, with proper signage and suitable containers as per hazardous waste classifications and that they are labelled for each type of hazardous waste	Mitigation	Visual inspections	At applicable area	Once before commencement of construction	
		Ensure hazardous waste storage area is equipped with spill kit, fire extinguisher and anti-spillage trays and a hazardous waste inventory is available	Mitigation	Visual inspections	At applicable area	Daily / weekly	
		Prohibit illegal disposal of hazardous waste in unlicensed facilities/areas	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Ensure all workers handling hazardous waste are equipped with the necessary personal protective equipment	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous waste disposal facilities	Mitigation	Submit manifests	Not applicable	Throughout construction period	
	Hazardous material management	Ensure that hazardous materials are stored in an area that is of hard impermeable surface, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another	Mitigation	Visual inspections	At applicable area	Once before commencement of construction	Contractor
		Maintain a register of all hazardous materials used and accompanying MSDS must present at all times. Spilled material should be tracked and accounted for in the registers	Mitigation	Visual inspections	At applicable area	Daily / weekly	
		Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.)	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refuelling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Ensure that hazardous materials warehouses are equipped with emergency eye wash and/or emergency shower, first aid kits, as well as fire extinguishers, based on type of material stored	Mitigation	Visual inspections	At applicable area	Throughout construction period	
		Ensure that all workers handling hazardous materials or working at the warehouses are equipped with the necessary personal protective equipment based on information provided in materials' SDSs and risk assessments	Mitigation	Visual inspections	At applicable area	Throughout construction period	
		Ensure that a minimum of 1,000 liters of general-purpose spill absorbent is available at hazardous material storage facility.	Mitigation	Visual inspections	At applicable area	Daily / weekly	
		If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste	Mitigation	Visual inspection	At applicable area	Upon occurrence	
	Erosion and runoff management	Avoid executing excavation works under harsh weather conditions	Mitigation	Visual inspections	At construction active areas	Upon occurrence	Contractor
		Place clear markers indicating stockpiling area of excavated materials to restrict equipment and personnel movement, thus	Mitigation	Visual inspections	At construction active areas	Daily / weekly	

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
		limiting the physical disturbance to land and soils in adjacent areas					
		Erect erosion control barriers around work site during site preparation and construction to prevent silt runoff where applicable	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Reinstate surfaces disturbed during construction to their original (or better) condition to the greatest extent possible	Mitigation	Visual inspections	At construction active areas	Upon occurrence	
Biodiversity	Construction activities would disturb existing habitats (flora and fauna). In addition, other impacts could be from improper management of the site (e.g. improper conduct and housekeeping practices).	Undertake a detailed Egyptian Dabb Lizard survey through a biodiversity expert. The survey should focus on all construction activities areas and in particular the Wadi systems where such a species is likely to be located. Should burrows and/or records of this species be identified, relocation activities should be undertaken to nearby similar habitats.	Additional Survey	Submission of report	Prior to construction	Once; before construction	Contractor
		Implement proper housekeeping practices on the construction site at all times	Mitigation	Visual inspections	At construction active areas	Daily / weekly	Contractor
Birds (avi-fauna)	Construction activities could disturb existing habitats of birds breeding and/or nesting within the Project site.	Implement proper housekeeping practices on the construction site at all times to reduce impacts including: <ul style="list-style-type: none"> <li>- Restrict activities exclusively to the allocated construction areas, including movement of workers and vehicles to allocated roads within the site, prohibiting off-roading to minimize disturbances.</li> <li>- Ban hunting of birds on site at any time and under any condition to anyone, especially workers.</li> <li>- Implement measures, preventing bird attraction to the site. This includes measures such as prohibiting littering, dumping, and ensuring waste streams are disposed appropriately in accordance with the measures identified in earlier chapters.</li> <li>- Avoid unnecessary elevated noise levels at all times. In addition, apply adequate noise abatement measures. This could include the use of well-maintained mufflers and suppressants for high noise generating equipment and machinery. Develop a regular maintenance schedule of vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.</li> <li>- Reduced speed limits inside the footprint to avoid road kills and dust.</li> <li>- Report any incidental finding and killing of wildlife. Develop a protocol to report dispose of any dead and injured wildlife or animals recorded onsite.</li> </ul>	Mitigation	Visual inspections	At construction active areas	Daily / weekly	Contractor
Archaeology and Cultural Heritage	Improper management of construction activities could disturb/damage archaeological remains which could be buried in the ground (if any).	As required by the SCA, during excavation activities, SCA must be notified to check if they will provide any observers to oversee the process and ensure that no underground archaeological remains of importance are unearthed and/or disturbed	Mitigation	Submission of evidence of communication with SCA	Not applicable	Prior to construction	Contractor
		If potential archaeological remains in the ground are discovered, appropriate measures for such chance find procedures are implemented. Those mainly require that construction activities be halted and the area fenced along with proper signage, while immediately notifying the Ministry of Tourism and Antiquities/Red Sea and Suez Antiquities Inspection Office. No additional work will be allowed before the Ministry/Inspection Office assesses the found potential archaeological site and grants a clearance to resume the work. Construction activities can	Mitigation	Visual inspections and submittal of chance find report	At applicable area	Upon occurrence	Contractor



Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
		continue at other parts of the site if no potential archaeological remains were found. If found, same procedures above apply					
Air Quality and Noise	Construction activities will likely result in an increased level of dust, particulate matter and pollutant emissions as well as noise which in turn will directly impact ambient air quality and noise levels.	If dust or pollutant emissions were found to be excessive due to construction activities, the source of such emissions should be identified and adequate control measures must be implemented (as identified below)	Mitigation	Visual inspections	At construction active areas and other receptors to include nearby petroleum activities and internal road networks	Upon occurrence	Contractor
		Comply with the Occupational Safety and Health Administration (OSHA) requirements and the Egyptian Codes to ensure that for activities associated with high dust and noise levels, workers are equipped with proper Personal Protective Equipment	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Apply basic dust control and suppression measures which could include: (i) regular watering of roads for dust suppression; (ii) proper planning of dust causing activities to take place simultaneously in order to reduce the dust incidents over the construction period; (iii) proper management of stockpiles and excavated material (e.g. watering, containment, covering, bundling); (iv) proper covering of trucks transporting aggregates and fine materials (e.g. through the use of tarpaulin); and (v) adhering to a speed limit of 15km/h for trucks on the construction site.	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Develop a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment to be used throughout the construction phase for early detection of issue to avoid unnecessary pollutant and noise emissions	Mitigation	Submission of maintenance program	Not applicable	Monthly	
		If noise levels were found to be excessive from construction activities, the source of such excessive noise levels should be identified and adequate control measures must be implemented	Mitigation	Visual inspections	At construction active areas and other receptors to include petroleum storage facilities	Upon occurrence	
		Apply adequate general noise suppressing measures. This could include the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery, developing a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
Infrastructure and Utilities	Traffic and transport management	Develop a Traffic and Transport Plan to ensure transportation process of turbine components does not pose a risk of damage to the existing roads, highways, overpasses whilst ensuring public safety. The Plan must analyse and study the entire route for transportation of the Project components from the port till the Project site. The study must investigate any constraints which need to be considered along the highways leading to the Project site such as bridges, overhead utility cables, slants in roads, etc. and identify accommodations which need to be taken into account.	Additional study	Submission of Traffic and Transport Plan and approval from local authorities	Not applicable	Once before commencement of construction	Contractor
		Establish coordination with relevant entities to take into account any specific requirements that should be considered and ensure they are aware of the transportation requirements and details related to the Project.	Additional requirement	Submit formal communication letter (or similar) with relevant entity	Not applicable	Once before commencement of construction	Developer
	Civil and Military Aviation	Establish coordination with NREA to ensure that the clearance that has been provided by the Ministry of Defence for the area includes in particular approvals from civil and military aviation entities. In addition, based on the that adhere to any specific navigational safety requirements (e.g. navigational lights, blade paintings, etc.)	Additional requirement	Submit of formal non-objection letter (or similar) with relevant entity	Not applicable	Once before commencement of construction	Developer

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
	Improper planning and design of project could affect electricity lines and pylons within Project area.	Establish coordination with EETC to discuss and determine any specific requirements to be taken into account for the established electricity networks (e.g. avoidance of such areas, buffer distances to be considered, etc.)	Additional requirement	Submit formal communication letter (or similar) with relevant entity	Not applicable	Once before commencement of construction	Developer
	Improper planning and design of project could affect petroleum facilities	Establish coordination via NREA/EETC with General Petroleum Company to discuss and determine any specific requirements to be taken into account for the pipeline (e.g. avoidance of such areas, buffer distances to be considered, etc.)	Additional requirement	Submit formal communication letter (or similar) with relevant entity	Not applicable	Once before commencement of construction	Developer
	Water resources management	Coordinate with the Ras Ghareb Water and Wastewater Company to sector the water requirements of the Project	Additional requirement	Submit formal communication letter (or similar) with Ras Ghareb Water Company	Not applicable	Once before commencement of construction	Contractor
	Waste utilities	Undertake the following: (i) coordinate with the Ras Ghareb Water and Wastewater Company and obtain list of authorized contractors for collection of wastewater from the site; (ii) coordinate with the Ras Ghareb City Council to hire a competent private contractor for the collection of solid waste from the site; and (iii) obtain list of authorized contractors for collection of hazardous waste from the site	Additional requirement	Submit formal communication letter with relevant entities	Not applicable	Once before commencement of construction	Contractor
	Telecommunication and TV/Radio management	Establish coordination via NREA with NTRA to provide information on the Project (to include location and specifications of turbines in specific) and include any specific requirements to be considered as part of the detailed design to include setback distances if required for telecommunication, infrastructure (e.g. from LoS connections)	Additional requirement	Submit formal communication letter with relevant entities	Not applicable	Once before commencement of construction	Developer
	Improper planning and design of project could affect dams	Consider the following requirements in project design: (i) any construction work should be avoided in the areas behind and in front of the dam, because these areas are the most vulnerable to flood risks; and (ii) a minimum distance of 20 m on the right side and the left side of the dam must be avoided for the maintenance works of the dam and its artificial lake.	Additional requirement	Submit formal communication letter (or similar) with relevant entity	Not applicable	Once before commencement of construction	Developer
	Improper planning and design of project could affect dumpsite	Establish coordination with Ras Ghareb Local Unit to enforce dumpsite closure and relocation prior to the construction phase commencement.	Additional requirement	Submit formal and official letter stating the official closure and relocation of the dumpsite (or similar) from Ras Ghareb City Council	Not applicable	Once before commencement of construction	Developer/Contractor
Occupational Health and Safety	There will be some generic risks to workers health and safety from working on construction sites, as it increases the risk of injury or death due to accidents.	Develop and submit an Occupational Health and Safety Plan (OHSP) that is project and site specific 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 or damage property.	Additional study	Submit OHSP plan	Not applicable	Once before commencement of construction	Contractor
		Implement the OHSP, including hazard identification, risk assessment, PPE requirements, training, safety procedures, and incident reporting.	Mitigation	Site inspections and internal audits	Not applicable	Continuous	
		Develop and implement an Emergency Preparedness and Response Plan (EPRP), including trained emergency teams, procedures, drills, and coordination with external services.	Mitigation	Submission of EPRP and records of drills	Not applicable	Once prior to construction + regular updates	
		Conduct regular emergency drills and maintain emergency equipment (fire extinguishers, first aid kits, spill kits, etc.).	Monitoring	Inspection records and drill reports	Not applicable	Regular (e.g. quarterly)	
		Establish and implement a Worker Grievance Mechanism in line with the Developer's Complaints Management Procedure.	Additional Requirement	Submission of grievance records and logs	Not applicable	Continuous	
		Provide OHS training and awareness to all workers, including induction, task-specific training, and refresher sessions.	Mitigation	Training records	Not applicable	Continuous	

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
		If worker accommodation is provided, ensure compliance with national requirements and IFC/EBRD guidance on worker accommodation standards.	Mitigation	Inspection reports and compliance records	Worker Accommodation	Continuous	
		Conduct regular inspections of worker accommodation to ensure compliance with health, safety, and welfare standards.	Monitoring	Inspection reports	Worker Accommodation	Regular	
		Report all incidents, accidents, and emergencies, including corrective and preventive actions.	Monitoring	Submission of incident reports	Project site and Worker Accommodation	Continuous	
Public health and safety	Worker influx during construction may result in risks related to spread of diseases, inappropriate worker conduct, increase in social vices, and pressure on local housing, services, and infrastructure.	Develop and implement a Worker Influx Plan for the construction phase. The Plan shall include: (i) pre-employment and periodic medical examination programme; (ii) procedures to maintain hygienic conditions onsite (sanitation, washing and eating facilities); (iii) development and enforcement of a worker code of conduct addressing behaviour, cultural sensitivities, GBV, harassment, and social vices; (iv) induction training and awareness programmes on communicable diseases and hygiene; and (v) measures to manage pressure on local infrastructure, including preparation and implementation of a Worker Accommodation Plan (e.g. dedicated camps or pre-arranged housing).	Additional study	Submit worker influx plan and worker accommodation plan	Not applicable	Once before commencement of construction	Contractor
	Inappropriate management of security issues and incidents by security personnel towards local communities could result in resentment, distrust and escalation of events	Prepare a Security Management Plan that identifies appropriate measures for hiring, rules of conduct, training, equipping, and monitoring of security personnel to control and manage such issues	Additional study	Submit security management plan	Not applicable	Once before commencement of construction	Contractor
Socio-economics	The Project is expected at a minimum to provide job opportunities for local communities. This, to some extent, could contribute to enhancing the living environment for its inhabitants, elevate their standards of living, and bring social and economic prosperity	Local Recruitment Procedure: the procedure must identify the number of job opportunities targeted for local communities to include skilled and unskilled workers. Such job opportunities shall also take into account employment of local communities in the area around the project to include fresh graduate engineers, technicians, labourers, etc. In addition, the procedure must include details on how job opportunities will be announced as well as a selection process that is fair and transparent and provides equal opportunities for all including females. Local Procurement Procedure: the procedure must identify the procurement opportunities targeted for local communities to include for example local subcontractors, local supplies and services, cleaning services, etc. In addition, the procedure must include details on how procurement opportunities will be announced as well as a selection process that is fair and transparent and provides equal opportunities for all. Social Responsibility Program: it is recommended that the Developer implement a social responsibility program which aims to benefit the local communities to the greatest extent possible. In this case, a structured approach must be developed which must identify priority development projects which could benefit local communities (e.g. based on a needs assessment if available). Based on that the social responsibility program can prioritise projects for local communities based on available budget, company vision, timeline for implementation as well as other factors.	Recommendation	Regular reporting on outcomes of Program implementation	Not applicable	Continuous	Developer/ Contractors

Table 95: ESMP for the Operation Phase

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
Geology, Hydrology and hydrogeology	Solid waste management	Coordinate with Ras Ghareb City Council for the collection of solid waste from the site to the municipal approved landfill (the closest being Ras Ghareb Landfill)	Mitigation	Submit contract	Not applicable	Once before commencement of operation	Project Operator
		Prohibit fly-dumping of any solid waste to the land	Mitigation	Visual inspections	At operational active areas	Daily / weekly	
		Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste"	Mitigation	Visual inspections	At operational active areas	Once before commencement of operation	
		Implement proper housekeeping practices onsite at all times	Mitigation	Visual inspections	At operational active areas	Daily / weekly	
		Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill	Mitigation	Submit manifests	Not applicable	Throughout operational period	
	Wastewater management	Coordinate with Ras Ghareb Water and Wastewater Company to hire a private contractor for the collection of wastewater from the site to the closest WWTP	Mitigation	Submit contract	Not applicable	Once before commencement of operation	Project Operator
		Prohibit illegal disposal of wastewater to the land or sea	Mitigation	Visual inspections	At operational active areas	Daily / weekly	
		Ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing	Mitigation	Visual inspection	At applicable area	Daily/weekly	
		Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP	Mitigation	Submit manifests	Not applicable	Throughout operational period	
	Hazardous waste management	Hire approved private contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities	Mitigation	Submit contract	Not applicable	Once before commencement of operation	Project Operator
		Ensure that hazardous waste is disposed in a dedicated area that is enclosed, of hard surface, with proper signage and suitable containers as per hazardous waste classifications and that they are labelled for each type of hazardous waste	Mitigation	Visual inspections	At applicable area	Once before commencement of operation	
		Ensure hazardous waste storage area is equipped with spill kit, fire extinguisher and anti-spillage trays and a hazardous waste inventory is available	Mitigation	Visual inspections	At applicable area	Daily / weekly	
		Ensure all workers handling hazardous waste are equipped with the necessary personal protective equipment	Mitigation	Visual inspections	At operational active areas	Daily / weekly	
		Prohibit illegal disposal of hazardous waste in unlicensed facilities/areas	Mitigation	Visual inspections	At operational active areas	Daily / weekly	
		Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste	Mitigation	Visual inspections	At operational active areas	Daily / weekly	
		Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing	Mitigation	Visual inspections	At operational active areas	Daily / weekly	
		Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous waste disposal facilities	Mitigation	Submit manifests	Not applicable	Throughout operational period	
	Hazardous material management	Ensure that hazardous materials are stored in an area that is of hard impermeable surface, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another	Mitigation	Visual inspections	At applicable area	Once before commencement of operation	Project Operator
		Maintain a register of all hazardous materials used and accompanying MSDS must present at all times. Spilled material should be tracked and accounted for in the registers	Mitigation	Visual inspections	At applicable area	Daily / weekly	
		Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.)	Mitigation	Visual inspections	At operational active areas	Daily / weekly	

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
		Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refuelling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material	Mitigation	Visual inspections	At operational active areas	Daily / weekly	
		Ensure that hazardous materials warehouses are equipped with emergency eye wash and/or emergency shower, first aid kits, as well as fire extinguishers, based on type of material stored	Mitigation	Visual inspections	At operational active areas	Throughout operational period	
		Ensure that all workers handling hazardous materials or working at the warehouses are equipped with the necessary personal protective equipment based on information provided in materials' SDSs and risk assessments	Mitigation	Visual inspections	At operational active areas	Throughout operational period	
		Ensure that a minimum of 1,000 litters of general-purpose spill absorbent is available at hazardous material storage facility.	Mitigation	Visual inspections	At applicable area	Daily / weekly	
		If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste	Mitigation	Visual inspection	At applicable area	Upon occurrence	
Biodiversity	Improper management of the site could disturb existing habitats (e.g. improper conduct and housekeeping practices).	Implement proper management measures to prevent damage to the biodiversity of the site.	Mitigation	Inspection	At applicable area	Continuous	Project Operator
		Ongoing monitoring for the Dabb Lizard sites must be undertaken during at least the first 3 years of operation. The objective of the monitoring is to ensure that the Project is not resulting in a decline of the species onsite as well as monitoring on translocated populations. Assessment report should be submitted at end of year 3 to lenders after which monitoring requirements and frequency can be determined.	Mitigation	Monitoring report at end of year 3 of operation	At operational active areas	Continuous	Developer & RCREEE
Birds (avi-fauna)	Wind turbines are associated with impacts on birds from risks of strikes and collision on both migratory soaring birds and resident soaring birds in the area. Generally, such impacts depend on several factors but could affect the population levels of certain species especially those with international/national critical conservation status.	Dumpsite must be completely closed, removed, and remediated before commencement of the construction phase of the Project. No entity is allowed to utilize this dumpsite moving forward whether officially or unofficially	Mitigation	Submit Formal Letter	At applicable area	Once	Developer & RCREEE
		Should the onsite dam store water at any stage, the Active Turbine Management Plan (ATMP) shall be updated to include additional monitoring and shutdown measures to address increased bird attraction.	Mitigation	Submit formal confirmation / closure report	At applicable area	Upon occurrence	
		Undertake a Barrier Effect Study to assess potential cumulative barrier impacts on migratory routes, if required by lenders or regulators.	Additional requirement	Submission of updated ATMP	At operational active areas	Once	
		Implement Avi-fauna Monitoring and Shutdown on Demand (SDOD) in accordance with the ATMP and Bird Migration Protocol.	Mitigation	Submission of report	At operational active areas	spring and autumn migration seasons	
		Implement Post-Construction Fatality Monitoring (PCFM) programme in line with IFC/EBRD/KfW guidelines to assess turbine-related mortality	Additional requirement	Monitoring reports and ATMP implementation records	At operational active areas	Continuous	
		Conduct routine carcass search surveys to support fatality estimation and adaptive management.	Additional requirement	Submission of seasonal monitoring reports	At operational active areas	Continuous	
Bats	The potential impacts from the Project during operation are mainly related to risk of bat strikes and collisions with rotors of the operating wind turbines.	Very limited bat activity confirmed during pre-construction acoustic survey. Nevertheless, the following monitoring measures are recommended: <ul style="list-style-type: none"> <li>- Post-construction carcass search surveys, as outlined in the wider biodiversity monitoring program (refer to Section 8.6.2), shall include bats. Surveys should be conducted at regular intervals during the first two years of operation to verify the low collision risk predicted.</li> <li>- If carcass search surveys identify bat fatalities at a rate that suggests an unanticipated level of impact, additional mitigation measures shall be determined,</li> <li>- Annual reporting on bat fatality monitoring results, with adaptive management measures implemented as required based on findings.</li> </ul>	Additional requirement	Submission of report	At operational active areas	Continuous	
Infrastructure and Utilities	Water resources management	Coordinate with the Ras Ghareb Water and Wastewater Company to sector the water requirements of the Project.	Additional requirement	Submit formal communication letter (or similar) with Ras	Not applicable	Once before commencement of construction	Project Operator



Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
				Ghareb Water Company			
	Waste utilities	Undertake the following: (i) coordinate with the Ras Ghareb Water and Wastewater Company and obtain list of authorized contractors for collection of wastewater from the site; (ii) coordinate with the Ras Ghareb City Council to hire a competent private contractor for the collection of solid waste from the site; and (iii) obtain list of authorized contractors for collection of hazardous waste from the site	Additional requirement	Submit formal communication letter with relevant entities	Not applicable	Once before commencement of construction	Project Operator
Occupational Health and Safety	There will be some generic risks to workers health and safety from working on construction sites, as it increases the risk of injury or death due to accidents.	Develop and submit an Occupational Health and Safety Plan (OHSP) that is project and site specific 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 or damage property.	Additional study	Submit OHSP plan	Not applicable	Once before commencement of construction	Project Operator
		Implement the OHSP, including hazard identification, risk assessment, PPE requirements, training, safety procedures, and incident reporting.	Mitigation	Site inspections and internal audits	Not applicable	Continuous	
		Develop and implement an Emergency Preparedness and Response Plan (EPRP), including trained emergency teams, procedures, drills, and coordination with external services.	Mitigation	Submission of EPRP and records of drills	Not applicable	Once prior to construction + regular updates	
		Conduct regular emergency drills and maintain emergency equipment (fire extinguishers, first aid kits, spill kits, etc.).	Monitoring	Inspection records and drill reports	Not applicable	Regular (e.g. quarterly)	
		Establish and implement a Worker Grievance Mechanism in line with the Developer's Complaints Management Procedure.	Additional Requirement	Submission of grievance records and logs	Not applicable	Continuous	
		Provide OHS training and awareness to all workers, including induction, task-specific training, and refresher sessions.	Mitigation	Training records	Not applicable	Continuous	
		If worker accommodation is provided, ensure compliance with national requirements and IFC/EBRD guidance on worker accommodation standards.	Mitigation	Inspection reports and compliance records	Worker Accommodation	Continuous	
		Conduct regular inspections of worker accommodation to ensure compliance with health, safety, and welfare standards.	Monitoring	Inspection reports	Worker Accommodation	Regular	
		Report all incidents, accidents, and emergencies, including corrective and preventive actions.	Monitoring	Submission of incident reports	Project site and Worker Accommodation	Continuous	
Public Health and Safety	Potential impact from Noise from Wind Turbines	<p>The predicted internal noise levels comply with the applicable internal noise criteria. Additional requirements in terms of Noise management to be implemented below:</p> <ul style="list-style-type: none"> <li>- The Developer will be required to implement a Stakeholder Engagement Plan (SEP) that includes a stakeholder grievance mechanism. The SEP is provided as a standalone document.</li> <li>- As part of the SEP and prior to the operation phase, the Developer will be required to undertake direct consultations with the residents of the sensitive receptors identified and explain in detail the noise impacts and the results and outcomes of the assessment. In addition, the Developer should also explain the stakeholder grievance mechanism.</li> <li>- In the case that the residents do submit grievances related to noise, the Developer should consider measures to eliminate such impacts could include installation of vegetative buffer, retrofit insulations, any other barriers around the property as applicable. This should be done in agreement and consultation with the residents of the property.</li> </ul>	Additional Requirements	Implement SEP and Submit grievances related to noise	Not applicable	Developer	

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
	Potential nuisance and visual disturbance from shadow flicker affecting workers and nearby sensitive receptors during operation phase.	Conduct an occupational risk assessment to confirm real-case impacts on workers, including monitoring worker presence, movement patterns, duration of exposure, and activities during peak shadow flicker periods (sunrise/sunset).	Additional Requirement	Submission of occupational risk assessment report		Once prior to operation	Developer
		Implement management measures where impacts are identified, including avoiding prolonged worker presence in affected areas during peak flicker periods, relocating or reorienting workstations where feasible, incorporating awareness into HSE briefings, and providing localised screening or shelter where required.	Additional Requirement	Site inspections and HSE records		During Operation	Contractor
		Implement a Stakeholder Engagement Plan (SEP), including a community grievance mechanism to address shadow flicker concerns.	Additional Requirement	Submission and implementation of SEP		Continuous	Developer
		Undertake direct consultations with affected sensitive receptors prior to operation to explain shadow flicker impacts, assessment outcomes, and grievance mechanism.	Additional Requirement	Records of consultation meetings		Once prior to operation	Developer
		In case of grievances from affected receptors (e.g. SR1), implement site-specific mitigation measures in agreement with residents (e.g. window blinds, vegetative buffers, physical barriers).	Additional Requirement	Submission of grievance resolution records		Upon occurrence	Developer
	Public access of unauthorized personnel to the various Project components.	A Security Risk Assessment should be developed for the Wind Farm Project and which should include some or all of the below measures, among other: (i) each turbine to be fitted with locked doors to prevent unauthorized access to the turbines; (ii) substation area to be completely fenced with concrete walls to prevent unauthorized access; (iii) onsite guards; (iv) post informative signs on the turbines and substation about public safety hazards and emergency contact information, and other as applicable	Additional study	Submit Security Risk Assessment and document evidence of implementation, such as number of patrols and locations of security posts	Not applicable	Once before commencement of operation	Project Operator
	Inappropriate management of security issues and incidents by security personnel towards local communities could result in resentment, distrust and escalation of events	Prepare a Security Management Plan that identifies appropriate measures for hiring, rules of conduct, training, equipping, and monitoring of security personnel to control and manage such issues	Additional study	Submit security management plan	Not applicable	Once before commencement of operation	Project Operator
	Blade or tower glint can impact nearby receptors in the area	Consideration should be given to the use of non-reflective finishes to ensure potential impacts are not significant	Mitigation	Visual inspection	Turbines	Once before commencement of operation	Project Operator
Socio-economics	The Project is expected at a minimum to provide job opportunities for local communities. This, to some extent, could contribute to enhancing the living environment for its inhabitants, elevate their standards of living, and bring social and economic prosperity	<p>Local Recruitment Procedure: the procedure must identify the number of job opportunities targeted for local communities to include skilled and unskilled workers. Such job opportunities shall also take into account employment of local communities in the area around the project to include fresh graduate engineers, technicians, labourers, etc. In addition, the procedure must include details on how job opportunities will be announced as well as a selection process that is fair and transparent and provides equal opportunities for all including females.</p> <p>Local Procurement Procedure: the procedure must identify the procurement opportunities targeted for local communities to include for example local subcontractors, local supplies and services, cleaning services, etc. In addition, the procedure must include details on how procurement opportunities will be announced as well as a selection process that is fair and transparent and provides equal opportunities for all.</p> <p>- Social Responsibility Program: it is recommended that the Developer implement a social responsibility program which aims to benefit the local communities to the greatest extent possible. In this case,</p>	Recommendation	Regular reporting on outcomes of Program implementation	Not applicable	Continuous	Project Developer/ Operator

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
		a structured approach must be developed which must identify priority development projects which could benefit local communities (e.g. based on a needs assessment if available). Based on that the social responsibility program can prioritise projects for local communities based on available budget, company vision, timeline for implementation as well as other factors.					

## **10 ANNEXES**

### **10.1 NIAT & RASGHA OHL Biodiversity Document**

### **10.2 Spiny-tailed Lizard Survey of NIAT and RASGHA 500MW Wind Energy Project**

## 1. ASSESSMENT OF ASSOCIATED FACILITIES

This section presents an overall description of the associated facilities for the Project along with a biodiversity assessment. As discussed previously, the only associated facility of the Project is the OHTL.

### 1.1 Project Description

The OHTL is considered a key element as the Project will rely on it to evacuate electricity to the national grid. As stated earlier, EETC (i.e. the off-taker) will be fully responsible for planning, developing, constructing, commissioning and operating the OHTL. This assessment is based on preliminary design information for the associated facilities. The OHTL includes two (2) lines as noted in the Figure below:

- Northwestern OHTL NIAT220kV LILO (shown in black in the Figure below): this OHTL will connect the NIAT & Rasgha substations with the planned OHTL Masdar IPH S4 220kV 35km (shown in green in the Figure below) also located along the western and northern boundaries of the windfarm. This line has a length of 9km;
- Southwestern OHTL 220kV LILO (shown in yellow in the Figure below): this OHTL will connect the substations with the planned OHTL Masdar IPH Ras Ghareb SS 220kV 15km (shown in purple in the Figure below) also located along the western and northern boundaries of the windfarm. This line has a length of 6km;

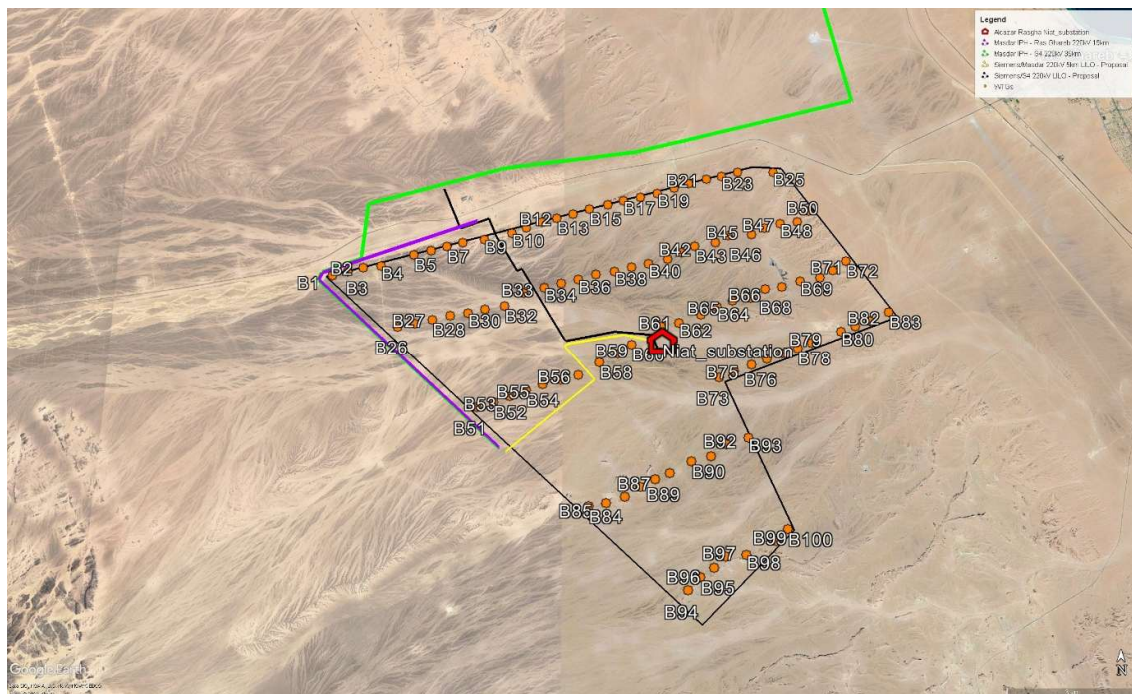


Figure 1: Location of OHTL Route

#### 1.1.1 OHTL Components

The following describes the main OHTL components. This has been based on currently available information provided by EETC.



**(i) Transmission Towers**

The main component of the OHTL is the transmission towers. The transmission tower will be a three (3) phase steel beam Double-Circuit Transmission Towers (DCT), which will transport the electricity from the substation located within the windfarm to the High Voltage National Grid. The typical structure of the DCT tower is presented in the Figure below. To the left of the figure is the actual tower that EETC will utilize for the project, while to the right is a schematic to explain the key components.

Each transmission tower will consist of the following:

- Foundations: each tower will be fixed and bolted to the ground through reinforced concrete foundations. The exact area for each foundation is expected to be around 15m×15m and will be confirmed as part of the detailed design;
- Steel structure: the foundations will support the steel structure that will carry the conductors, cross-arms and shield wire;
- Cross-Arms: each tower will have six (6) steel beam cross arms (three (3) on each side) which connect the conductors (discussed below) with the towers (refer to the Figure below).
- Conductors: the conductor is the line used to carry electrical energy from one tower to the next until its connection with the High Voltage National Grid. There will be six (6) conductors, three (3) on each side of the tower that will connect through the cross-arms (refer to Figure below). The conductor will be a 220 kV line; and
- Shield Wire (also known as earth wire): positioned above the phase conductors, the shield wire is grounded at each tower to facilitate the safe and rapid dissipation of voltage surges caused by technical issues or external factors (e.g. lightning).

The tower is likely to have a height of around 54m. In addition, there will be one (1) tower approximately every 360m. Therefore, a total of 43 towers are expected all both OHTLs presented in the Figure 1 above – will include: (i) 26 towers for northwestern 220kV LILO, and (ii) 17 towers for the southwestern OHTL 220kV LILO.

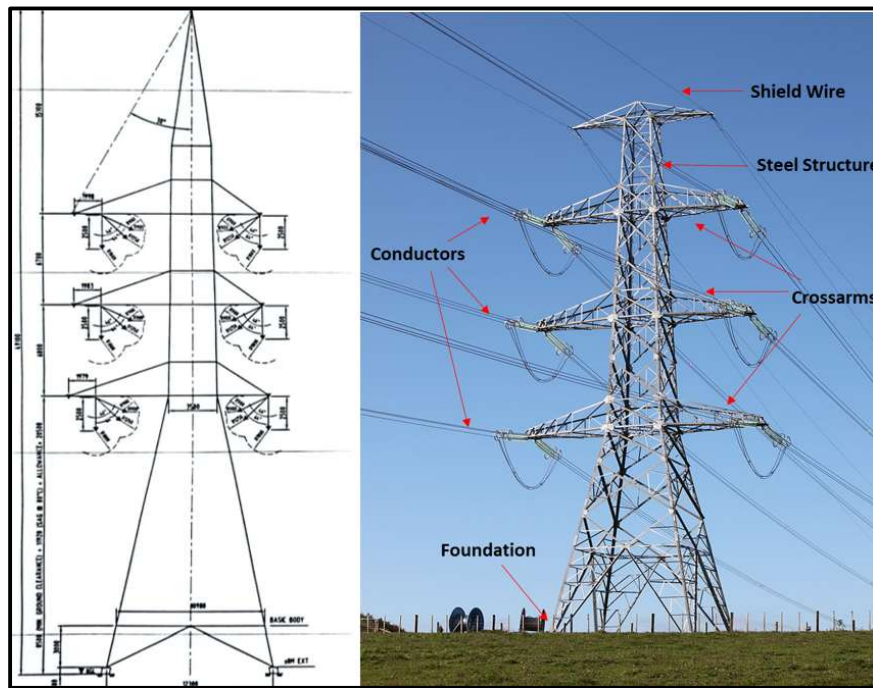


Figure 2: Typical Structural Components of DCT Towers

## (ii) Infrastructure Elements

The only infrastructure requirements for the OHTL will be access roads, which may be required in areas where the towers are inaccessible based on existing site conditions. Such access roads are required for access of construction vehicles and machinery during construction and for maintenance activities during operation. The layout of the access roads will be determined at a later stage as part of the detailed design to be prepared by EETC's OHTL Contractor and once areas with no access are identified.

### 1.1.2 Right of Way for the OHTL

Electricity transmission and distribution projects require Rights-of-Way (RoW) to protect the system from windfall, contact with trees, branches, utilities, buildings, and other potential hazards that may result in damage to the system, or power failures, as well as public health and safety concerns. RoW are also utilized to access, service, and inspect transmission and distribution systems.

The IFC EHS Guidelines for Electric Power Transmission and Distribution (2007), states that the RoW width for transmission lines ranges from 15 to 100m depending on voltage and proximity to other RoW, but typical range is between 15 and 30m.

Within the local requirements, EETC will take into account the requirements of the Electricity Law 87/2015, which provides requirements for safe distance between the conductors and the neighbouring lands and buildings and other receptors. Based on the law, the requirements of the RoW distances applicable for the 220kV OHTL is 25m horizontal distance from each side and for the 500kV OHTL is 50m horizontal distance from each side. Any successive buildings, structures or other receptors to be built shall take into account this safety distance/ RoW.

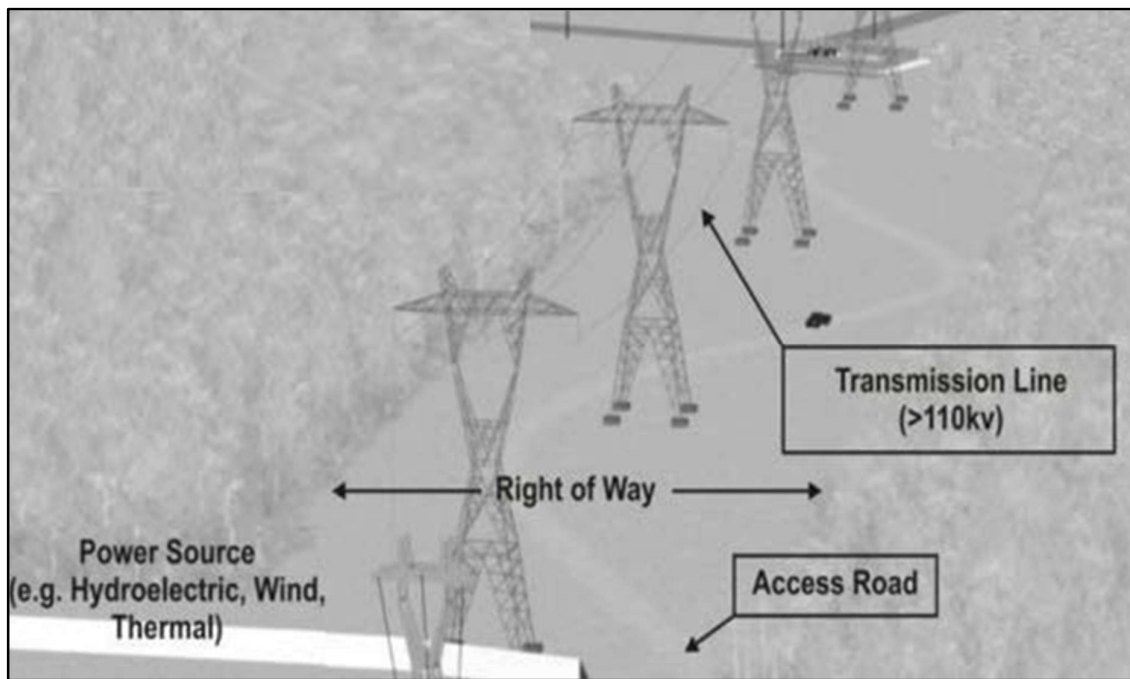


Figure 3: Right of Way and Access Road for OHTL (IFC, 2007)

### **1.1.3 Overview of Project Phases**

This section presents the likely activities to take place during the Project development, which will include three (3) distinct phases: (i) construction, (ii) operation and (iii) decommissioning each of which is summarised below.

#### **Planning & Construction Phase**

Typical activities during the construction phase for the OHTL include the following:

- Transportation of various Project components to the Project site. The components are expected to be transported by road to the Project area;
- Site preparation activities for the tower foundations. Such activities are limited to the individual footprint of the towers and therefore the actual area of disturbance is small. Nevertheless, such activities could include land clearing activities, excavations, and levelling;
- Installation of components such as the DCT towers, cross-arms, ,conductors ;
- Installation of Bird Flight Divertors (BFDs) during erection of the overhead transmission lines if any needed.
- Stringing to install the conductor wires and the ground wire which is typically undertaken through using sufficient pulling force on one end and tension capabilities on the other;
- In addition to the erection of each DCT, there is additional construction work (which could include excavations, land clearing activities, etc.) for the road network if required to provide access to equipment and machinery onsite.

Throughout the construction phase, the Project will require skilled labour (such as engineers, technicians, surveyors, etc.) and unskilled labour, to be hired through EETC's construction contractor.

#### Operation Phase

The OHTL is expected to remain operational at least throughout the operation period of the windfarm – which is set for 25 years. The operational phase will be mainly limited to maintenance and repair activities for the OHTL when needed. These could also include some routine preventive maintenance activities (based on a set schedule) as well as corrective maintenance in case of failure of any of the Project components. Maintenance activities are generally undertaken by a dedicated team of technicians from EETC and do not normally require any permanent staff to be onsite. The EETC Team would undertake the required technical activities during any given day and leave the site.

#### Decommissioning Phase

As discussed earlier, the windfarm is expected to remain operational for 25 years, after which the OHTL could be decommissioned or possibly used to connect another energy facility which would replace this wind farm. Decommissioning activities will include disassembly of the towers for final disposal. However, most of these materials are salvageable (i.e. recyclable).

### **1.2 Avifauna Assessment**

#### *Avifauna*

Powerlines pose potential risks to birds through collisions during flight and from electrocution. In the study region extending north to south along the western coast of the Gulf of Suez, the main risks are from collision with powerlines and wind turbines. Birds are at risk of colliding with power lines during flights, especially when lines are not clearly visible or intersect with important bird flight paths. Factors influencing collision risk include line visibility, bird species behavior, and the proximity of power lines to critical habitats.

The construction of two high voltage over-head transmission lines (OHTLs) are proposed in the region between Gebel El Zeit and Ras Gharib in a region located along a flyway for migratory soaring birds. However, the proposed route of the OHTL passes at 7 km away from the Gebel El Zeit IBA; a region identified as a high-risk zone for collision of migratory soaring birds with OHTLs, according to the Guidelines for Addressing Risks to Soaring Birds from Overhead Transmission Lines in Egypt (Baha El Din, 2022), as shown in the Figure 4 below. The Guidelines recommend conducting high-intensity pre-construction monitoring of migratory soaring birds for all new OHTLs proposed in High-Risk zones.

Therefore, the avifaunal assessment does not rely solely on the pre-construction surveys conducted during autumn 2025 (10 August – 10 November) and spring 2026 (20 February – 27 April), but also incorporates a comprehensive compounded and cumulative assessment as will be discussed later. Approximately 85% of the OHTL alignment lies within the wind farm boundary, and therefore benefits from extensive ornithological monitoring. Field surveys were conducted during daylight hours (from one hour after sunrise until one hour before sunset) on a daily basis throughout the autumn 2025 and spring 2026 seasons. A total of two field teams carried out observations across the OHTLs routes. These teams rotated among four fixed vantage points (VPs [2,4,5,7], Figure 8), ensuring that each location is surveyed approximately every two days, thereby providing robust spatial and temporal coverage of bird movements.

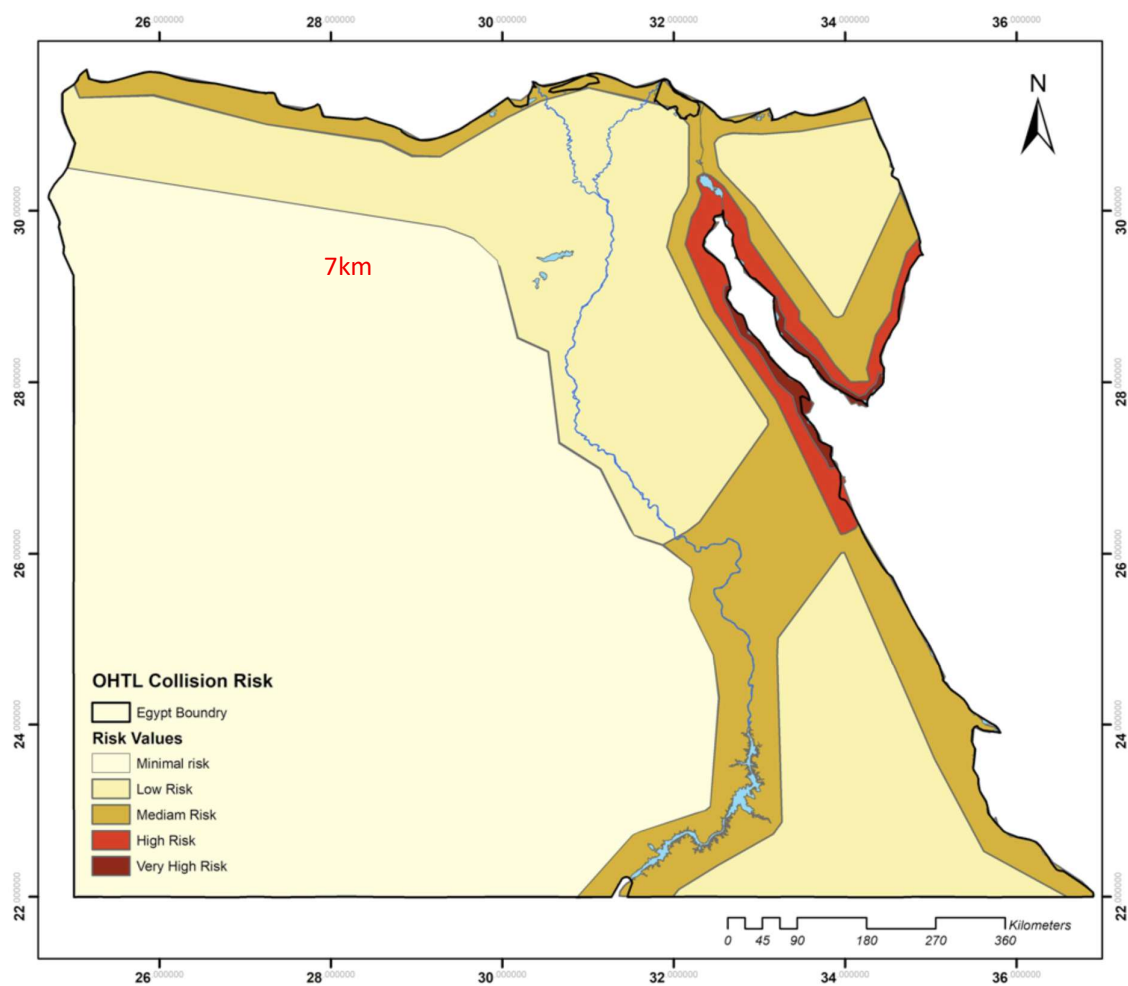


Figure 4: Preliminary OHTL Collision Risk Map for Egypt (Up) – Proposed OHTLs and Gebel El Zeit IBA (Down)



Assessing risks of avian mortality from power line collisions is dependent on identifying the factors and circumstances under which birds fly at collision risk altitudes. These conditions could be the basis for the identification and development of appropriate risk management strategies to reduce the potential of collision risk. Flight altitudes, and consequently bird collision risk is influenced by both extrinsic (site-specific and OHTL-specific) and intrinsic (species-specific) factors<sup>1</sup>. Topographic variations, habitat features, weather and light conditions, as well as anthropogenic disturbance levels are considered site-specific factors; while line configuration, wire diameter and height are OHTL-specific factors of collision risk.

Geography, topography and the distribution of water bodies define migratory flyways and thermal uplift zones, with mountains and depressions providing different flyways for soaring birds and consequently, different flight altitudes. In the current study area, the Gulf of Suez provides a “thermal barrier” for certain passive species, which strongly prefer to fly over landmasses, while some active fliers brave the crossing (at a cost). Understanding the soaring bird migration phenology in the region is critical for the assessment of risks from various infrastructure in this region.

While Intrinsic (species-specific) factors play a critical role in determining collision risk, including flight behaviour, body size, maneuverability, and visual perception. Soaring species such as White Stork and European Honey Buzzard, which dominate movements along the RSRV Flyway, are generally considered susceptible due to their reliance on thermals, variability in flight altitude, and tendency to pass through the OHTL height range. However, recorded field data indicate that this susceptibility varies significantly depending on behaviour and spatial context.

Post-Construction Fatality Monitoring (PCFM) results demonstrate clear seasonal and spatial differences in collision patterns along the OHTLs. During the spring seasons (2021 – 2025), collisions were recorded mainly for 8 European Honey Buzzard, 2 Steppe Buzzard, and 1 Sparrowhawk, while no collisions of White Stork were observed, likely due to its strong coastal tracking behaviour, which reduces interaction with inland infrastructure. In contrast, the PCFM in autumn seasons (2023–2025) within the coastal area recorded collisions involving multiple species, including 16 White Storks, 3 White Pelicans, 5 European Honey Buzzards, 1 Steppe Buzzard, 1 Sparrowhawk, 1 Marsh Harrier, and 1 Short-toed Eagle, while no carcasses were recorded during spring in the same coastal zone. So, the fatalities recorded in the central inland (between the mountains and the coastal plain) during the past five years (2021 – 2025) reflecting a different collision risk profile with OHTLs compared to the coastal corridor.

Overall, these findings highlight that collision risk is strongly influenced by the interaction between species-specific behaviour, migration season, and landscape features. While some species such as White Stork may generally avoid collision risk in certain areas due to route selection, they can still be affected under specific seasonal and spatial conditions, particularly during autumn migration in coastal zones.

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<sup>1</sup> Intrinsic risk depends on: flight behaviour, body size, altitude variability, visual limitation, experience, age, migration ecology and strategy.

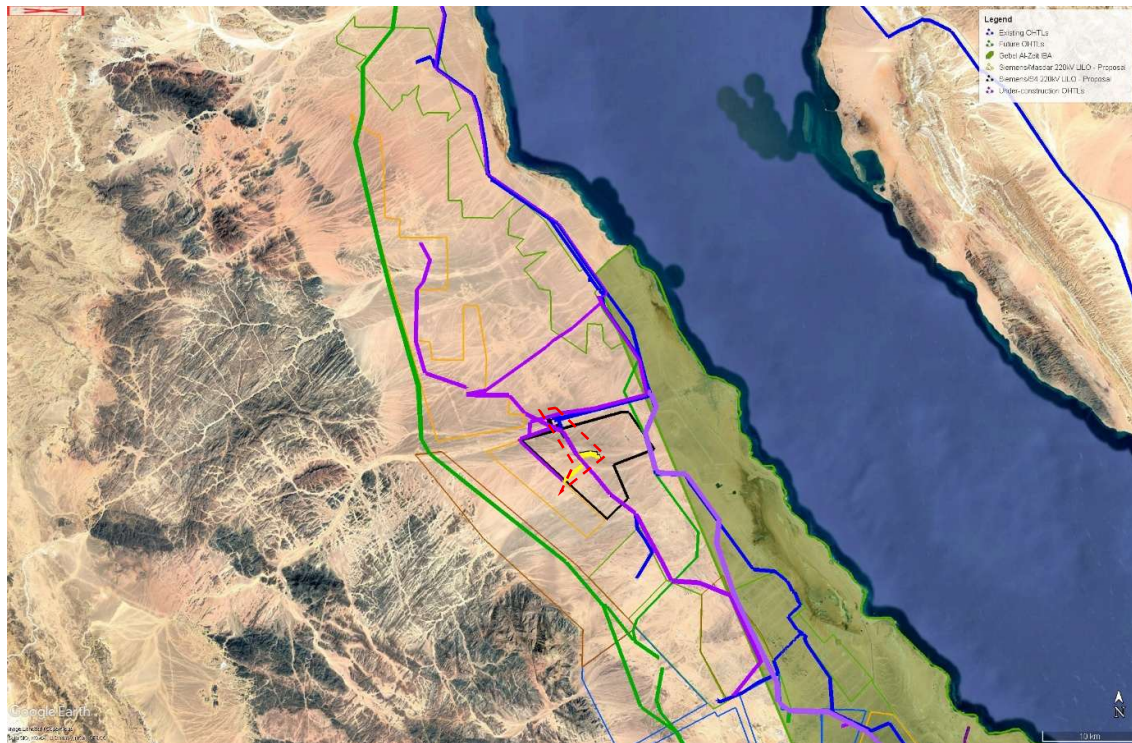


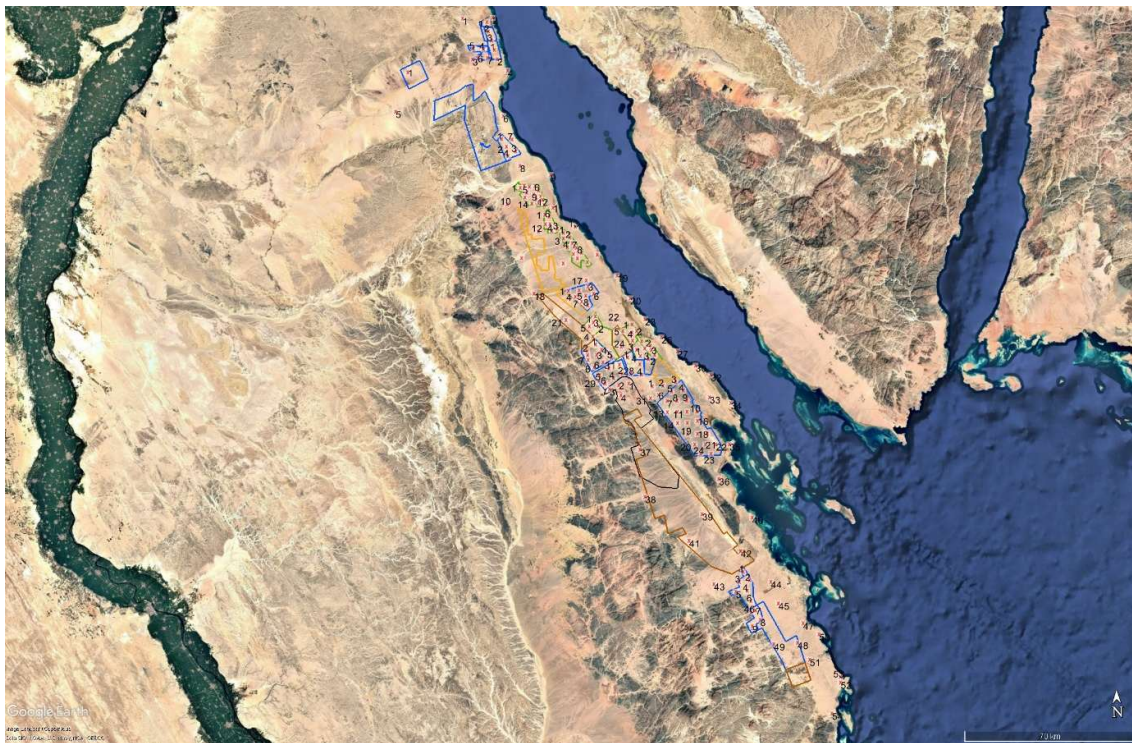
Figure 5: General location of the project region and the distribution of windfarms, existing OHTLs (blue), under-construction OHTLs (purple), future OHTLs (green), and study area (dashed red).

#### *Avifaunal Assessment Approach and Methodology*

The avifauna assessment initiation (bird migration and fatalities) used a pragmatic approach taking into consideration the limited time that was available for its preparation and capitalizing on available data from the wind energy developments in the region during the previous years to optimize the outcome of the study. This was formulated by combining all available information from large parts of the study area. In this respect, the study depended on two basic data sources:

- Bird monitoring data

Bird monitoring data from 17 locations for RE projects (wind farms and PV) located within the Gulf of Suez. The bird data was collected from 176 observation points (vantage points) scattered through the 17 RE projects along the study area through the last year (2025) from both the spring and autumn seasons. The Figure below identifies the MSB sensitivity (bird/hour) that flew in 120m. The data collection included the date, location, number, species, direction and altitude data for each observation, amongst other parameters. Most relevant to this assessment were data on the number of birds and flight altitude, location and seasonality.

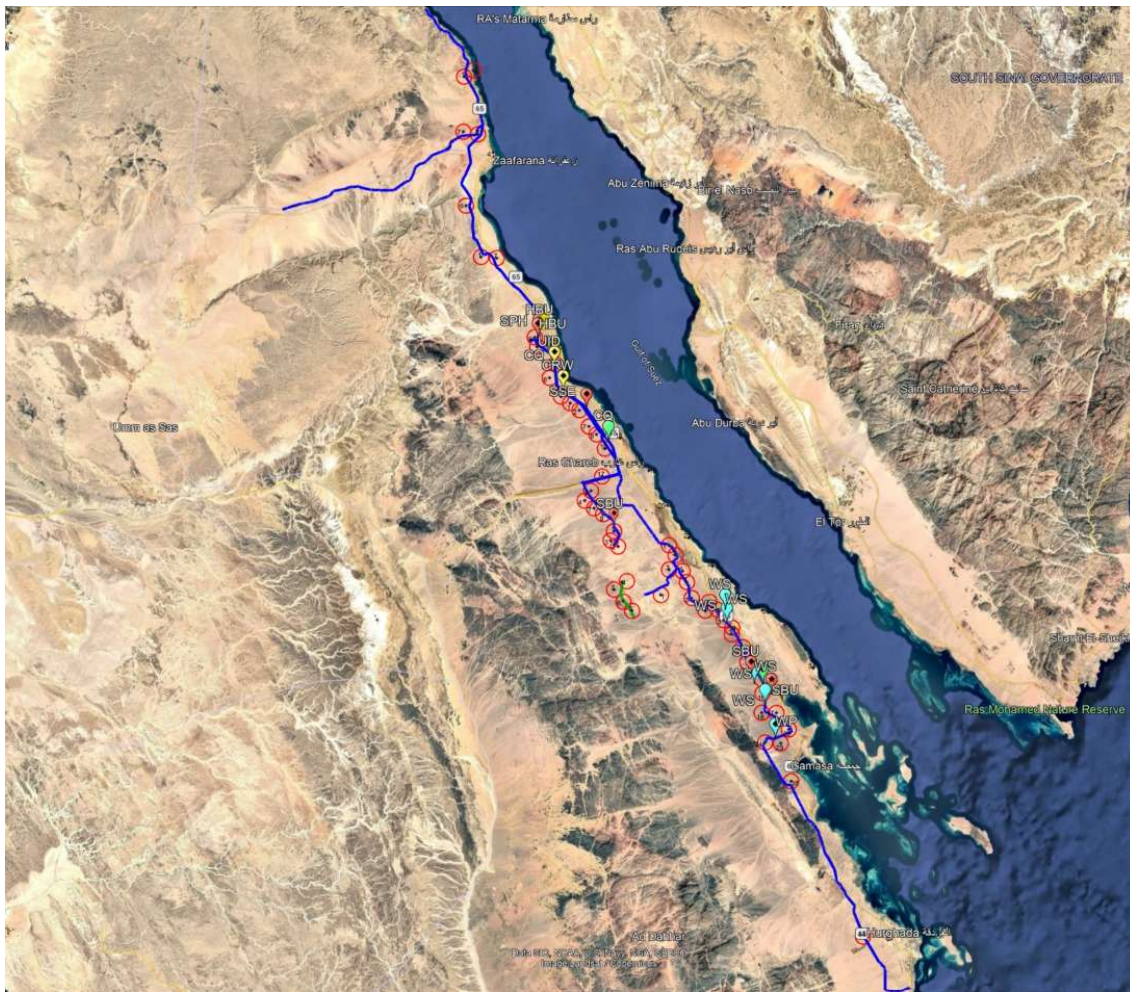


**Figure 6: VPs locations in the west side of GoS during spring and autumn 2025**

- Overhead Powerlines fatality surveys

There is now a common protocol for fatality monitoring at wind farms of the region. While project-specific carcass searches are localized and only cover relatively short lengths of overhead powerlines directly associated with individual wind farms, data was also gathered from other lengths of the overhead powerlines for the purposes of the SESA CIA in 2024-25 in the western side of GoS, see the Figure 7 below. This data provides important evidence of the existence of high levels of mortality in some aforementioned localities along the existing overhead powerlines.





**Figure 7: Fatalities recorded on overhead power transmission lines and the observation points intersecting with them during 2025**

Systematic fatality surveys of sample lengths of existing overhead powerlines in the vicinity of wind farms and other power stations in the study region near the proposed OHTL route provided some empirical data on the potential mortality from power transmission infrastructure in the region, which could be applied to the proposed NIAT & RASGHA OHTLs. However, the data collected is not equally distributed along existing overhead powerlines during 2021-22-23-24-25 and thus can only serve to indicate potential relative mortality from power lines in general rather than provide spatially differentiated mortality levels along different lengths of the powerline.

This available data on actual bird deaths along existing OHTLs is more valuable than surveys within the area that MSBs pass through as it provides real data from similar and close by projects and will provide a more accurate result to determine predicted numbers of MSB collisions per year / over the lifetime of the Project. Three assessments have been undertaken:

- Number of fatalities per year: using bird collision data from wind farms in the immediate vicinity of the proposed project ( such as RGWE OHTL that considered as a Realistic Case Scenario “High Risk Zone”) and the coastal existing OHTLs (Such as RSWE, WBWF, AMUNET, Zaafarana, NREA (KFW, FIEM, JICA), and Gabel Elzeit Hurgada OHTLs that considered as Worst Case Scenario “Very High Risk Zone”) to extrapolate how many individual birds are predicted to collide with the NIAT &

RASGHA OHTLs each year. This has been done by taking the average number of fatalities for each species per km over several seasons (with data surveyed a length of 16.9km from 2021-2025 for the Realistic Case Scenario, while other data surveys lengths of 38km, 61.4km, and 198.3km during 2023, 2024, and 2025 respectively for the Worst Case Scenario). Data from these projects has been extrapolated to predict how many birds may potentially collide with the proposed NIAT & RASGHA OHTLs per km of overhead powerlines, per year. As part of the extrapolation, it has been assumed that no bird diverters are currently in place (it is known to be the case that at least 5 of the powerlines have no diverters and the exact use of diverters along the full length of the other lines is unknown). The number of recorded fatalities at each OHTL was multiplied up using the results of OHTL studies using GenEst at RGWE, WBWF, AMUNET, RSWE, NREA OHTLs. Whilst this data was not available for all projects a standardized approach for scaling up the number of recorded carcasses was used to ensure that searcher efficiency, effort and prey removal were considered. Based on the RGWE PCFM monitoring reports (2021–2025), the estimated average collision fatality rate in the inland section of the OHTL, where bird flight diverters (BFDs) are installed (assumed 50% efficiency), is estimated at approximately 0.14 fatalities per km per year. In comparison, data from RSWE, AMUNET, WBWF<sup>2</sup>, and NREA (2025) indicate a higher estimated fatality rate of approximately 0.24 fatalities per km per year in the coastal area, reflecting increased collision risk associated with higher bird densities and more concentrated migration pathways along the coast.

- Number of fatalities with and without diverters: data has been used from background data studies showing the typical impact of installing diverters to decrease bird collision and understand what the impact would be reduced to in this project should bird diverters be used.
- Compounded and cumulative risk assessment: using bird collision data from local wind farms with OHTLs along similar lines to assess which areas of the OHTL are at the highest risk of MSB collisions, a cumulative risk assessment was undertaken by RCREEE and Safe Soar. This assessment takes into account five indicators (parameters):

#### Topography

Points	Criteria
1	Flat surface
2	Area with small elevations
3	Area with higher elevations and hills
4	Area with hills and different successive elevations

The cumulative effect resulting from the convergence of other OHTLs

Points	Criteria
1	Distance between different OHTLs > 1000 m
2	Distance between different OHTLs 500-1000 m
3	Distance between different OHTLs 250-500 m
4	Distance between different OHTLs 50-250 m

<sup>2</sup> BFDs are installed (assumed 50% efficiency) at associated WBWF OHTL.



When calculating the risk level for the cumulative effect of converging OHTLs, the differences in the pylon elevations are taken into account. If two converging lines have different elevations, this increases the risk level by one point.

The cumulative effect resulting from the convergence of OHTLs with Wind Turbines

Points	Criteria
1	Distance between OHTL and Wind Turbines > 2000 m
2	Distance between OHTL and Wind Turbines 1000-2000 m
3	Distance between OHTL and Wind Turbines 500-1000 m
4	Distance between OHTL and Wind Turbines 100-500 m

Distance from any attraction (Sea –Sabkha - Hills or Mountainous areas)

Points	Criteria
1	Distance from attraction site >10 km
2	Distance from attraction site 6-10 km
3	Distance from attraction site 3-6 km
4	Distance from attraction site 0-3 km

Bird Density at risky height (<120m) (This indicator is assessed in segments of 2.5 km)

Points	Criteria
1	0-1000 Bird / 2.5 km
2	1001-5000 Bird / 2.5 km
3	5001-10000 Bird / 2.5 km
4	≥10000 Bird / 2.5 km

Each indicator was assessed in segments of around 2.5 km

## A. Results

### ***Avifauna***

The abundant available data from wind energy developments throughout the region provided by RCREEE was composed of bird records of pre and post construction monitoring at active, under construction and planned wind farms in the Gulf of Suez region, coinciding with the proposed lengths of powerlines.

This data was collected in roughly the same manner and provides similar information on bird movements through the target region. Some modest treatment of the data was required to align all data sets to provide a common plateau for analysis, most importantly unifying altitudinal bands used amongst various wind farm monitoring teams and to categorize these data into two altitudinal bands below 50 m above ground and below 120 m above ground. These height bands were selected in order to provide the best evaluation of risk from OHTLs in the region, without the loss of too many observations that would not conform with these bands otherwise.

Because bird monitoring data was not equally distributed across the study area spatial interpolation techniques were used for predicting the values of bird migration intensity at unsampled sites in order

to generate spatially continuous data (Li and Heap, 2011). Among the interpolation methods, the most commonly used are Interpolates an Inverse Distance Weighted (IDW) technique (Mirzaei and Sakizadeh, 2016).

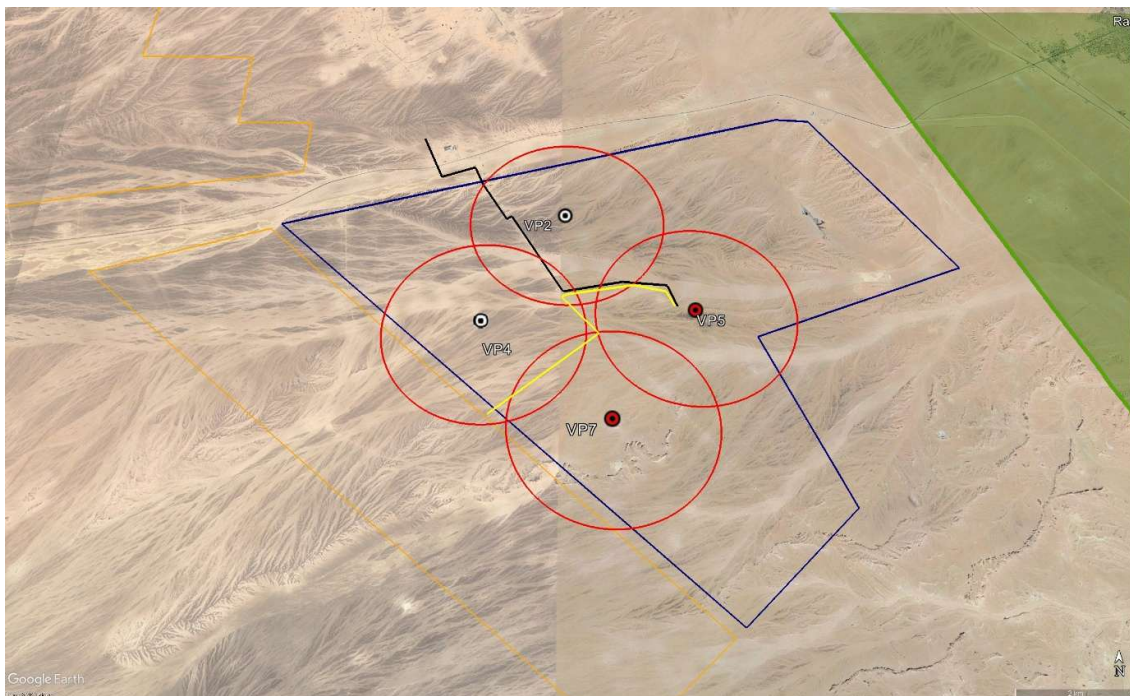
The output value for a cell using inverse distance weighting (IDW) is limited to the range of the values used to interpolate. Because IDW is a weighted distance average, the average cannot be greater than the highest or less than the lowest input. The best results from IDW are obtained when sampling is sufficiently dense regarding the local variation to be simulated. If the sampling of input points is sparse or uneven, the results may not sufficiently represent the desired surface (Watson and Philip 1985).

This technique was used to generate the bird migration intensity maps and identify potential risk hotspots along the proposed powerlines.

Bird monitoring data used in this assessment were collected from four VPs located along the proposed OHTL route during the spring and autumn seasons of 2025. The dataset includes key observation parameters such as date, location, species, number of individuals, flight direction, and flight altitude.

In addition, carcass data from existing OHTLs along the western coast of the Gulf of Suez were incorporated to provide context on historical bird mortality and potential collision risk associated with transmission infrastructure in the region.

To support a broader spatial understanding of bird movement and sensitivity, seasonal sensitivity maps (spring and autumn) were developed using data from all wind energy projects within the GoS. These maps provide a regional perspective on migration patterns and high-use areas, complementing the site-specific observations collected along the proposed OHTL route.



**Figure 8: Observation Points Located Along the Proposed OHTL Route During Spring and Autumn Seasons 2025**

### ***Spatial Distribution of Migration Intensity Along the Western Coast of the GoS Spring and Autumn 2025***

The first map presents a sensitivity assessment of wind farm areas in the Gulf of Suez (GoS) based on soaring bird migration activity during spring and autumn 2025. It highlights how bird passage rates vary spatially along the coastal corridor, which is a well-known migration route. The color-coded zones represent bird activity intensity, ranging from very low (0-29 birds/hour) (light yellow) to very high (360-730 birds/hour) (dark red) in spring, while very low levels (0–17 birds/hour in light yellow) to very high levels (192–319 birds/hour in dark red) in autumn 2025, indicating areas of increasing ecological sensitivity and potential collision risk.

The central part of the study area shows the highest bird passage rates, particularly in locations where darker orange and red colors appear. These zones represent migration hotspots where large numbers of birds concentrate, increasing the likelihood of interaction with man-made structures. In contrast, the northern and southern sections generally show lower to moderate activity levels. The map emphasizes that bird migration is not uniform but rather concentrated in specific segments along the coast.

In addition to bird sensitivity, the map overlays existing and planned wind farms, as well as overhead transmission lines (OHTLs) and vantage points (VPs). This allows for identifying areas where infrastructure overlaps with high bird activity, highlighting potential collision risks. The map is therefore an important tool for environmental assessment and planning, supporting decisions on turbine placement, transmission routing, and the implementation of mitigation measures to reduce impacts on migratory birds.

The second map provides a detailed sensitivity assessment of soaring bird migration at low altitude (<120 m) within the wind farm area and its associated 220 kV overhead transmission lines in the Gulf of Suez during spring and autumn 2025. It shows that most of the project footprint lies within low to moderate bird passage zones (approximately 0.3–40 birds/hour in spring, while 0.02–4 birds/hour in autumn), while higher activity areas (up to 80–100 birds/hour in spring and up to 20 birds/hour in autumn) are mainly located toward the northeast, to the east near coastal corridor, and in limited surrounding pockets. The map also overlays key infrastructure, including nearby wind farms, transmission lines, and observation points used to derive the data. Overall, it indicates that although some moderate-risk zones exist—particularly along certain transmission line segments—the project area is relatively well positioned outside the highest bird migration hotspots, suggesting manageable collision risks with appropriate mitigation measures.

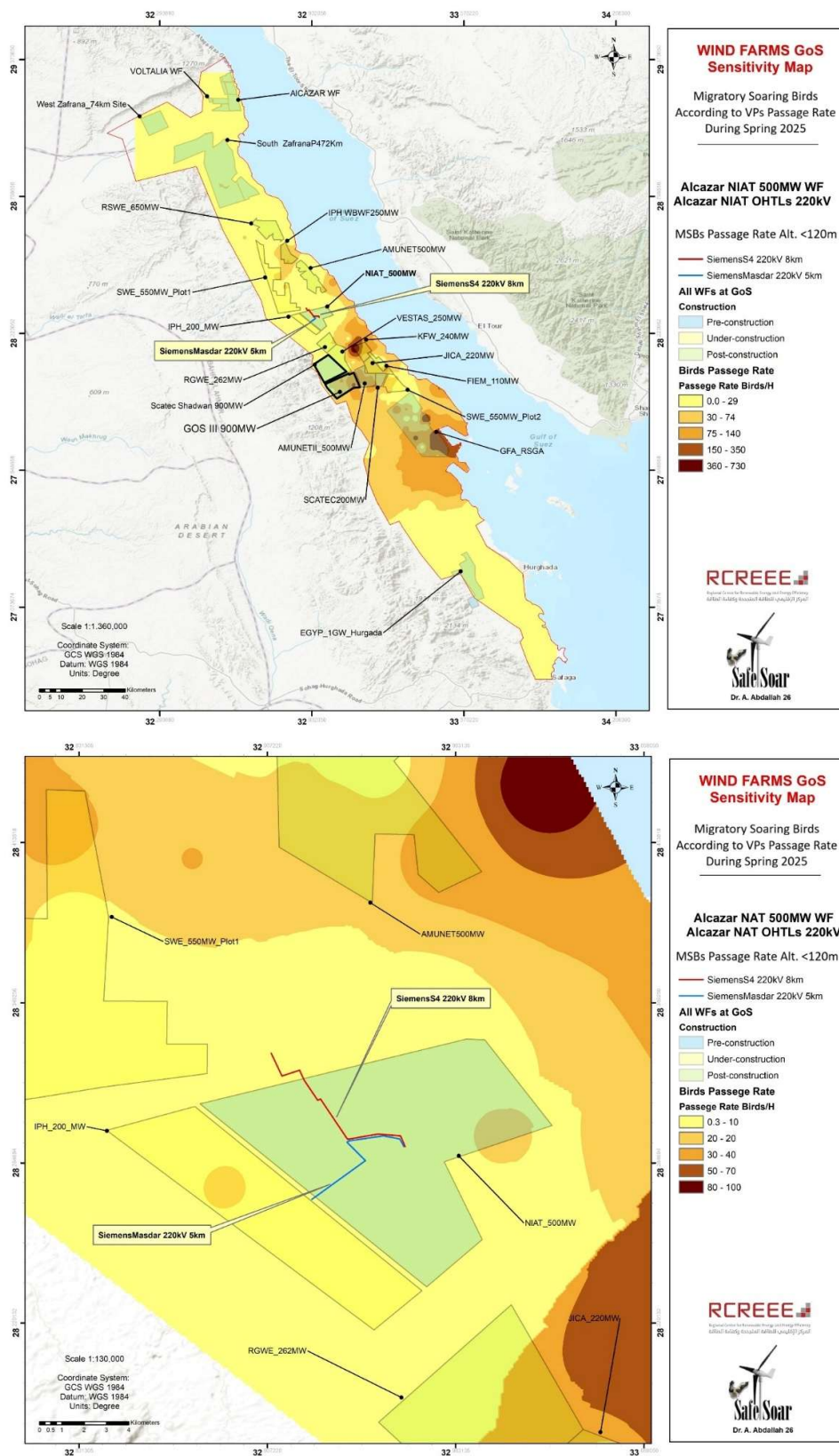


Figure 9: Intensity of MSB migration in spring 2025 season below 120 m.



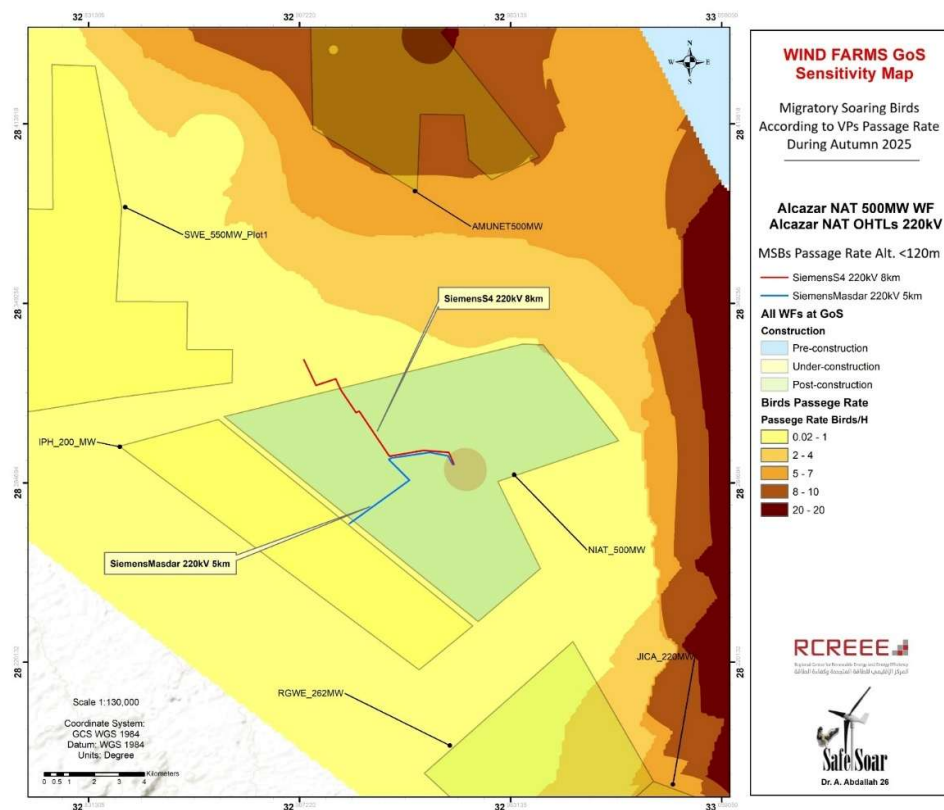
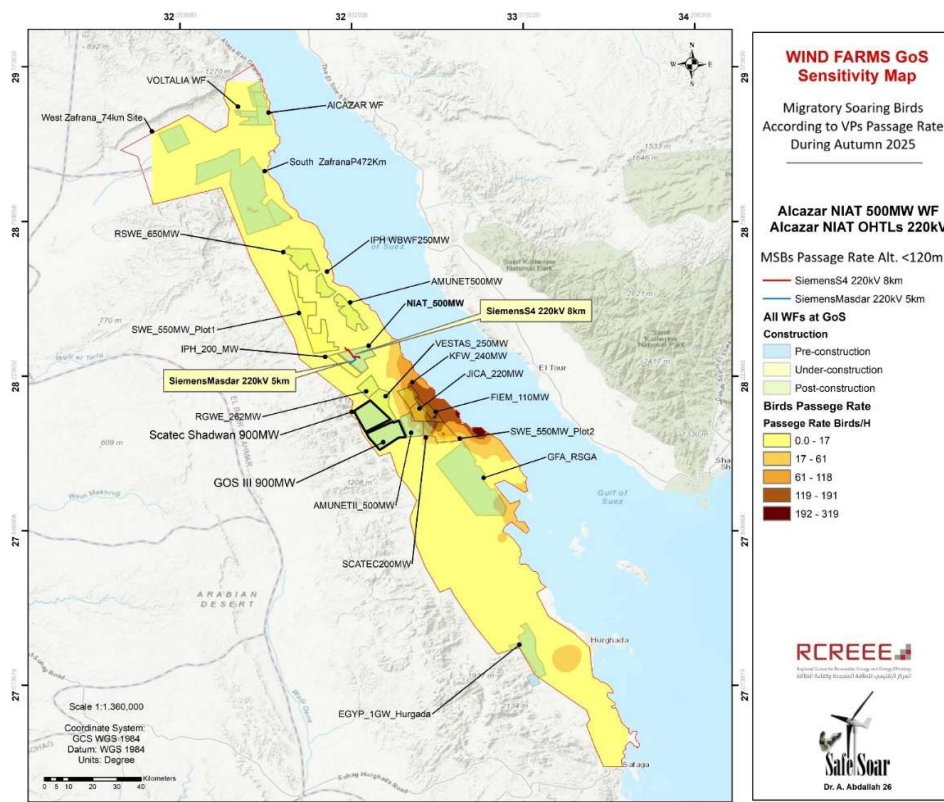


Figure 10: Intensity of MSB migration in autumn 2025 season below 120 m.



### **MSBs Species Sensitivity to Collision Risk in Spring 2026 and Autumn 2025**

At least 2/3 of the spring migration monitoring (20 February – 27 April 2026) recorded a diverse assemblage of migratory soaring birds, dominated by Steppe Buzzard (23,352 individuals), White Stork (12,441), Black Kite (9,658), and Steppe Eagle (5,894) as shown in Table below. These species collectively represent the majority of observed avifauna and are characteristic of major migratory flyways.

Flight activity analysis shows that a significant proportion of bird movements does not occur within the 0–120 m altitude band (approx.12.6% and 22% of bird recorded in spring 2026 and autumn 2025 respectively), corresponding to the typical risky zone of overhead powerlines, thereby representing the primary collision risk zone.

Collision risk is assessed based on: bird abundance, time spent within the OHTL area, and Proportion of flight within the risk zone (0–120 m). The analysis demonstrates that:

- White Stork exhibits the highest collision exposure, with 3,203 individuals (26%) recorded within the risk zone, indicating frequent, low-altitude soaring behavior.
- Black Kite shows substantial exposure, with 1,991 individuals (21%) at risk and the longest cumulative time at risk (497 minutes).
- Steppe Buzzard, despite a relatively low proportional risk (~7%), contributes significantly due to its very high abundance, resulting in 1,642 individuals at risk.
- Other species, such as Steppe Eagle and Lesser Spotted Eagle, show moderate exposure but are considered important due to their conservation sensitivity and large body size.
- Additionally, several species (e.g., Montagu’s Harrier, Common Kestrel, Marsh Harrier) exhibit high proportions of low-altitude flight (up to 50%), indicating behavioral susceptibility, although their overall contribution to cumulative impact remains limited due to low abundance.
- Some species (e.g., White Pelican) show negligible risk, as they do not utilize the risky altitude band.

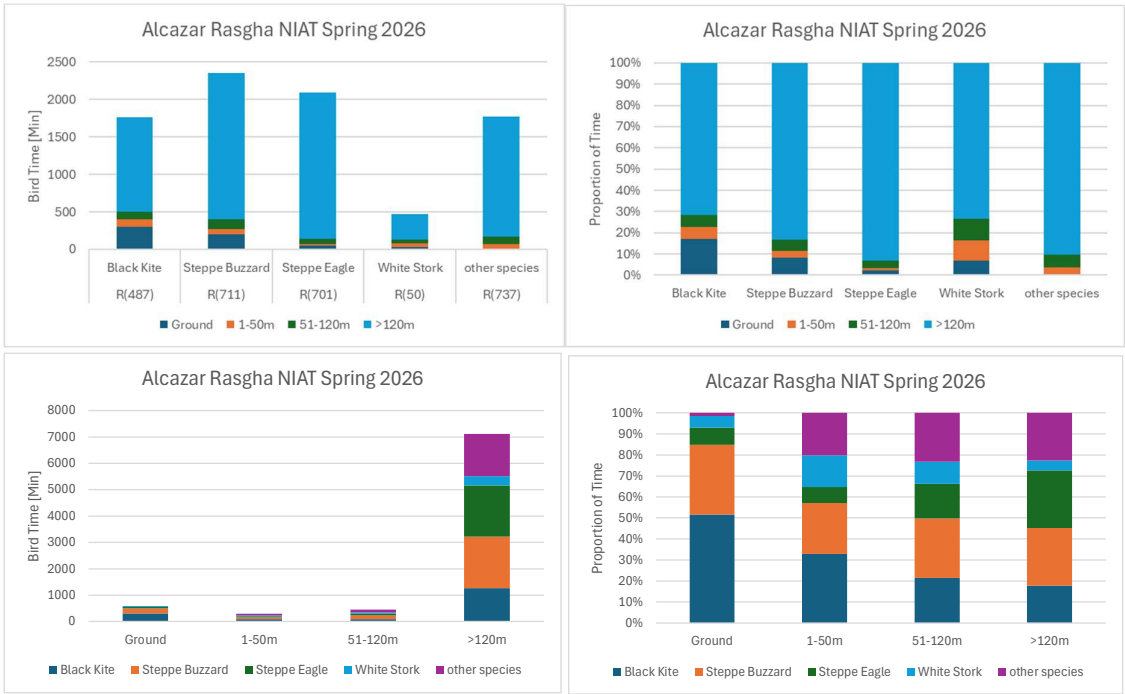
**Table 1 Summary of Bird Migration Intensity and Collision Risk by Species – Spring 2026**

Species/Spring 2026 (20 Feb – 27 Apr)	Accumulat ed Number of Birds	Accumulat ed Number of Records	Bir d/ h	Accu mulat ed Time Spent (minu tes)	Accumulated Number of Birds at Risky Altitudes (0-120 m)	Accu mulat ed Numb er of Recor ds at Risky Altitu des	Bird /h at Risk y Altit ude s (0- 120 m)	Accumulated Time Spent at risky Altitudes (minutes)	Ris k Bir d Co unt s %	Ri sk Bi rd Ti me %
<b>Black Kite</b>	9658	487	9. 13	1763	1991	86	1.88	497	21	2 8
Black Stork	129	26	0. 12	108	12	2	0.01	12	9	1 1
Booted Eagle	147	115	0. 14	258	25	15	0.02	22	17	9

Species/Spring 2026 (20 Feb – 27 Apr)	Accumulat ed Number of Birds	Accumulat ed Number of Records	Bir d/ h	Accu mulat ed Time Spent (minu tes)	Accumulated Number of Birds at Risky Altitudes (0-120 m)	Accu mulat ed Numb er of Recor ds at Risky Altitu des	Bird /h at Risk y Altit ude s (0- 120 m)	Accumulated Time Spent at risky Altitudes (minutes)	Ris k Bir d Co unt s %	Ri sk Bi rd Ti me %
Common Kestrel	27	26	0.03	45	13	13	0.01	22	48	49
Egyptian Vulture	43	35	0.04	81	4	4	0.00	7	9	9
European Honey Buzzard	180	30	0.17	67	10	4	0.01	7	6	10
Imperial Eagle	11	11	0.01	29	1	1	0.00	1	9	3
Lesser Spotted Eagle	716	191	0.68	512	50	21	0.05	36	7	7
Long-legged Buzzard	21	21	0.02	58	4	4	0.00	8	19	14
Marsh Harrier	13	12	0.01	26	5	5	0.00	10	38	38
Montagu's Harrier	4	4	0.00	6	2	2	0.00	3	50	50
Osprey	13	13	0.01	25	3	3	0.00	4	23	16
Pallid Harrier	4	1.33	0.00	7	1	1	0.00	1	25	14
Peregrine Falcon	1	1	0.00	3	1	1	0.00	1	100	33
Short-toed Eagle	278	201	0.26	438	20	13	0.02	28	7	6
Sooty Falcon	1	1	0.00	1	1	1	0.00	1	100	100
Sparrowhawk	9	8	0.01	11	1	1	0.00	1	11	9
Greater Spotted Eagle	5	5	0.00	8	0	0	0.00	0	0	0
<b>Steppe Buzzard</b>	23352	711	22.08	2350	1642	102	1.55	395	7	17
<b>Steppe Eagle</b>	5894	701	5.57	2090	270	54	0.26	144	5	7
White Pelican	4801	10	4.54	55	0	0	0.00	0	0	0
<b>White Stork</b>	12441	50	11.76	470	3203	12	3.03	125	26	27

The Figure below illustrates the distribution of bird flight time across altitude bands during the spring migration period (20 February – 27 April 2026). Most species spend the majority of their flight time above 120 m, indicating generally low exposure to OHTL collision risk. However, certain species, particularly Black Kite and Steppe Buzzard, exhibit a significant proportion of flight within the 0–120 m OHTL risk collision zone. While Steppe Buzzard and Steppe Eagle dominate in terms of total flight time, their activity is largely concentrated at higher altitudes, resulting in comparatively lower

proportional risk. Overall, collision exposure is driven by a combination of flight height and time spent within the risk zone.



The autumn migration dataset in 2025 indicates that European Honey Buzzard is the dominant migratory species and the primary contributor to collision risk due to its relatively high abundance and consistent use of the 0–120 m altitude band. White Pelican also represents a significant risk, with approximately half of recorded individuals and flight time occurring within the OHTL collision zone. In contrast, White Stork, despite its high abundance, shows no recorded use of risky altitudes, indicating negligible collision exposure. Several species, including harriers and small falcons, exhibit very high proportions of low-altitude flight; however, their overall contribution to cumulative impact remains limited due to low numbers. Overall, collision risk during autumn migration is driven by a combination of species abundance, flight behaviour, and duration of exposure within the OHTL collision zone.

The Table below shows the following points:

- European Honey Buzzard is the dominant species and the main driver of the OHTL collision risk, due to its high abundance (1,050 birds) and moderate use of the risky altitude band (~20%).
- White Pelican is the highest-risk species proportionally, with 50–55% of birds and time within the collision zone, making it a key concern despite lower numbers.
- White Stork, although abundant (900 birds), shows no flight within risky altitudes, and therefore represents negligible collision risk.
- Black Kite and Eurasian Crane show moderate risk, with a noticeable proportion of birds flying within the risky altitude range.

- Several species (e.g., harriers, kestrels, falcons) exhibit very high percentages (up to 100%) of low-altitude flight, indicating behavioral vulnerability, but their overall impact is low due to small population size.

**Table 2 Summary of Bird Migration Intensity and Collision Risk by Species – Autumn 2025**

Species/Autumn 2025 (10 Aug – 10 Nov)	Accumulated Number of Birds	Accumulated Number of Records	Bird/h	Accumulated Time Spent (minutes)	Accumulated Number of Birds at Risk Altitudes (0-120 m)	Accumulated Number of Records at Risk Altitudes	Bird/h at Risk Altitudes (0-120 m)	Accumulated Time Spent at Risk Altitudes (minutes)	Risk Bird Counts %	Risk Bird Time %
Black Kite	37	19	0.02	50	8	6	0.01	14	32	28
Crested Honey Buzzard	2	2	0.00	4	0	0	0.00	0	0	0
Eurasian Crane	66	3	0.04	13	1	1	0.00	2	33	15
<b>European Honey Buzzard</b>	1050	54	0.71	184	332	11	0.22	36	20	20
Imperial Eagle	1	1	0.00	9	0	0	0.00	0	0	0
Common Kestrel	15	14	0.01	25	13	11	0.01	22	79	88
Long-legged Buzzard	1	1	0.00	5	1	1	0.00	1	100	20
Marsh Harrier	18	16	0.01	53	15	13	0.01	36	81	68
Montagu's Harrier	7	7	0.00	12	7	7	0.00	11	100	92
Osprey	1	1	0.00	6	0	0	0.00	0	0	0
Pallid Harrier	7	7	0.00	14	7	7	0.00	14	100	100
Red-footed Falcon	1	1	0.00	1	1	1	0.00	1	100	100
Steppe Buzzard	7	3	0.00	12	1	1	0.00	0	33	0
Sooty Falcon	1	1	0.00	2	1	1	0.00	2	100	100
Steppe Eagle	6	4	0.00	19	1	1	0.00	5	25	26
<b>White Pelican</b>	230	2	0.15	93	130	1	0.09	51	50	55
White Stork	900	2	0.61	13	0	0	0.00	0	0	0

The Figure below indicates that the majority of bird flight activity during autumn migration occurs above 120 m, suggesting generally low overall exposure to collision risk. However, a limited number of species contribute disproportionately to risk. White Pelican shows the highest proportional use of the 0–120 m altitude band, while Black Kite and European Honey Buzzard contribute through a combination of moderate exposure and higher abundance. White Stork, despite its presence, remains at safe altitudes and does not contribute to collision risk. Overall, collision exposure is limited but concentrated in a few key species and altitude bands.

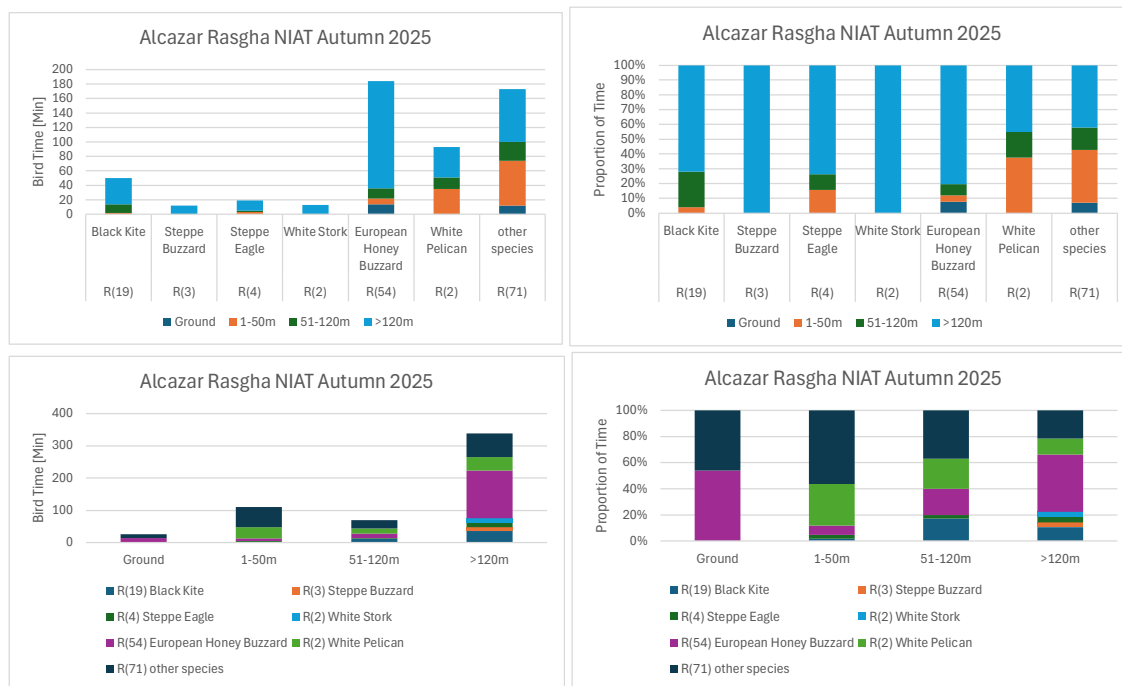


Figure 12: Distribution of bird flight time across altitude bands during autumn 2025

### Resting and Roosting Birds in the Vicinity of the Proposed OHTL Route

This section summarizes resting and roosting bird activity recorded along the proposed OHTL route, detailing species presence, frequency of observations, and total time spent on the ground in spring and autumn 2025.

The table below shows the resting and roosting birds in the vicinity of the proposed OHTL routes in spring 2026.

Table 3 Resting and Roosting (Re/Ro) bird activity recorded along the proposed OHTL Route in spring 2026

Species	Number of Birds	Number of Records	Total Time of Re/Ro in minutes
Black Kite	147	9	296
Steppe Buzzard	72	8	196
Steppe Eagle	19	2	48
White Stork	1250	3	33



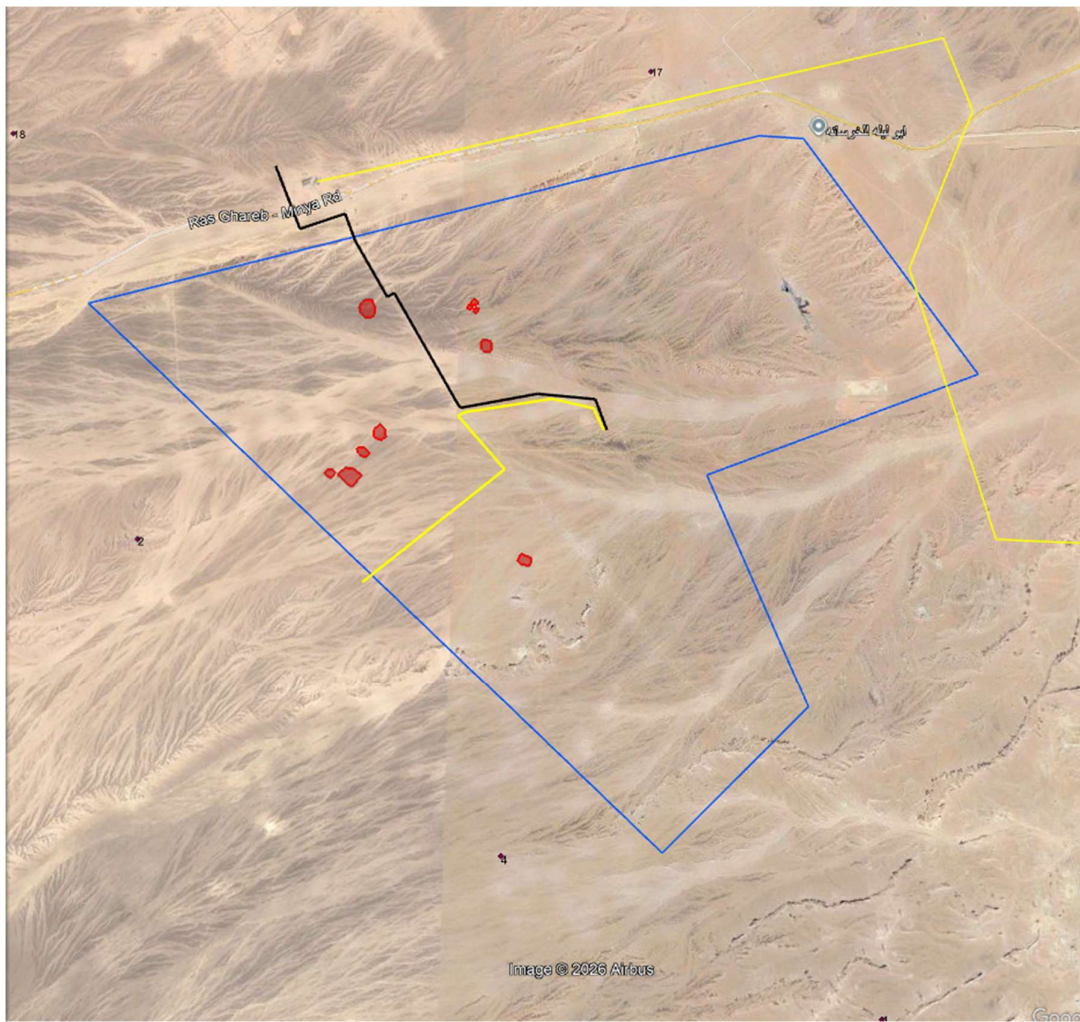


Figure 13: Re/Ro areas along the proposed OHTL route during spring 2026

In autumn 2025, European Honey Buzzard was the dominant species, with 35 individuals recorded across three observations and a total resting/roosting duration of 14 minutes. Marsh Harrier and Pallid Harrier were each recorded once, with total resting/roosting times of 9 minutes and 1 minute, respectively.

Table 4 Resting and Roosting (Re/Ro) bird activity recorded along the proposed OHTL Route in autumn 2025

Species	Number of Birds	Number of Records	Total Time of Re/Ro in minutes
European Honey Buzzard	35	3	14
Marsh Harrier	1	1	9
Pallid Harrier	1	1	1

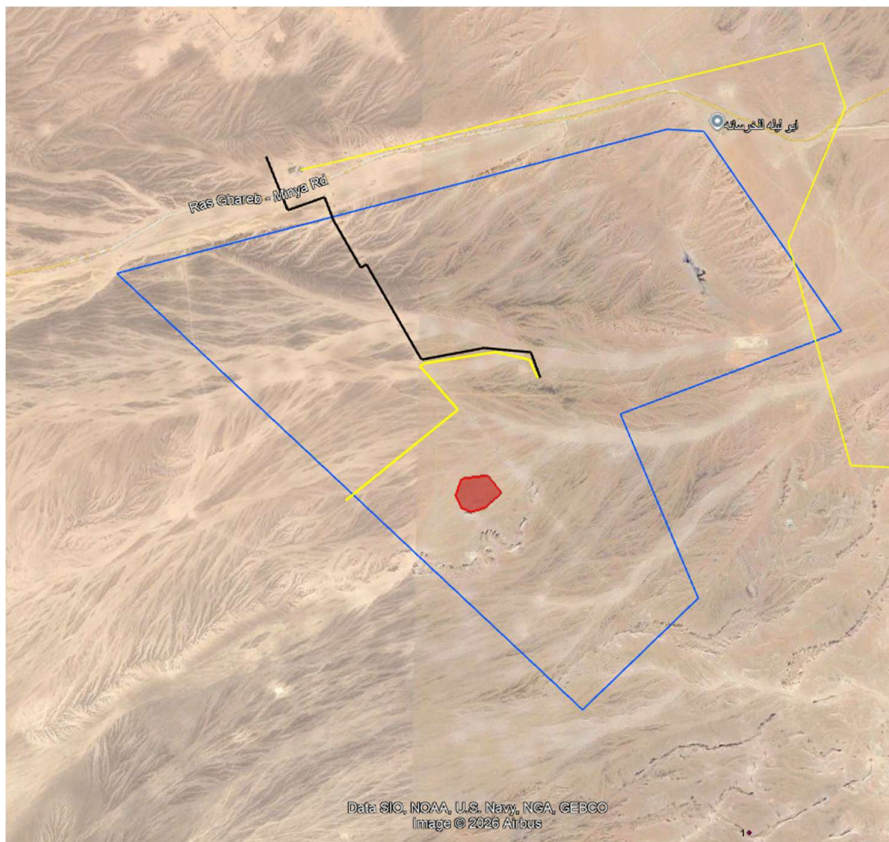


Figure 14: Re/Ro areas along the proposed OHTL route during autumn 2025

### Non-soaring Birds

The table below summarizes non-soaring bird species recorded along the proposed OHTL route, highlighting the total number of individuals observed and their dominant flight height categories.

Table 5 Non-Soaring bird species and their dominant flight height in spring 2026

Row Labels	Total Number of Birds Recorded on the Proposed OHTL Route	Dominant Flight Height
Barn Swallow	3	1-50
European Bee-eater	5	1-50
Great Cormorant	113	50-120
Rock Dove	2	1-50
Short-toed Lark	5	1-50

In autumn 2025, most species were primarily observed flying within the lowest altitude band (0–50 m), indicating that low-level flight is the dominant behavior among non-soaring birds in the study area.

Table 6 Non-Soaring bird species and their dominant flight height in autumn 2025

Row Labels	Total Number of Birds Recorded on the Proposed OHTL Route	Dominant Flight Height
Barn Swallow	15	0-50
Black-winged Kite	1	0-50
Brown-necked Raven	49	0-50
Crowned Sandgrouse	61	0-50
European Bee-eater	119	0-50
Great Cormorant	12	120-180
Hoopoe Lark	4	0-50
Rock Pigeon	40	0-50
Sand Martin	1	0-50
Sandgrouse	195	0-50
Short-toed Lark	28	0-50
Spotted flycatcher	1	0-50
Spotted Sandgrouse	9	50-120
Willow Warbler	4	0-50
Yellow Wagtail	1	50-120

## B. Impact Assessment

### **General**

This assessment looks at the NIAT & RASGHA OHTLs, as there will be cumulative impacts across the Project area.

### ***Impacts During Operational Phase***

#### Direct and Indirect Impacts on Sensitive Receptors (Birds) – Collision with OHTL

The OHTL Route is split into two sections, with a total length of approximately 15 km and notably crosses a main bird flyway. There is no refined migration corridor along any part of the route, so birds moving through will be on a broad front generally moving along the flyway adjacent to, or crossing, the Gulf of Suez. Although it has been identified that the route does not run through the Gabal El Zeit IBA , it crosses a known migratory corridor, the East Africa Flyway. As such, these areas are likely to have a high volume of migratory birds and will potentially have a higher risk of collision with OHTLs. Additionally, due to the scale of the project and the other wind projects and OHTLs within the area of the project, there is likely to be an impact cumulatively.

The operation of OHTLs is likely to have an impact on birds as they are proven to have a mortality factor for migratory and soaring birds. In most cases, impacts from overhead powerlines lead to severe injuries or immediate death. In case of collision accidents, birds crash at high flight speed into cables or wires. The resulting injuries vary widely and are comparable to trauma caused by collisions with cars. Electrocution harms mostly birds sitting on the live components or having ground contact, but

this is less of an issue with high power OHTL such as the one proposed here, that should be addressed and mitigated.

**Table 7: MSBs likely to utilize OHTL area, their conservation status and notes on likelihood of site utilization**

Common Name	Conservation Status	Notes
	IUCN	
Egyptian Vulture	EN	Recorded across the existing OHTLs corridor within the wind farm with average of 21 EV per year (occurred in spring seasons only) while only with average of 4 EV in spring season at risky altitude (120m). Migratory species through the flyway. Migration through the Aol is likely.
Steppe Eagle	EN	High numbers of birds recorded migrating across the existing OHTLs corridor within the wind farm with average of 2950 STE per year (Mostly occurred in spring seasons) while with average of 270 STE in spring season at risky altitude (120m). Migration through the Aol is likely
Red Footed Falcon	VU	A single bird on survey registered at risky altitude (120m) in autumn season. Migration through Aol possible.
Sooty Falcon	VU	A single bird registered on survey per season. Migration through Aol possible.
Pallid Harrier	NT	Recorded in low numbers (11 per year) during surveys. Migration through the Aol is likely.
Imperial Eagle	VU	Recorded in low numbers (12 per year) during surveys. Migration through the Aol is likely.
Greater Spotted Eagle	VU	Recorded in low numbers (5 per year) during surveys. Migration through the Aol is likely.
White Stork	LC	Very high numbers of birds recorded migrating across the existing OHTLs corridor within the wind farm with average of 6671 WS per year (mostly recorded in spring season) while with 3203 WS at risky altitude (120m). Migration through the Aol is likely.
Black Kite	LC	Very high numbers of birds recorded migrating across the existing OHTLs corridor within the wind farm with average of 4848 BK per year (mostly recorded in spring season) while with 1991 BK at risky altitude (120m). Migratory species through the flyway. Migration through the Aol is likely.
Steppe Buzzard	LC	Very high numbers of birds recorded across the existing OHTLs corridor within the wind farm with average of 11680 SBU per year (mostly occurred in spring season) while only with average of 1642 SBU at risky altitude (120m). Migratory species through the flyway. Migration through the Aol is likely.
European Honey Buzzard	LC	Recorded across the existing OHTLs corridor within the wind farm with average of 615 HBU per year (mostly occurred in autumn season) while only with average of

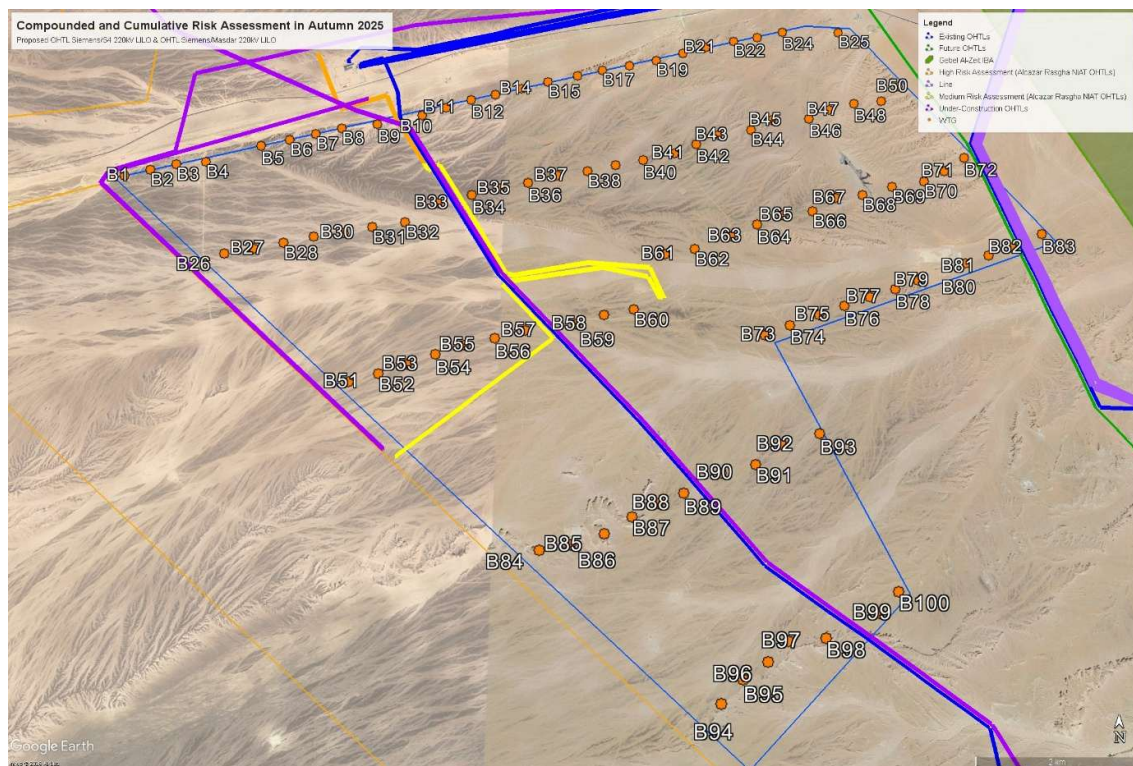
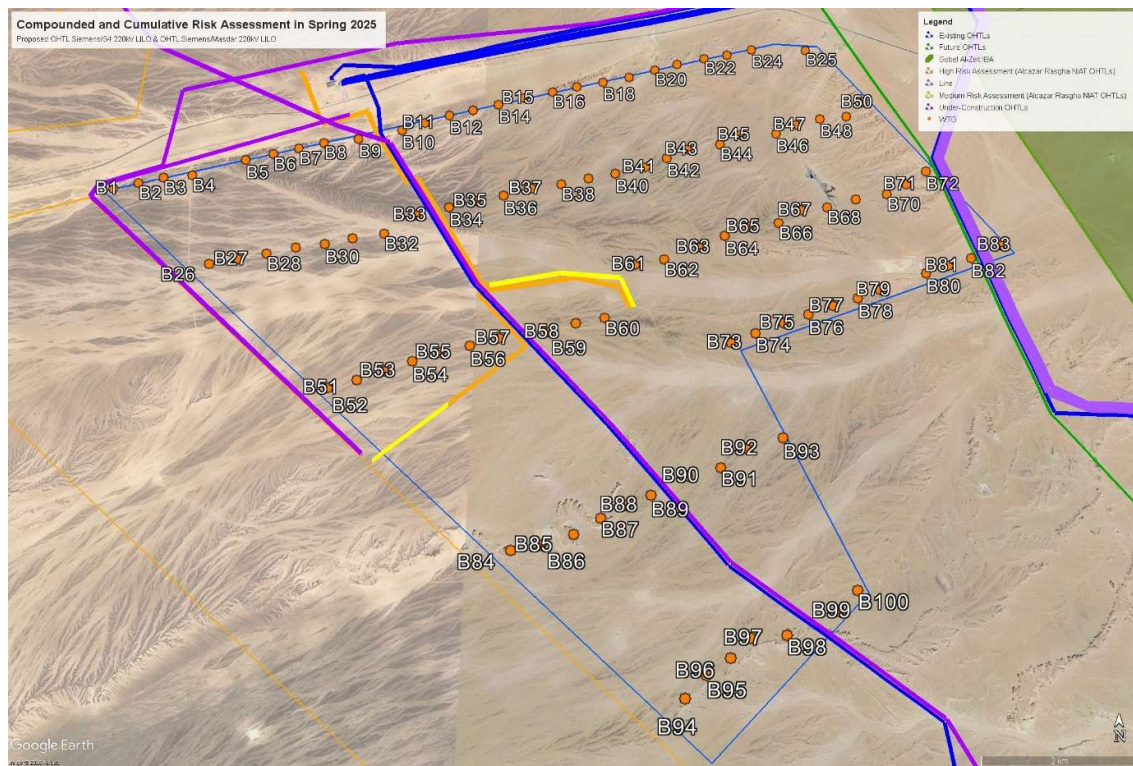
		332 HBU at risky altitude (120m). Migration through the Aol is likely.
White Pelican	LC	Recorded across the existing OHTLs corridor within the wind farm with average of 2516 WP per year (mostly occurred in spring season without any OHTL collision risk) while only with 130 WP at risky altitude (120m) in autumn season. Migratory species through the flyway. Migration through the Aol is likely.

Generally, any large soaring or fast flying species is at risk of collision with OHTLs. The size and flight behavior (and sometimes other biological characteristics) of these species results in a low level of detection and being able to avoid collision with such structures.

It is anticipated that most migratory soaring birds will be at insignificant risk to collisions due to their flight behavior, i.e. smaller and more maneuverable birds (such as falcons and harriers) will actively avoid the OHTL and most large soaring raptors (like eagles and vultures) will be moving at a much greater height than the OHTL and avoid it apart from Black Kite and Steppe Buzzard. This is shown in the existing data from the OHTL bird surveys from nearby wind farms and the Wind Farm VP surveys. However, factors such as unsuitable weather for migration and the need to rest or roost are likely to bring them into greater risk of collision.

As noted within "Assessment of Baseline Conditions" a compounded and cumulative risk assessment was undertaken by RCREEE and Safe Soar, which is presented in the Figure below. The results of this assessment show a range of high and medium risk areas within the proposed OHTL line. The perceived risk of MSB collision is higher in the Northwestern OHTL compared with the Southwestern OHTL. However there are areas of medium risk throughout the powerlines, and although the risk maybe be low in sections, collisions are still possible.





**Figure 15: Compounded and cumulative risk assessment for predicted bird collisions along the proposed OHTLs (UP for spring 2026) (Down for autumn 2025).**

Using available data from the monitoring of confirmed bird casualties along existing OHTLs (RGWE, RSWE, WBWF, AMUNET, Zaaferana, NREA (KFW, FIEM, JICA) in the vicinity of the wind farm and proposed routes of the OHTL, an assessment has been undertaken to show predicted collision of MSBs

for NIAT & RASGHA OHTLS for both worst case scenario and realistic case scenario as presented in the table below.

Following fatality monitoring at other wind farms locally, it has been predicted that, without the use of diverters, some MSBs will have a high number of collisions per year across the proposed OHTL lines as presented in the table below. White Storks are predicted to have over 8 collisions per year without mitigation. Without mitigation this will have a significant impact, however mitigation is discussed in further details below.

**Table 8: Predicted Fatalities per Year for Proposed Alcazar Rasgha NIAT OHTLS**

Species	Collision Exposure Index Spring	Collision Exposure Index Autumn	Collision Exposure Index per year	Worst Case Scenario based on Site-Specific Prediction	Realistic Case Scenario based on Site-Specific Prediction
Black Kite	561.27	3.27	564.55	1.69	1.13
Black Stork	1.33	0	1.33	0.01	0.01
Booted Eagle	2.13	0	2.13	0.01	0.01
Common Kestrel	6.36	10.37	16.73	0.02	0.01
Egyptian Vulture	0.35	0	0.35	0.00	0.00
European Honey Buzzard	1.04	41.85	42.89	0.09	0.06
Imperial Eagle	0.03	0.00	0.03	0.00	0.00
Lesser Spotted Eagle	3.52	0	3.52	0.02	0.01
Long-legged Buzzard	0.55	0.20	0.75	0.00	0.00
Marsh Harrier	1.92	9.93	11.86	0.02	0.01
Montagu's Harrier	1.00	6.42	7.42	0.01	0.01
Osprey	0.48	0.00	0.48	0.00	0.00
Pallid Harrier	0.14	7.00	7.14	0.01	0.01
Peregrine Falcon	0.33	0	0.33	0.00	0.00
Short-toed Eagle	1.28	0	1.28	0.01	0.01
Sooty Falcon	1.00	1.00	2.00	0.00	0.00
Sparrowhawk	0.09	0	0.09	0.00	0.00
Greater Spotted Eagle	0.00	0	0.00	0.00	0.00
Steppe Buzzard	276.00	0.00	276.00	0.83	0.55
Steppe Eagle	18.60	0.39	19.00	0.11	0.08
White Pelican	0.00	63.06	63.06	0.63	0.41
White Stork	851.86	0.00	851.86	8.52	5.54
<b>Estimated Annual Fatalities</b>				<b>12.00</b>	<b>7.85</b>

Collisions with OHTLs could result in long-term negative impacts on MSBs through direct mortality and injury. Such impacts could be irreversible, will be between low to high magnitude and as such significance will vary from minor to major depending on the receptor species being affected.

### **C. Mitigation**

#### ***Operational Phase***

#### ***Direct and Indirect Impacts on Sensitive Receptors (Birds) – Collision with OHTL***

Due to the requirements and length of the OHTL, routing options will never be able to completely avoid the risk to migratory birds or the risk of collision impacts. However, as discussed earlier within “Section **Error! Reference source not found.**” one factor considered with siting by EETC was to align the route with existing OHTL route. Studies by Pallet et al. (2022) have shown that aligning and staggering the towers could reduce collisions of collision prone MSBs by 67%.

The proposed design of the towers and lines are possibly the least impactful possible as the towers are free standing with no support wires.

An extensive literature review and meta-analysis was performed (Bernardion et al. 2019) to evaluate the overall effectiveness of wire-marking in reducing bird collisions with powerlines, including the possible influencing factors of powerline voltage, habitat and type of device. Data was gathered from 35 field studies across the world (which included 66 trials) assessing the effectiveness of wire-marking based on regular carcass searches beneath power lines. Overall, wire-marking reduced bird collisions with power lines by 50.4%.

Mitigation is being installed to reduce the operational impact of the OHTL on migrating birds including birds of prey, waterbirds and other large soaring birds. The below table shows the difference in collision predictions with and without diverter mitigation. The results, based on local OHTL data, show that there is a reduction in collisions through the use of diverters and therefore this has been recommended for this project.

While high-voltage OHTLs present relatively low electrocution risk, this risk is not negligible, particularly at jumper connections and substation interfaces where conductor spacing is reduced. Appropriate mitigation measures, such as insulation of critical components and bird-safe substation design, will be implemented to minimize any residual risk.

**Table 9 Comparison of Annual Bird Collisions per Species Before and After Diverter Installation**

Species	Collisions per year without diverters	Collisions per year with diverters
Black Kite	1.13	0.56
Black Stork	0.01	0.00
Booted Eagle	0.01	0.00
Common Kestrel	0.01	0.01
Egyptian Vulture	0.00	0.00
European Honey Buzzard	0.06	0.03
Imperial Eagle	0.00	0.00
Lesser Spotted Eagle	0.01	0.01
Long-legged Buzzard	0.00	0.00
Marsh Harrier	0.01	0.01
Montagu's Harrier	0.01	0.00
Osprey	0.00	0.00
Pallid Harrier	0.01	0.00
Peregrine Falcon	0.00	0.00
Short-toed Eagle	0.01	0.00
Sooty Falcon	0.00	0.00
Sparrowhawk	0.00	0.00
Greater Spotted Eagle	0.00	0.00
Steppe Buzzard	0.55	0.28
Steppe Eagle	0.08	0.04
White Pelican	0.41	0.20
White Stork	5.54	2.77
<b>Estimated Annual Fatalities</b>	<b>7.9</b>	<b>3.9</b>

Based on the results of the PCFM Program conducted along the RGWE OHTL crossing the NIAT & RASGHA wind farm, the estimated annual bird collision fatality rate is consistent with the findings of the present assessment. The values derived from the initial analysis fall within the same range as those reported by the PCFM Program, indicating that the predicted collision risk is comparable and aligns with regional benchmarks for overhead transmission lines within this high-use migratory corridor.

Bird Flight Diverters (BFDs) are to be installed every 10 m along the entire length of the OHTL on the shield wire. All BFDs installed will be dynamic (*e.g.* move in the wind) to increase visibility. However, A hybrid approach combining dynamic and static bird diverters will be adopted to ensure both high visibility and durability under desert conditions, supported by regular maintenance to ensure continued effectiveness. The BFDs installed within 4km of the dam will include models that glow or light up at night (*e.g.* FireFly diverters) to increase visibility for birds staging in the area and arriving late or leaving early.

The Project Developer is committed to installing diverters that meet the required long-term guarantee and specifications. Installation of shield/earthing wire and attached BFDs will be completed by EETC around the same time (as practicably possible). BFDs will be installed by EETC to the manufacturer's guidance and assessment of the OHTL, taking into consideration number and spacing, at a minimum of 1 every 10m.

The installation of BFDs will need to be recorded by the Project Ecologist and these checks need to be included in the annual reports. BFDs should be checked every 6 months before the spring and autumn migration seasons so that they are in place and operational for higher risk periods. Any damaged or defective BFDs will need to be replaced within 2 months of being reported as faulty.

However, the need for and extent of replacing damaged / defective BFDs will be undertaken following a review of the outcomes of the PCFM studies (discussed in further details below). This issue will be discussed in agreement with lenders and other relevant stakeholders.

#### Indirect Impacts on Sensitive Receptors

- Ban on off-road driving, especially during sensitive periods of the year (e.g. breeding bird season) and if off-road driving is required a check of the working area should be completed by the Project's Ecologist.
- Speed limits to be enforced.
- Sensitive species are to be included in the site induction for all operational staff where additional control measures will be discussed including allowing animals to move around the site, not chasing after them in vehicles or approaching them on foot and what to do if they observe breeding birds within their works areas.

**In addition, if any significant maintenance work is required (e.g. replacement of any transmission towers or wires etc.) all impacts related to construction will be relevant and all mitigation outlined in previous sections will be followed.**

#### **D. Monitoring**

Long-term monitoring of the Project AoI will be completed as set out above and will include:

- Post-construction fatality monitoring to be completed in the first three years of operation to record the actual impact of collisions with the OHTL. Additional surveys and/or mitigation measures to be implemented as part of an Adaptive Management Strategy if no sufficient decrease in fatalities have been recorded.
- All of the above monitoring requirements will be included within Construction and Operational Biodiversity Management Plans which will include KPIs and a Biodiversity Monitoring and Evaluation Plan (BEMP) against which the results of the monitoring will be assessed.

#### *Avifauna*

- Operational monitoring will be completed in line with best international practice presented in Post-Construction Bird and Bat Fatality Monitoring for Onshore Wind Energy Facilities In Emerging Market Countries (EBRD, IFC, KfW 2023) to monitor actual levels of mortality. Post construction fatality monitoring will be completed along the whole OHTL and the program of post construction monitoring will include carcass searching, searcher efficiency trials and carcass persistence trials. The results of the post-construction fatality monitoring will be used to inform a GenEst Analysis. Post-construction monitoring will follow the latest international best practice including the recently published PCFM Handbook (EBRD, IFC, KfW 2023). Full details of the PCFM Protocol will be included in an Operational BMP/BAP documents.
- An adaptive management strategy will be developed (in line with the PCFM Handbook), and additional mitigation will be undertaken if the results of the post-construction fatality monitoring



indicate higher than predicted mortality, especially in relation to species of elevated conservation concern. Adaptive management could include retrofitting of BFDs (or different types of BFD) on unmarked lines where PCFM surveys indicate areas of elevated mortality or provision of additional BFDs on marked lines if the installed BFDs are not preventing (or reducing) mortality. This could include installation of additional BFDs or those that are shown to increase avoidance / reduce collision in species susceptible to OHTL impacts. Installation of BFDs can be undertaken using a drone and would not require powerlines to be disconnected. Installed mitigation (if deemed necessary and useful) could also be changed if additional research into the effectiveness of BFDs comes to light during the construction period which would be agreed with lenders.

- On completion of the post-construction fatality monitoring a decision will be taken to continue or cease this survey effort or reduce it to specific times of the year. This will be undertaken with the Lenders. If monitoring is ceased, site workers will continue to record any carcasses they find and this information will be passed on to the Project team.
- A chance finds procedure will be implemented and any carcasses seen by site workers will be reported to the Project Ecologist so that they can investigate.

#### **E. Cumulative Impacts**

##### ***Avifauna***

##### ***Cumulative Impacts with the other wind farms and other OHTLs schemes***

The cumulative impacts between the turbines and the OHTL have been considered. Without mitigation it is likely there would be a significant impact on MSBs. The turbines themselves are to operate on a 'Shut down on demand' strategy which is described in the BMP. This should mean that the combined impact of the turbines and OHTL is of minor significance, when proposed with mitigation along the length of the OHTL. An adaptive management scheme is proposed which will monitor higher than predicted mortality and further mitigation undertaken.

There are several windfarms in operation within the same area with associated OHTLs, and therefore the addition of new OHTL lines may have a cumulative impact on species within the area (see Figure below ).

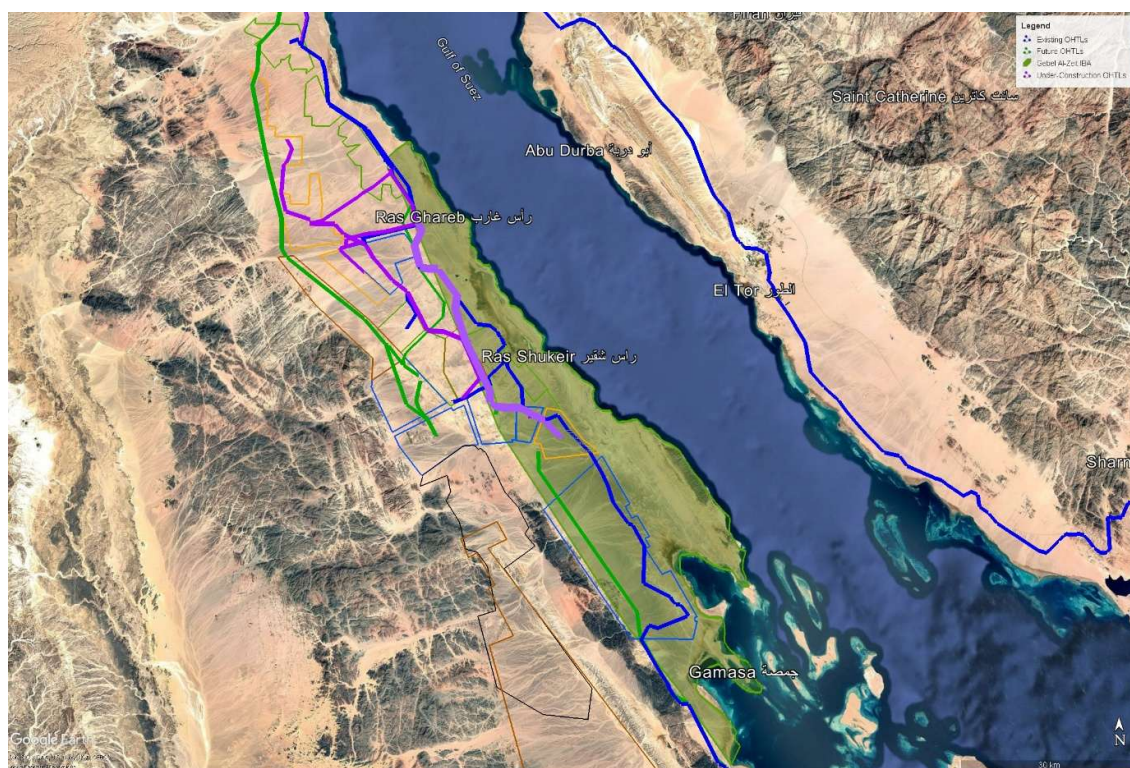


Figure 16: Wind and OHTL schemes within the Gulf of Suez

Because of this the aforementioned projects have been considered within this assessment as each project could potentially affect the same populations of migratory birds. For example birds migrating through Masdar IPH, RGWE, NREA Vesta, and AMUNET are likely to move across the NIAT & RASGHA wind farm and could also possibly migrate through its associated OHTLs.

For those projects already constructed or for those with impact assessments no significant residual impact are predicted after the application of impact avoidance through project design or additional mitigation has been applied such that residual impacts were considered to be minor / not significant.

Where residual negative impacts are possible and cannot be effectively mitigated, off-setting<sup>3</sup> will be applied to ensure no net loss to these VECs. Collision risk and electrocution residual impacts for other species (e.g. raptors) is not significant for any of these projects. The NIAT & RASGHA OHTLs consists of two large 220KV transmission lines which will be constructed with BFDs. Collision risk of other species will therefore be minimal as BFDs are known to be effective at significantly reducing collision in other species and electrocution risk for raptors is minimal on HV lines due to their size (and visibility), insulation, distance between any live parts and size of pylons providing ample safe perching opportunities well away from any dangerous components.

#### *Adaptive Management for Avifauna*

Adaptive management is triggered when target thresholds are exceeded and when new evidence acquired over time shows an increased or decreased risk to a priority bird VEC or an increased risk to a non-priority population. Increased risk to priority birds requires that mitigation and management

<sup>3</sup> The need for biodiversity offsets will be determined through the residual impact assessment following mitigation and will be triggered where significant residual impacts remain on VECs. This process will be aligned with IFC PS6/EBRD PR6 and formalized within the Biodiversity Action Plan.

measures be revised to uphold thresholds and promote the long-term viability of the population. For priority bird VECs that exhibit a decreased risk over time, their primary threshold target may be reassessed, and revised or reassigned to reflect the reduced risk to their long-term population viability. Non-priority populations that exhibit evidence of increased risk may be assigned as priority bird VECs, may have an appropriate threshold determined and may be subject to associated adaptive management response strategies. Adaptive management is a key component of threshold setting within the CEA as it provides a mechanism for dealing with the uncertainty associated with determining priority bird populations and with predicting thresholds for priority bird VECs.

### 1.3 Biodiversity Assessment

#### **Objectives**

This study's objective was to evaluate the site's biodiversity and ecological merits by conducting field research in a given area. The study's objectives include:

- Locate and classify the fauna and flora species in the region under investigation.
- Determining the relative diversity and abundance of the dominant species.
- Evaluate the region's relative ecological importance for terrestrial fauna and flora, based on data from the field and taking into account known and potential species

#### **Methodology**

Data collection was facilitated through a two-pronged approach. The first stage is based on a review of existing literature which includes published sources of previous studies, data, surveys, and records available in published scientific papers, books, and journals on flora and fauna of the region, other available data from different studies that have been conducted in the area and adjacent areas, as well as any available grey literature or vernacular knowledge based on local community observations to establish a preliminary baseline data on terrestrial fauna and flora of proposed project area. The second stage consists of field surveys designed to gather primary data, confirm species identities, and document existing habitats within the project area.

According to (Kassas, 2003; Harhash, et al, 2015) the site is generally located in a desert coastal plain that encompasses the habitats of Hamada deserts, Wadis, and Hills interspersed with drainage channels for rain and flood. The research was carried out in a 11 km region of the Egyptian Red Sea desert habitat. The area is crossed by some main drainage wadis, making it a main feature in the study site that should be addressed in the OHTLs allocation and the Biodiversity Management Plan (BMP). The conservation status of each species is determined using the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2024).

Eighteen sampling points were selected systematically. Every point was selected at an average distance of 500 meters from each other to cover the whole area of the study, along the OHTLs. In addition to walking along the rest of the OHTL to survey 100 meters on either side of the line, covering important areas, and gap-filling along the OHTL's way. Stratification was not applied as the area was small enough to be considered homogenous on both ecological and topological scales. The observed Plant species were recorded over a circular area with a 50m diameter using the quadrat method, whereas small mammals were recorded using the active search approach. A dedicated system of transects is also used, with sampling as starting points and walking a 100m transect in the four cardinal directions (E, W, N & S). These transects are applied to look for the reptiles, especially the Egyptian Spiny-tailed lizard (*Uromastix aegyptia*), which is of significant importance as a Vulnerable species of the Area. which is of significant importance as a Vulnerable species of the Area.

### **Field Survey and Assessment**

The field surveys' main goal is to evaluate the biodiversity of the region and identify important habitats, that may be found inside the planned project region. The surveys were important for gathering factual data on the current status of species and determining any possible impacts of the proposed power lines on the species that may be present, in order to evaluate if mitigating actions are required or recommended in due course.



**Figure 17: Site Landscape.**

Site surveys were informed by international standards to identify/confirm prospective characteristics within the survey area that might be used by diverse terrestrial species. The surveys necessitate a comprehensive scale approach to determine the probable purposes for each portion of the survey area to be used for faunal species living, foraging, and mobility.

Furthermore, while analysing the significance of area's habitats to the species, data on the species densities was obtained by a standardized assessment of species activities within the area. The surveys included two main components:

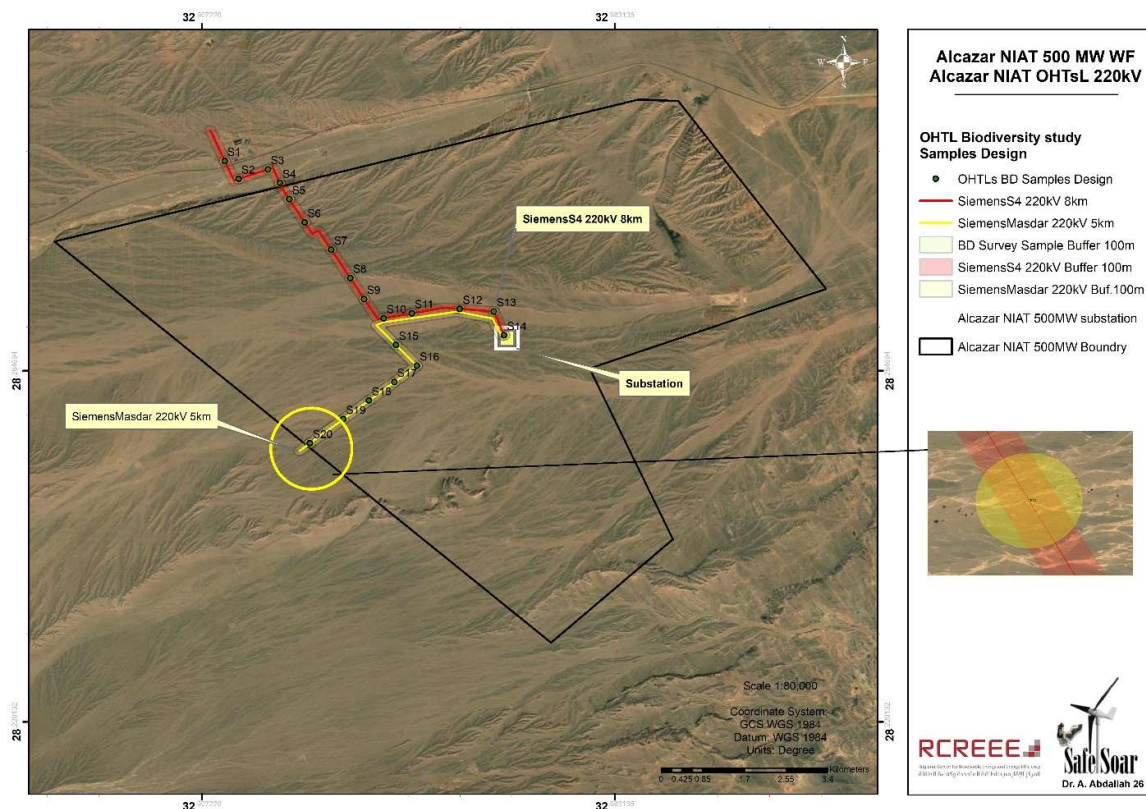
- Detailed inventory and assessment of the Fauna and Flora of the study site using detailed balanced spatial sampling design that is guaranteed to provide comprehensiveness and representation. This provides actual detection of species, ease their identification, and abundance estimation within the area. This field-based data is critical in verifying the need and scale of any further required measures, to be adopted in light of the new available data from the field for certain taxa.



- Detailed survey effort to account for the presence and density of specially threatened species that are known to occur in the area; Namely the Spiny tailed Lizard (Nagy, et al 2022).

A standardised sampling method was applied over the whole study region, allocating 20 sampling points along the proposed power lines length, maintaining at least 500 m as a minimum distance between sample sites to achieve regional comprehensive coverage and avoid double sampling in the vicinity of each site to maintain sample independence (map2). Assessment method was implemented to survey and assess the terrestrial flora and fauna of the project area including mammals (volant and non-volant; large, medium and small), herpetofauna (reptiles and amphibians), and invertebrate faunal species. The same sampling sites was used to collect data for the Flora and plant species. Further details of sampling for each particular taxa are detailed below.

A combination of different methods is applied to survey the study area. Walk transects; drive transects as well as active searching methods are conducted to obtain the required data about existing habitats,



fauna and flora of the study area. Habitats of the study area were explored along with their associated biodiversity. The presence of the faunal species was confirmed by direct observation or other associated signs such as tracks, dens and droppings. Photographic documentation for habitats, species and their signs were applied when possible. Particular attention was drawn to habitats that potentially support species of conservation interest such as protected and threatened species, if found.

**Map (1) Sampling Design and Site Influence area.**

Table 10: Sample Site Coordinates

ID	Latitude	Longitude	ID	Latitude	Longitude
St1	28.323289	32.911393	St11	28.295241	32.945816
St2	28.319975	32.91395	St12	28.296052	32.954614
St3	28.321741	32.919354	St13	28.295603	32.960879
St4	28.319232	32.921512	St14	28.291243	32.962775
St5	28.316245	32.923246	St15	28.289442	32.942901
St6	28.31198	32.92611	St16	28.285632	32.946737
St7	28.306966	32.930965	St17	28.282615	32.942594
St8	28.301756	32.934481	St18	28.279236	32.937921
St9	28.297888	32.937039	St19	28.275814	32.933195
St10	28.294347	32.940635	St20	28.271373	32.927073

### **Floral Survey**

Flora survey was conducted from the specified sampling point as shown in map (2) where the observer surveyed four 10m X 10m plots allocated in the four quarters of a 50m diameter circle around the sampling point in addition to the central plot around the point making a total of 5 quadrates in each sampling point see figure (2). The observer recorded the species and abundance of each species present in the quadrates using the sheet in APPENDIX I. Later calculations are done to account vegetation cover of the floral species per site and then pooled for the whole study site. Refraction curves or species-Area accumulation curves are created to account for the comprehensiveness and coverage of the survey in accounting for the flora in the site.

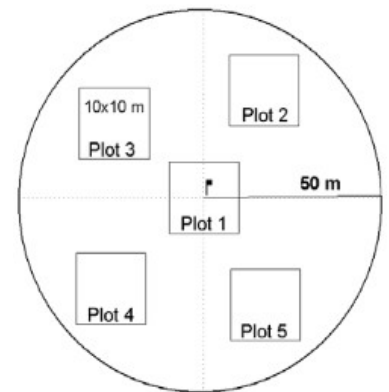


Figure 18: In the circular plot of 50m diameter, 5 plots of 10x10m are to be sampled for plant species and abundance.

### **Faunal Survey**

#### **Mammalian Species Survey**

Large, medium-sized and small mammals were surveyed adopting different methods including active search, and line transects from each of the sampling points.

- Line transects: transects in many areas of the project site of over 100m long, one in each cardinal direction (E, W, S. &N.) are conducted to provide detailed assessment of fauna species. Observed species are recorded and photographed when possible.
- Active search: during the active search, within 50 metres in both directions around the OHTLs and along the path, which was carried out all over the different parts of the area, animal signs such

as markings, urine, faeces, dens, tracks, trails, carcasses, remains of preys or even direct observation of mammals were recorded and documented, when present.

*Herpetofauna (Reptiles and Amphibians).*

Reptiles use habitats that offer exposure to the sun, cover from predators, suitable food and safe refuges. Diurnal active searching were used for reptiles survey (no amphibian species are known to inhabit the area), which involve searching for suitable basking spots, searching particular microhabitats, turning over rocks and logs, raking soil and leaf litter, and searching soil cracks and holes. Trees (especially acacia trees) and large shrubs – if any – and surroundings were checked for the presence of snakes. Results are reported separately for reptiles and ground dwelling arthropods.

A GIS-based survey design was prepared taking into account OHTLs lengths and account for the hydrology of the landscape to create 31 sampling stations as square-shaped line transects across the landscape with a distance of 100 m per transect ( Map 2). Those line transects are evenly distributed across all the habitats and landscapes along the proposed power line length . The lines take square-shape to increase the detectability of *Uromastix aegyptia* and its burrows. This survey design reveals the spatial distribution, and abundance of mammals, especially large and medium sized, as well as *Uromastix aegyptia* in the study area.

During the navigation time between stations the team conducted drive transects, in which each surveyor covers both sides of the path, any wildlife observations were recorded in specially made data sheets ( see Appendix).



Figure 19: The Egyptian spiny tailed Lizard *Uromastix aegyptia* lizard was spotted directly during Line transect.

## **Results:**

### *Flora Biodiversity*

Vegetation cover in the project area was extremely sparse, restricted to single drainage channels. Vegetation within the project area generally has low species richness and density, and a very patchy distribution. The wadis tend to support the most vegetation due to generally higher soil moisture levels.

According to the literature review of the flora recorded along the coastal desert of the Red Sea, a total of 68 species were recorded in the project site and its vicinity (Abd El-Ghani et al, 2014), see Appendix.

Twenty sites were surveyed as described in the methodology sections. The floral community of the study area comprises about 6 species only, which follow six genera and five families, and include one dominant species *Caroxylon imbricatum*. Except for the main drainage channels or wadis, which have better vegetation cover than elsewhere in the Project area, the rest of the study is sparsely vegetated (Map 3). The collective Average of Vegetation cover for the study area was 0.190 % while the minimum value of 0.00 % in 5 samples, and a maximum of 1.726 %. Species richness was also exhibiting a similar trend, shown in maps (3 and 4).

**Table 11: Sites and vegetation measurements (Species and vegetation cover)**

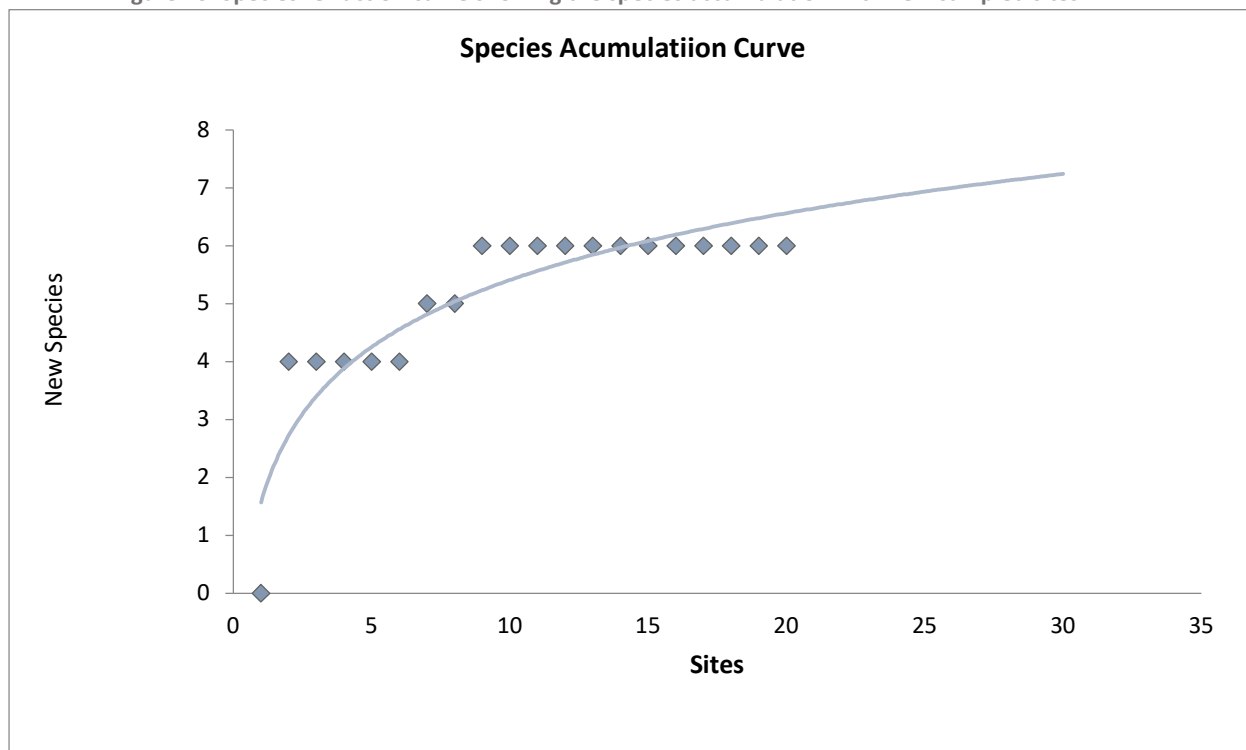
ID	No. of Species	No of Individual	Vegetaion Cover/m <sup>2</sup>	V. Cover %
St1	4	7	8.081	0.1029
St2	1	1	0.196	0.0025
St3	1	14	58.190	0.7409
St4	1	1	0.283	0.0036
St5	1	8	5.673	0.0722
St6	2	9	8.833	0.1125
St7	1	10	3.850	0.0490
St8	2	24	135.555	1.7259
St9	1	9	11.951	0.1522
St10	0	0	0.000	0.0000
St11	0	0	0.000	0.0000
St12	1	9	55.440	0.7059
St13	1	1	5.728	0.0729
St14	1	5	1.925	0.0245
St15	1	1	0.196	0.0025

St16	1	3	2.357	0.0300
St17	0	0	0.000	0.0000
St18	0	0	0.000	0.0000
St19	0	0	0.000	0.0000
St20	1	3	0.589	0.0075

The observed species richness for the study area was a collective 6 species while the individual site species richness ranged from a minimum of 0 species to a maximum of 4 species in one site. The average species richness recorded over the observed sites was 1.05 species, *Caroxylon imbricatum* is the highest richness species on the study area. Again, on the contrary of the diversity pattern, species richness shows very limited spatial variation. The areas outside the Wadis and their channels are completely barren, not having any plants.

A species refraction curve was constructed see Figure below and it shows that a plateau is reached at about 7 species by sampling 30 sites. Thus, it is concluded that the current sampling plan recording 6 species at 20 sites sampled is very suitable to account for the flora in the study region.

Figure 20: Species refraction curve showing the species accumulation with new sampled sites.

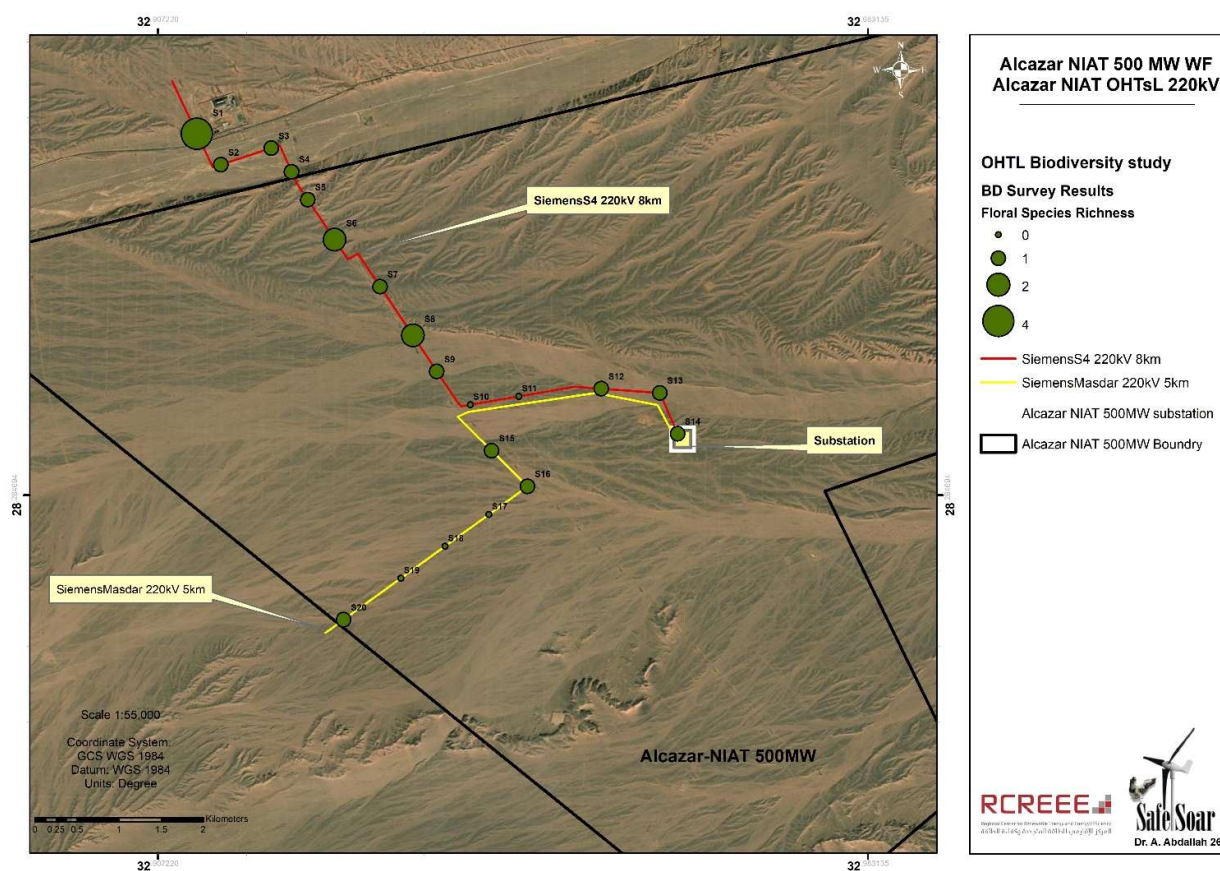




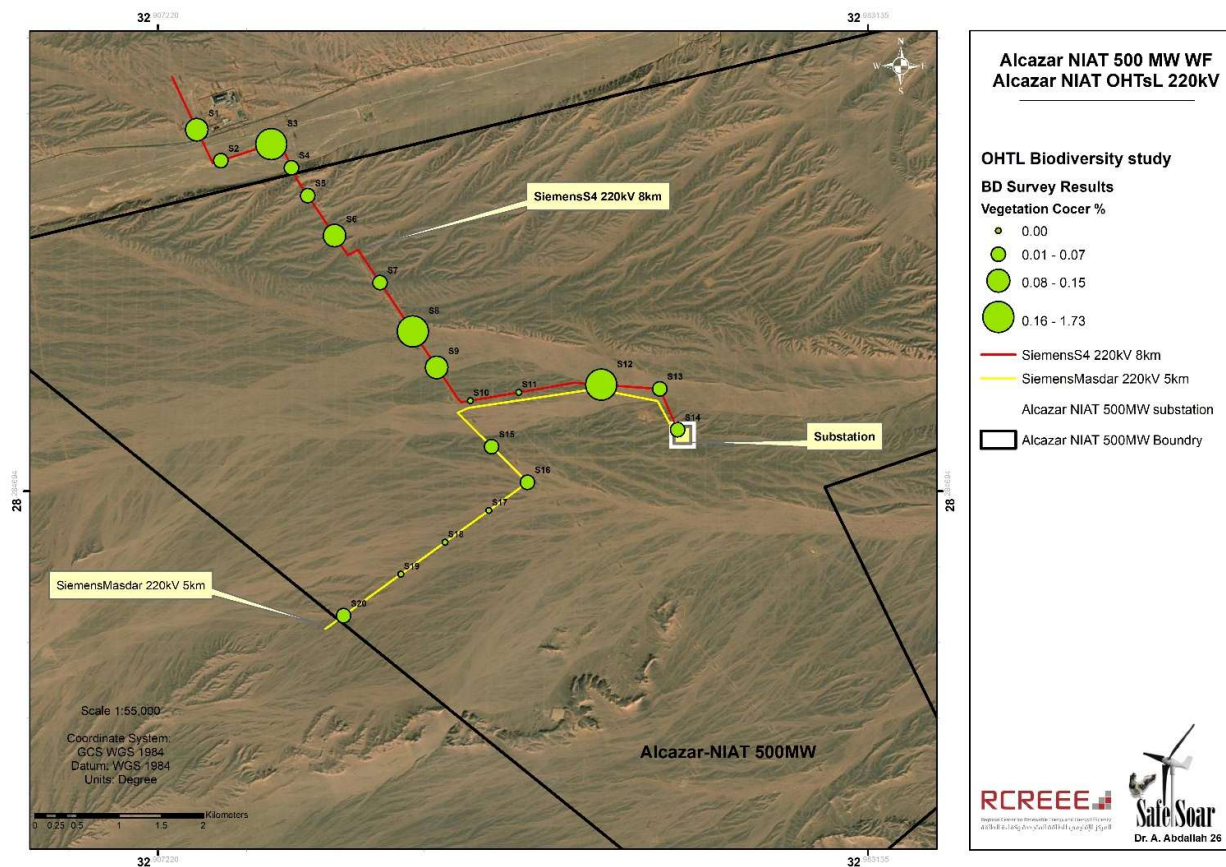
**Table 12: list of the Plants recorded Species showing total abundance and Total of Individual.**

Species	Sum of Abundance	Total of individual
<i>Caroxylon imbricatum</i> (Forssk.) Moq.	14	95
<i>Heliotropium strigosum</i> Boiss.	1	2
<i>Morettia philaeana</i> (Delile) DC.	1	1
<i>Ochradenus baccatus</i> Delile.	1	1
<i>Tetraena coccinea</i> (L.) Beier & Thulin	1	1
<i>Zygophyllum arabicum</i> (L.) Christenh. & Byng	1	2

None of the floral species recorded in the study region is known to be neither endemic nor of a special conservation value as being endangered or threatened according to (IUCN) Red List of Threatened Species (IUCN, 2026). Some of the commonly observed species are known to be palatable species and of importance as grazing species for the local livestock and wildlife. Specially the *Caroxylon imbricate*, *Heliotropium strigosum* and the *Zygophyllum arabica* L.



**Map (2) FloralSpecies Richness per site values in the study region.**



Map (4) Vegetation Cover % per site values in the study region.



*Caroxylon imbricatum*



*Heliotropium strigosum*



*Ochradenus baccatus*

Figure 21: Some recorded Plant Species

### Fauna Biodiversity

Fauna species richness for the study area was a collective 4 species, while the individual site species richness ranged from a minimum of 0 species to a maximum of 3 species in one site. The average species richness recorded over the observed sites was less than 1. Lizard and Rodent (Burrow and tracks) is the highest species richness in the study area.

**Table 13: Sites and Fanna (Species and Observations)**

ID	No. of Species	No of Individual
St1	0	0
St2	0	0
St3	0	0
St4	0	0
St5	3	4
St6	2	4
St7	0	0
St8	3	33
St9	0	0
St10	0	0
St11	1	1
St12	0	0
St13	0	0
St14	0	0
St15	0	0
St16	0	0
St17	0	0
St18	0	0
St19	0	0
St20	0	0

A species refracton curve was constructed (see Figure below) and it shows that a plateau is reached at about 5 species by sampling 30 sites. Thus, it is concluded that the current sampling plan recording 4 species at 20 sites sampled is suitable to account for the fauna a in the study region.

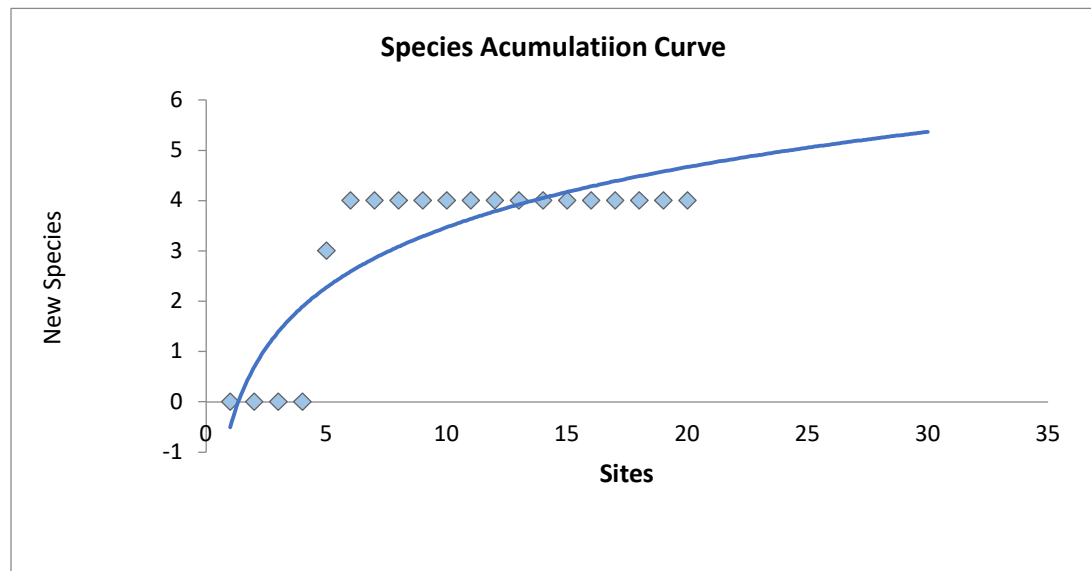


Figure 22: Fauna Species refracton curve showing the species accumulation with new sampled sites.

### Reptiles

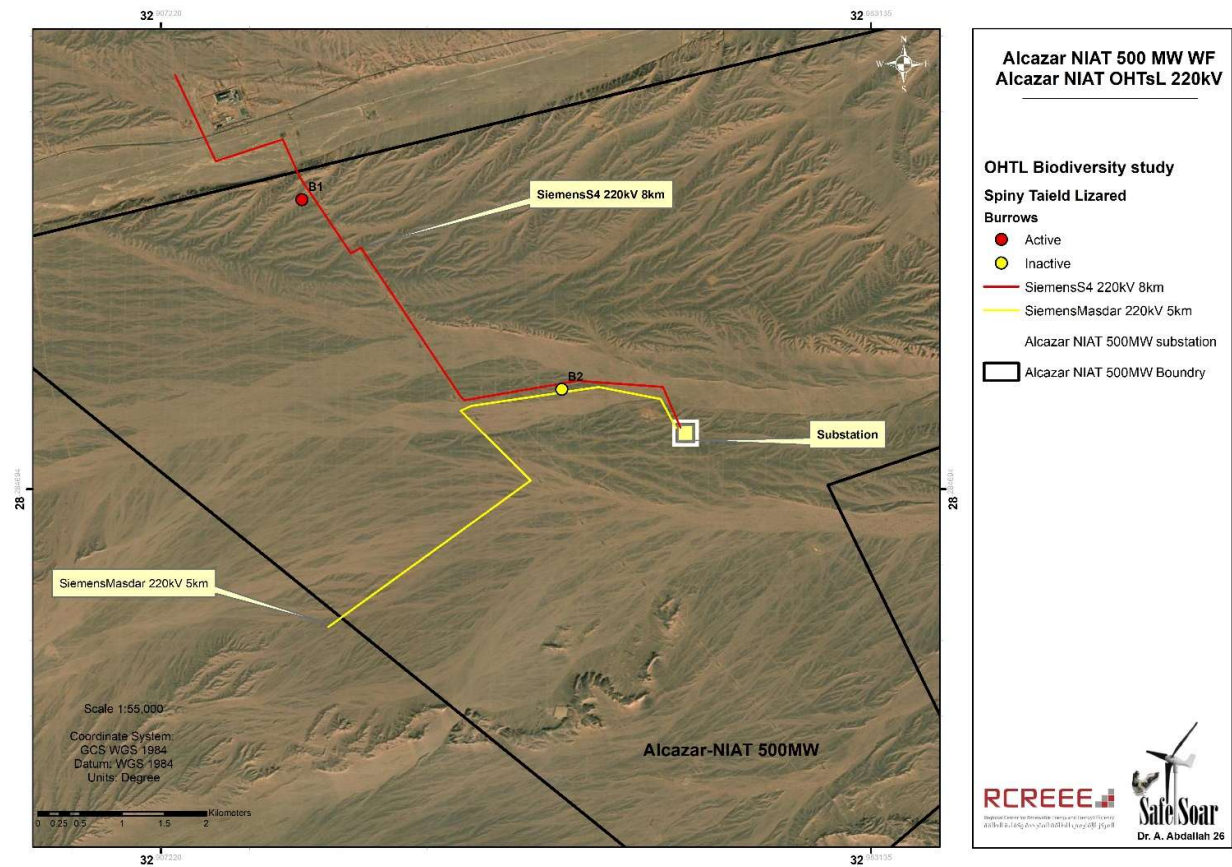
The reptile taxa detected during our investigation included 2 lizard species, namely: Spiny-tailed Lizard *Uromastyx aegyptia*, and Lizard *ssp.* Many other lizards and snakes almost certainly occur in the region but have not been recorded by the team during the survey.

The Spiny-tailed Lizard is the only reptile species that is on the IUCN Red List (regarded as Vulnerable), all the others are Least Concern (IUCN 2026).

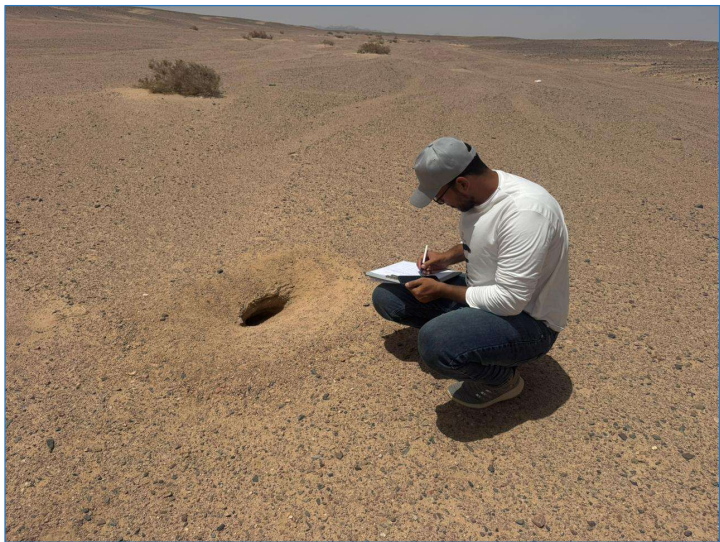
The survey for these endangered taxa resulted in detecting about one active and another inactive burrows, in 20 sampling stations, and along the path of the OHTLs. This yields an average density of about 0.3 uromastyc / km. These burrows showed variable spatial distribution over the site. Although Spiny-tailed Lizard presence was observed all over the study region, the southern portion of the study site is relatively highly populated with Spiny-tailed Lizard burrows and presence signs compared to the rest of the study site. In addition, the big wadis running east to west along the OHTL are remarkably void of burrows or other presence signs. This is probably because this lizard would avoid very low grounds and seek higher grounds for burrows to avoid potential flooding in Wadis. Also, avoid the highest mountains and the deepest wadis to avoid harsh and unsuitable soil for burrowing. Overall, Spiny-tailed Lizard is considered to be a Vulnerable species (IUCN Red List, 2024), which is exhibiting high presence in the site. According to the IUCN Red List assessment there has been a suspected population decline of over 30% over the past 15 years (3 generations), and this is expected to continue. It is recommended for this to be addressed as priority for the Biodiversity Management Plan of the



project. Translocation of this population is a must to mitigate the expected impact of the project on local Biodiversity.



Map (5): Recorded Spiny-tailed Lizard (Burrows along the proposed OHTL).

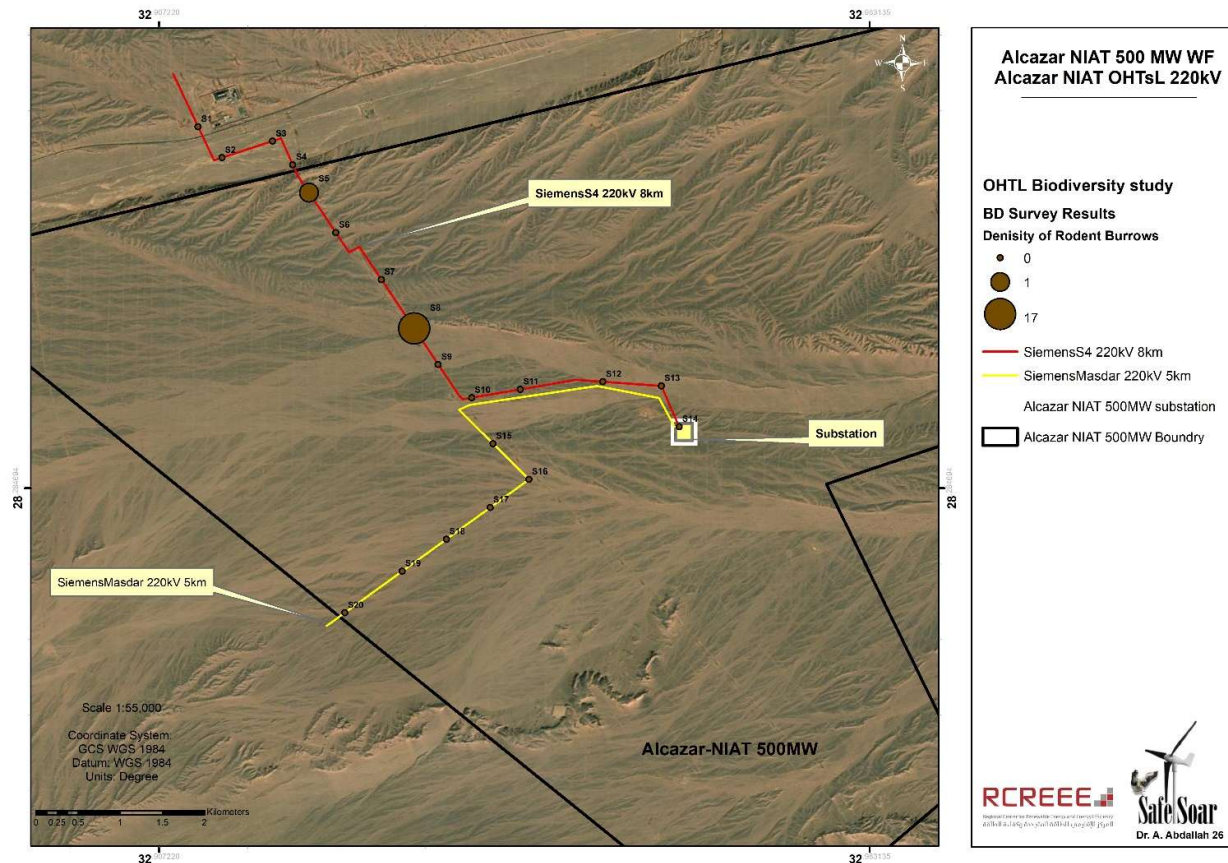


Mammals

No mammal species was recorded in the study region during our investigations.



Burrows and tracks belonging to smaller rodents, mostly *Gerbillus gerbillus* and *Acomys caherinus* were observed. Most of these rodent species are typical species of the Gulf of Suez coastal ecosystem and are commonly encountered. Rodent species recorded in study area are all Least Concern.



**Map (6): Distribution of Rodent Density (Burrows along the proposed OHTL).**

#### *Conclusion and Recommendations:*

The site shows a typical Red Sea coast Biodiversity with no endemic species recorded in the course of the multiple methods applied. The flora and fauna of the site were relatively on the Moderate side of the spectrum. The biodiversity and species richness measures for the flora were low and reflected a diverse site. Yet there were no endemic species recorded.

We recommend that conservation efforts in the Site focus on preserving key reptile species of the Spiny-tailed Lizard. Although of a very low density, only one active burrow of this kind has been recorded in the Southern Part of OHTLs in the range of 50m. The recommendation is to avoid this burrow. If it is not possible to avoid according to construction, a translocation operation should be conducted, and should be translocated to a less disturbed and suitable habitat.

**Training and Awareness:** Train construction staff on the importance of terrestrial fauna, especially key species like the Spiny-tailed lizard. Highlight the importance of minimizing disturbance to wildlife and their habitats. This could involve briefings on the importance of fauna and the potential impacts of disturbance, littering, or straying off designated trails.

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**Appendix I Flora Sheet**

Site: Project Alcazar NIAT 500MW OHTLS	Transect :	Circle radius/r= 50 m	Habitats description:
Date:		Quarter= 10m X 10m	
Researcher:	N:		
	E:		

[illegible]

## Appendix II Fauna Sheet

### Fauna Data Sheet (Dabb)

Site: Project Alcazar NIAT 500MW OHTLs

Date:

Researcher:

Start T.:

End Time:

Transect :

N:

E:

Alt.

**Habitats description:**

[illegible]

## 2.2 Appendix III Flora check list of species recorded in the site.

No.	Latin Name	A.Name	Family Name	IUCN/R.List
1.	<i>Caroxylon imbricatum (Forssk.) Moq.</i>	خريط	Amaranthaceae	Not Evaluated
2.	<i>Heliotropium strigosum Boiss.</i>	مُكْر	Boraginaceae	Not Evaluated
3.	<i>Morettia philaeana (Delile) DC.</i>	الثغر	Brassicales	Not Evaluated
4.	<i>Ochradenus baccatus Delile.</i>	القِرَضِي	Resedaceae	Least Concern
5.	<i>Tetraena coccinea (L.) Beier &amp; Thulin</i>	رُطْرِيْط	Zygophyllaceae	Not Evaluated
6.	<i>Zygophyllum arabicum (L.) Christenh. &amp; Byng</i>	الشُّكَاعِي	Zygophyllaceae	Not Evaluated

**Appendix VI Funa check list of species recorded in the site.**

<u>Order</u>	<u>Family</u>	<u>Scientific Name</u>	<u>Common Name</u>	<u>IUCN</u>	<u>Recording</u>
<u>Reptiles</u>					
Squamata	Agamidae	<i>Uromastyx aegyptia</i> (Forskål, 1775)	Spinny tailed lizard	VU	Direct observation/Burrows



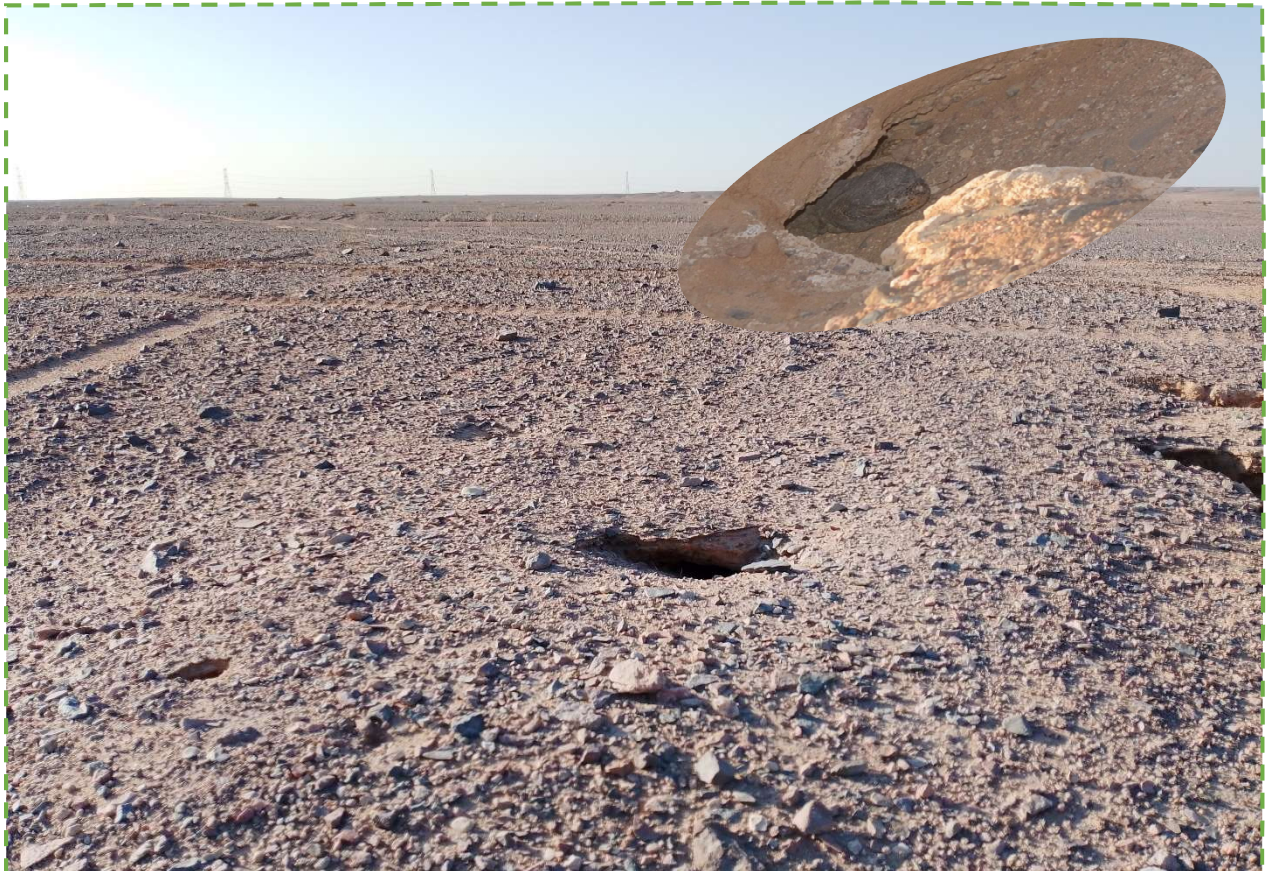


# Spiny-tailed Lizard Survey of ALCAZAR-NIAT 500MW Wind Energy site on the Gulf of Suez Region, Egypt

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Biodiversity Report Ver1

**Safe Sour**



22 – 30 May, 2025

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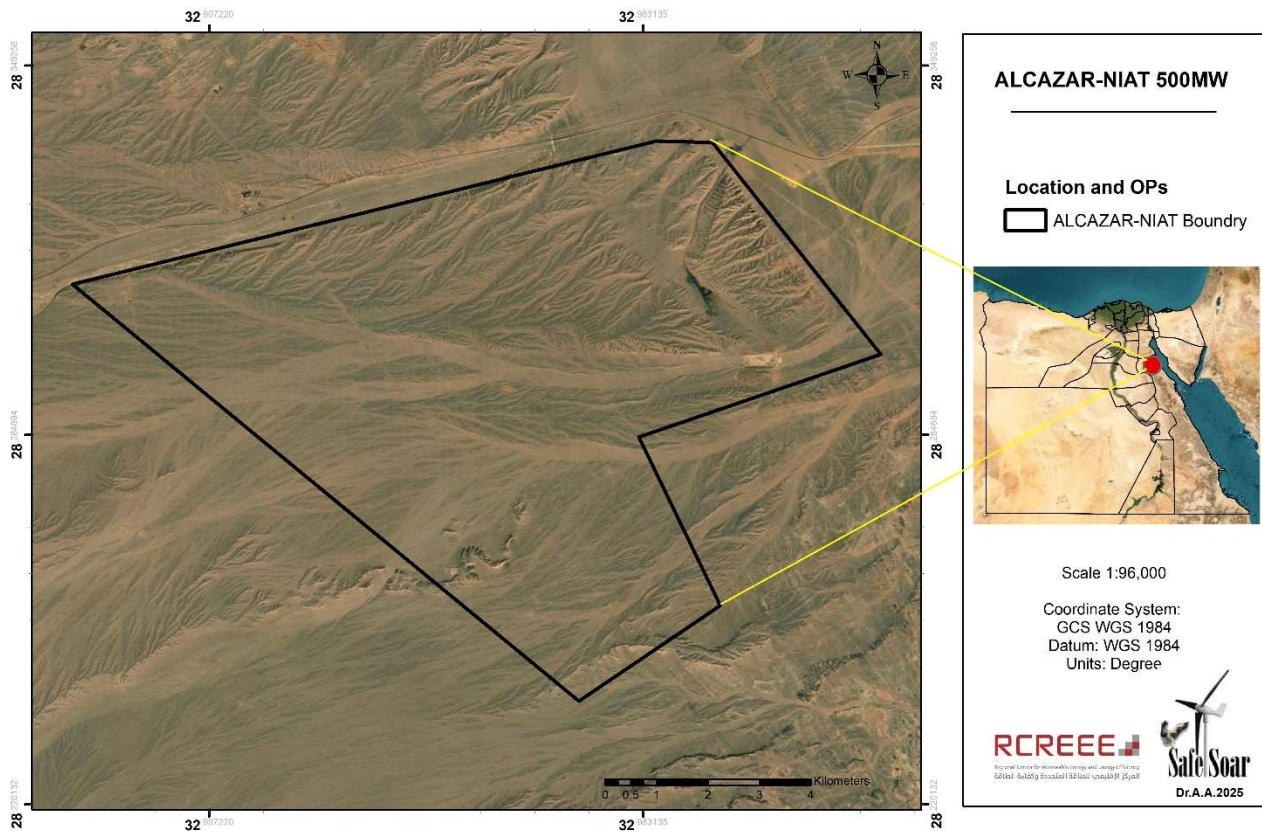
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# 1. INTRODUCTION

The New and Renewable Energy Authority (NREA), entrusted with spearheading the nation's transition towards renewable energy, plays a pivotal role in realizing these objectives. Through strategic partnerships with both domestic and international stakeholders, NREA has laid the groundwork for ambitious projects aimed at harnessing Egypt's renewable energy potential.

Alcazar Energy Partners is a Dubai-based independent sustainable investment manager with a strong track record in investing and developing utility-scale renewable energy projects in emerging markets since 2014. The Alcazar NIAT wind farm refers to a project developed by NIAT (National Infrastructure for the Development of Agricultural and Industrial Technologies) and Alcazar Energy in Egypt, involving a wind power capacity of 500 MW, situated to the west of Ras Ghareb city.

The project area, located on the west bank of the Gulf of Suez, a northern extension of the Red Sea Coast of Egypt, is characterized by its arid landscape and unique biodiversity. The region is part of the larger Red Sea Coastal Desert. Rocky terrain, wadi channels, and mountains dominate the landscape. The site is located 10 km to the west of Ras Gharib, shown in map (1).





The Alcazar-NIAT wind farm occupies around 73 Km<sup>2</sup> (calculated using WGS 84 UTM Zone 36N) with a maximum length from north to south of around 11.3 Km and a maximum width from east to west of around 13.9 Km. The site is bounded by Latitude 28.322845° at the northern end and Latitude 28.238836° at its southern end. The general Landscape of the site is shown in Figure 1..

The site's topology is entirely flat, with no significant hills or plateaus. It slopes from west to east and is dissected by many wadis and drainage channels that also flow eastward.





### Figure 1: Site Landscape.

Despite the challenging conditions, the Egyptian Red Sea Coast landscape and biodiversity are of significant ecological and scientific interest. The area is part of ongoing studies on desertification and environmental sensitivity, aiming to understand and mitigate the impacts of climate change and human activities on these fragile ecosystems.

The fauna of the Red Sea coast includes a range of desert-adapted animals such as reptiles, small mammals, and birds. The region is also home to several species of insects and arachnids that have adapted to the extreme environment (Biodiversity of Egypt, 2024). The presence of oases provides a habitat for more diverse wildlife, including migratory birds that use these areas as stopover points during their long journeys.

The conservation status of the endemic Species as the Spiny-tailed Lizard (*Uromastix aegyptia*), is a concern due to threats such as climate change, overgrazing, urbanization, and tourism. Efforts are being made to evaluate and protect these unique species to ensure their survival.

## 2. OBJECTIVES

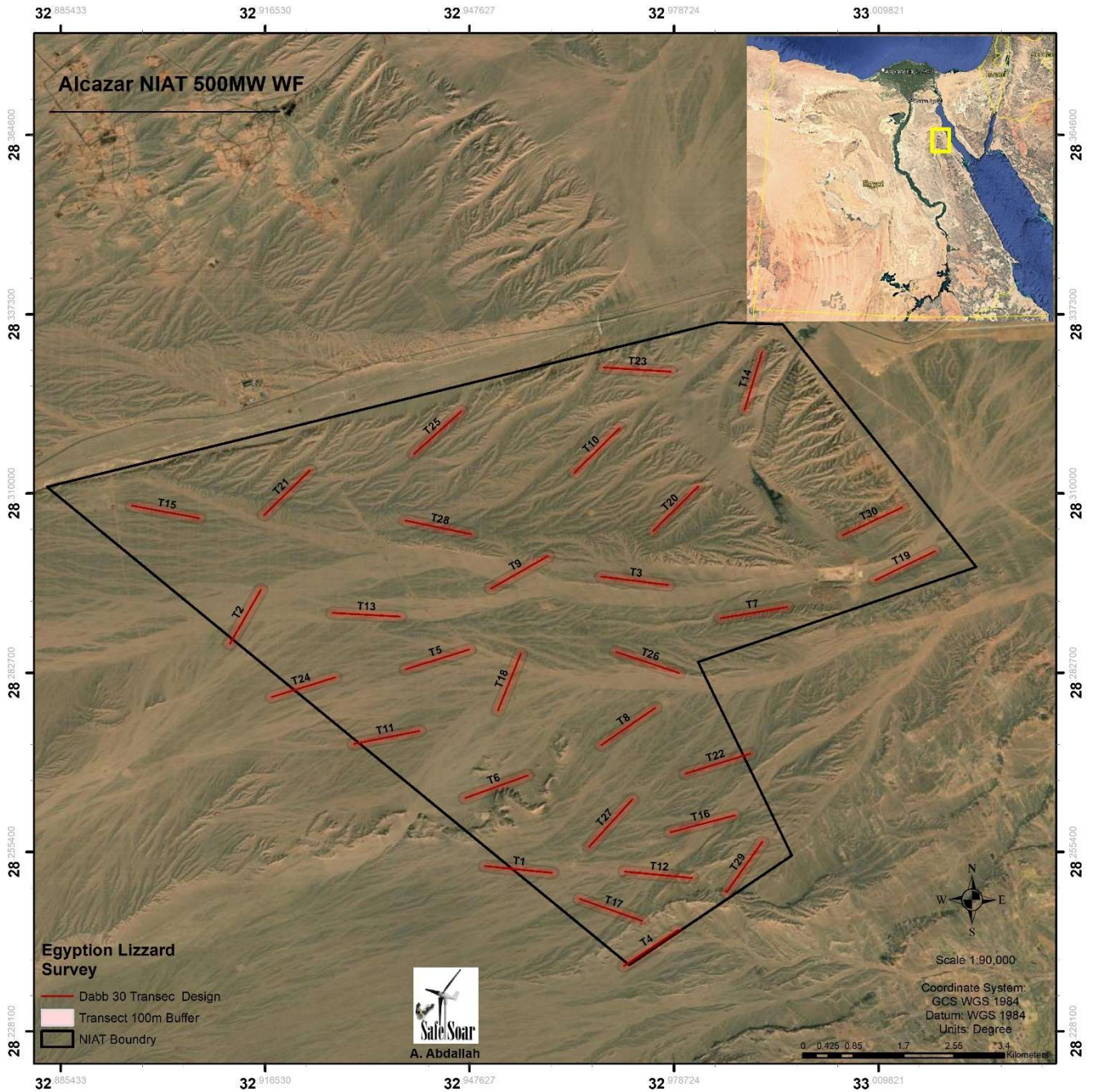
The consulting firm will **undertake pre-construction biodiversity screening surveys at ALCAZAR-NIAT 500MW Wind Energy** site prior to civil works commencing to ensure that impacts to terrestrial priority biodiversity, such as the Egyptian Spiny-tailed Lizard (see Project Critical Habitat Assessment), are avoided and/or minimised as per the Project Biodiversity Management Plans for ALCAZAR-NIAT 500MW project.

## 3. METHODOLOGY

This section contains the proposed methodology to conduct a survey of the Egyptian Spiny Lizard within the Project area. Reptiles use habitats that offer sun exposure, protection from predators, suitable food and safe refuges. Diurnal active searching will be used for the spiny-tailed lizard (Dabb), which involves searching for suitable basking spots, and suitable habitats. Results will be reported as fixes and the status of the observation. Stata will include active, basking, active burrows, and inactive burrows. All will be

regarded as a positive presence of the spiny-tailed lizard. Dedicated surveys for the endangered spiny-tailed lizard were done with 30 transects distributed randomly over the study site. Every point was chosen at an average distance of 1000 meters from each other to cover the whole area of the study site as shown in the map (**Map 1**). Stratification was not applied, as the area was small enough to be considered homogenous on both ecological and topological scales.

- Active search walks will be conducted for 1000m starting from the designated sample point, within 100 metres in both directions around the line and along the path. The walk direction will be parallel to the direction of the drainage channel, if there is one; otherwise, it should follow the general slope in the landscape. These transects are applied to look for the Reptiles, especially the Egyptian Spiny-tailed lizard (*Uromastyx aegyptia*), which is of significant importance as a Vulnerable species of the Area.
- The dump area was avoided in the survey points. It's unexpected that there are lizards because there are so many stray dogs in this area.
- Good care should be given to all marks of Lizard presence, including tracks, tail drags, faces, and burrows.
- Observations recording, and mapping to determine the density of presence marks and map the trend over the study area.
- The field survey will be implemented by two teams; each team composed of 2 experts who carry out day-to-day field surveys.

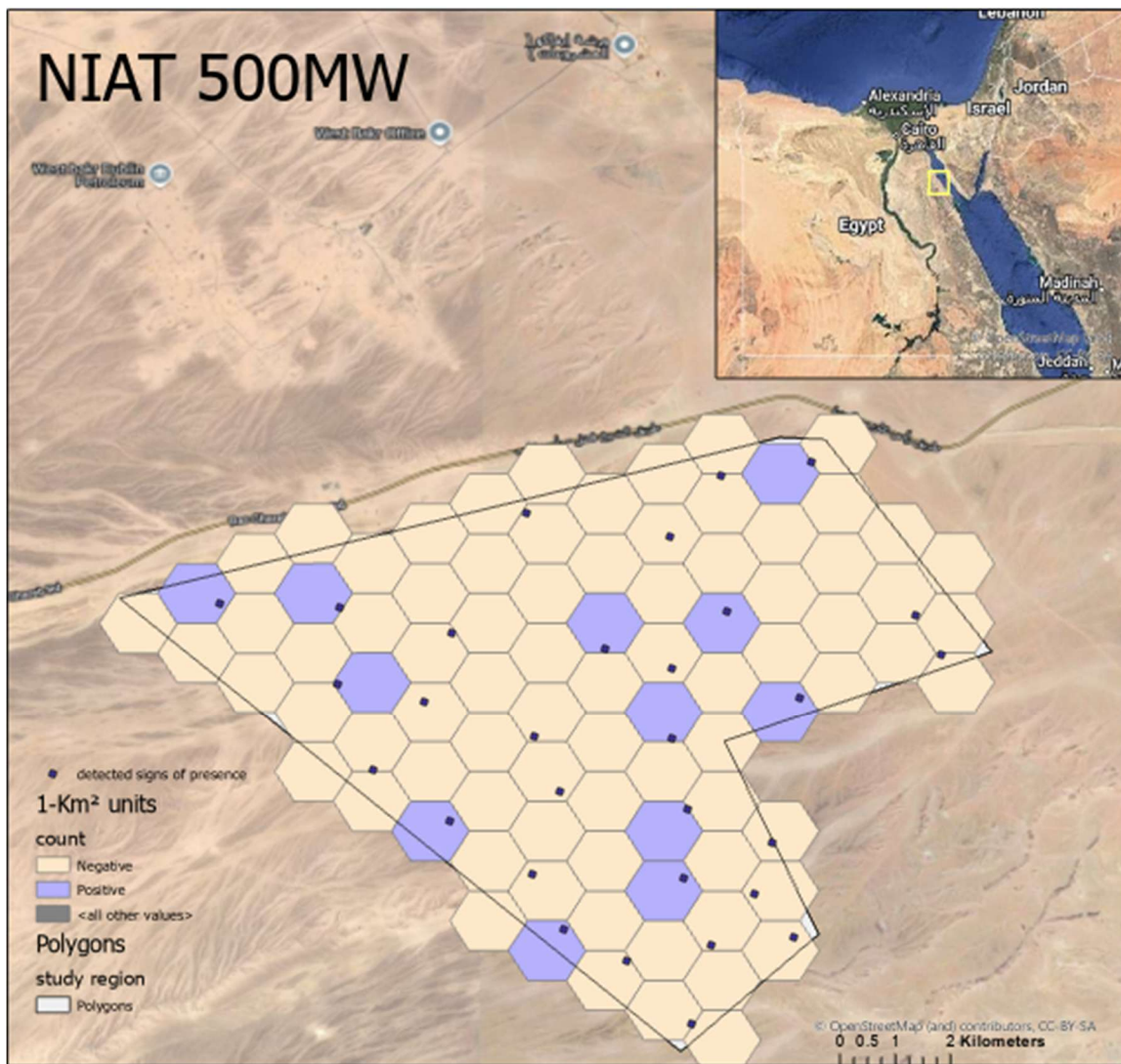


Map (2) showing the sampling transects of the spiny-tailed lizard survey.

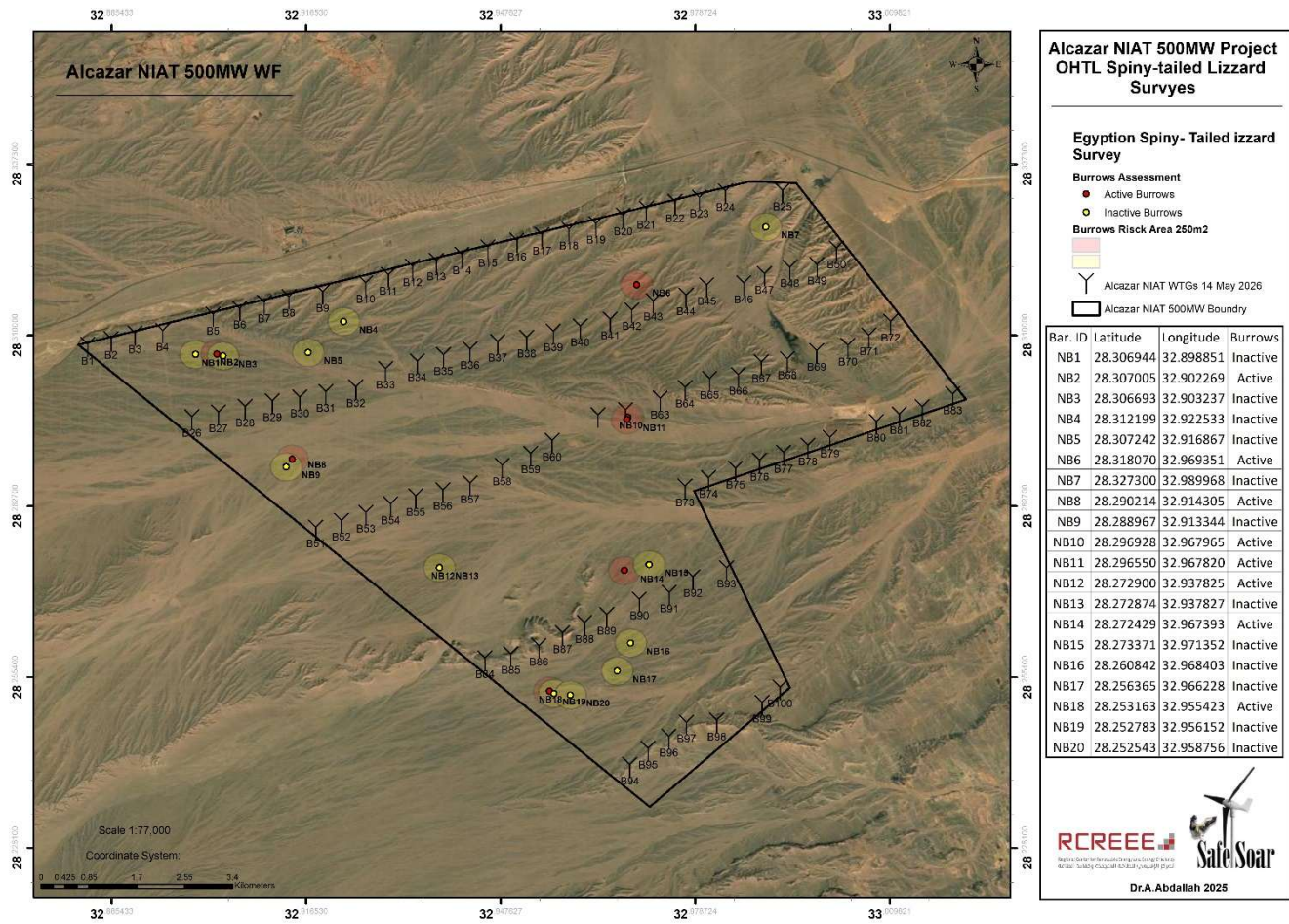


#### 4. RESULTS:

The survey resulted in detecting about 20 marks of presence for the endangered spiny-tailed lizard *Euromastix aegyptia*. These included about 8 active burrows and about 9 non-active ones, in addition to other signs such as scats and tracks. This yields an average density of about 0.136 burrow/Km<sup>2</sup>. These burrows showed a apparent random distribution of distribution over the site, where no particular pattern. This is probably because of the homogeneity of the terrain in the study sit, where spatial distribution of spiny-tailed lizard is mostly dictated by the terrain and soil type. In this case there is no detectable pattern in these properties and thus no pattern in spiny-tailed lizard distribution.



Map (3) Final Active and Inactive Egyptian Spiny tailed lizard.



Map (4) Active and Inactive burrows within the risk areas.





Figure 2: Pictures showing The Spiny-tailed Lizard and Its Burrows.

## 5. CONCLUSION AND RECOMMENDATIONS:

It was seen that the site harbors a significant density of the Egyptian spiny-tailed lizard (*Uromastix aegyptia*). Since the species is globally vulnerable, special consideration should be given to it in the Biodiversity Management plan of the site both, during construction and in the layout of the windfarm pads and the connecting routes. The area's high density of active burrows is to be avoided when laying out the plan of the site.

**It is recommended that this be addressed as a priority for the Biodiversity Management Plan of the project. And when it is not possible to avoid the active burrows by the developer, and also the density of active burrows in the project is relatively low, the translocation of this population that is located in the high-risk area is a must to mitigate the expected impact of the project on local Biodiversity. Training and Awareness:** Train construction staff on the importance of terrestrial fauna, especially key species like the Spiny-tailed lizard. Highlight the importance of minimizing disturbance to wildlife and their habitats. This could involve briefings on the importance of fauna and the potential impacts of disturbance, littering, or straying off designated trails.

**Overall, the Spiny-tailed Lizard is considered to be a Vulnerable species (IUCN Red List, 2024). According to the IUCN Red List assessment, there has been a suspected population decline of over 30% over the past 15 years (3 generations), and this is expected to continue. It is recommended that this be addressed as a priority for the Biodiversity Management Plan of the project.**

## 6. BIBLIOGRAPHY

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## 7.2 Appendix Spiny-tailed lizard records in base line survey

ID	Latitude	Longitude	Burrow case
1	28.253163	32.955423	Active
2	28.252783	32.956152	Inactive
3	28.252543	32.958756	Inactive
4	28.290214	32.914305	Active
5	28.288967	32.913344	Inactive
6	28.272429	32.967393	Active
7	28.273371	32.971352	Inactive
8	28.296928	32.967965	Active
9	28.296550	32.967820	Active
10	28.318070	32.969351	Active
11	28.272900	32.937825	Active
12	28.272900	32.937825	Inactive
13	28.327300	32.989968	Inactive
14	28.306944	32.898851	Inactive
15	28.307005	32.902269	Active
16	28.306693	32.903237	Inactive
17	28.307242	32.916867	Inactive
18	28.312199	32.922533	Inactive
19	28.260842	32.968403	Inactive
20	28.256365	32.966228	Inactive

### 7.3 Appendix The IUCN Red List of Threatened Species.

#### Background

The International Union for Conservation of Nature's (IUCN) Red List is the world's most comprehensive inventory of the global conservation status of biological species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity.

The IUCN Red List aims to provide scientifically-based information on the status of species and subspecies at a global level, to draw attention to the magnitude and importance of threatened biodiversity, to influence national and international policy and decision-making, and to provide information to guide actions to conserve biological diversity.

The IUCN aims to have the category of every species re-evaluated every five years if possible, or at least every ten years. This is done in a peer-reviewed manner through IUCN Species Survival Commission (SSC) Specialist Groups, which are Red List Authorities responsible for a species, group of species or specific geographic area, or in the case of BirdLife International, an entire class (Aves).

#### IUCN Red List Categories

Species are classified by the IUCN Red List into nine groups, specified through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation. Categories are (see figure below):

- **EXTINCT (EX)**: A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
- **EXTINCT IN THE WILD (EW)**: A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range



have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

- **CRITICALLY ENDANGERED (CR)**: A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
- **ENDANGERED (EN)**: A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.
- **VULNERABLE (VU)**: A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.
- **NEAR THREATENED (NT)**: A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
- **LEAST CONCERN (LC)**: A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable, or Near Threatened. Widespread and abundant taxa are included in this category.
- **DATA DEFICIENT (DD)**: A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases, great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.
- **NOT EVALUATED (NE)**: A taxon is Not Evaluated when it has not yet been evaluated against the criteria.

The nine IUCN Red List Categories is shown below:

