

# **Nefer Menya for Renewable Energy**

## **ESIA for West Menya Solar BESS Power Plant, Menya Governorate**

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## 1. Introduction

Nefer Menya for Renewable Energy is planning to develop a large-scale photovoltaic (PV) solar power facility integrated with a Battery Energy Storage System (BESS) in the desert hinterland of Menya Governorate, Egypt. The proposed project will comprise a 1,000 MW solar PV generation capacity, coupled with 600 MWh of battery storage capacity. The proposed location of the project is hereinafter referred to as “the Project Site”.

The Project Site is located within the West Nile Concession area (hereinafter, referred to as “West Menya Region”) designated by the New and Renewable Energy Authority (NREA). It lies approximately 33.5km west of the Western Desert Road and 53.45 km south of the Bani Mazar–El Wahat Road, encompassing an area of approximately 20.21 km<sup>2</sup>. The site directly adjoins the National 1.5 million Feddan Agricultural Development Project to the west and is accessible to the agricultural and built-up areas along the Nile River via unpaved roads situated approximately 19.7 km and 35.2 km to the north.

The surrounding region exhibits a diverse and transitional land use pattern, consisting of desert/vacant land, cultivated agricultural zones, and scattered rural settlements. The immediate land uses bordering the site are, as illustrated in Figure 1-1, as follows:

- **North:** Vacant land, NREA Concession.
- **East:** Vacant Land (NREA concession) followed by scattered agricultural reclaimed land,
- **South:** Canal Sugar Project area; and
- **West:** National 1.5 million Feddan Project.

The project is being implemented in collaboration with the European Bank for Reconstruction and Development (EBRD).

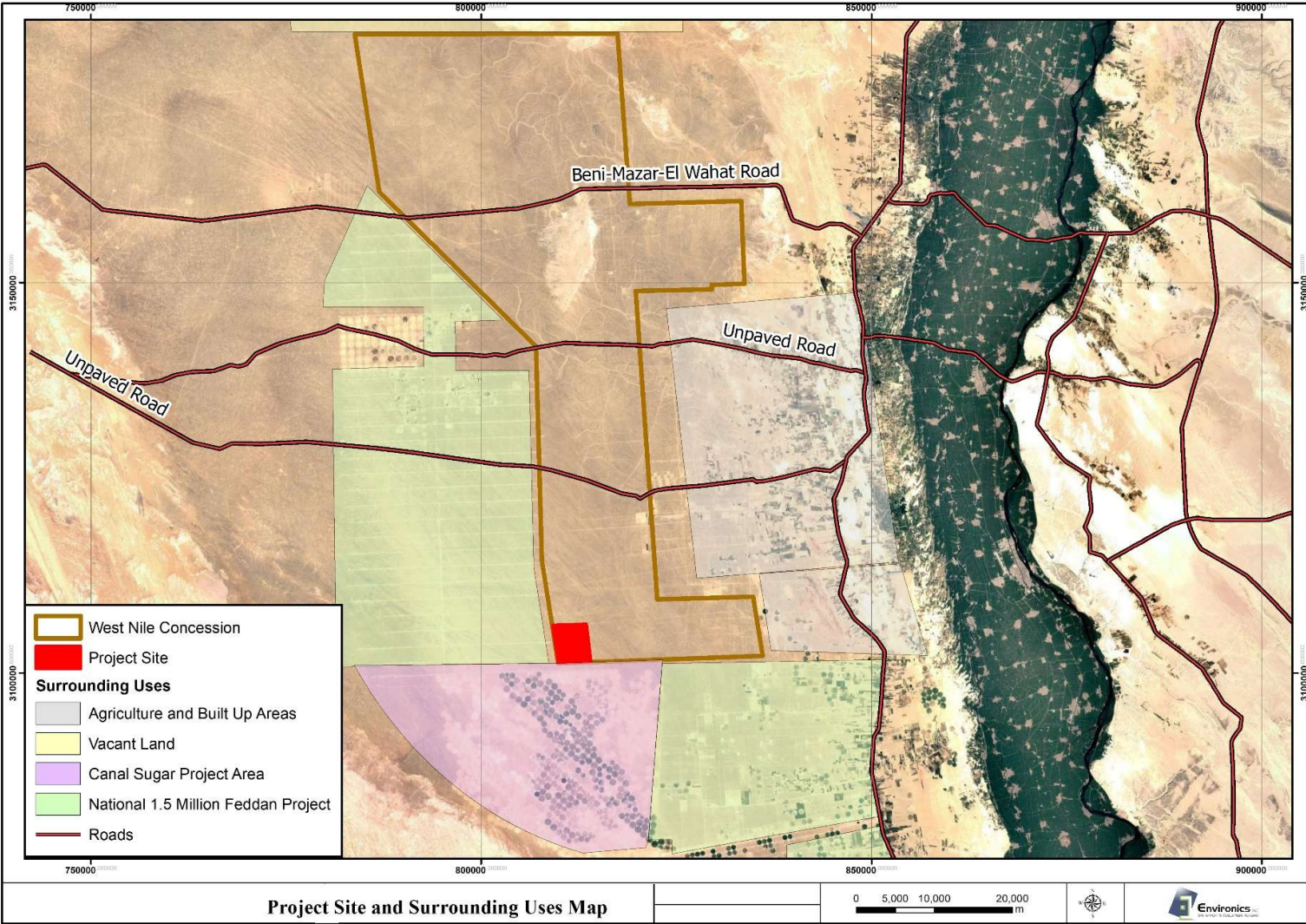


Figure 1-1: Location of the Project Site within the NREA concession



In accordance with Environment Law 4/1994 (as amended by Laws 9/2009 and 105/2015) and its revised Executive Regulations, an Environmental Impact Assessment (EIA) study is to be prepared for the PV plant and the BESS project.

As per the project categorization lists issued by the EEAA in June 2023, the PV Plant and the BESS have been classified as Category Scoped-B projects.

However, according to the Lenders categorization, the project is a Category A project, requiring a full scale ESIA including preparation of a scoping report and undertaking public consultation activities.

### 1.1 Objective of the ESIA

The objective of the ESIA is to ensure that the project is environmentally sound and socially sustainable and that any potential negative environmental and social consequences are recognized early in the project cycle and taken into account before project implementation. It also aims to propose appropriate mitigation measures to prevent/reduce potential negative impacts during the construction and operation of the proposed project, to be within the limits of legal environmental and social requirements.

Moreover, the ESIA aims to satisfy the legal environmental requirements, addressed in the Environment Law No. 4 of 1994, amended by Law No. 9 of 2009 and Law No. 105/2015, and the up-to-date ERs.

Moreover, the ESIA is also intended to satisfy the environmental and social requirements of the international funding institutions, including specifically the EBRD, but also the International Finance Corporation (IFC).

### 1.1 Scope of Work

The ESIA of the proposed project would assess the potential environmental and social risks and impacts across all project stages, including construction, operation, and decommissioning. The assessment will establish baseline environmental and social conditions within the project's area of influence, covering air, water, soil, biodiversity, noise, waste, land use, and socio-economic aspects.

The assessment will review relevant national, international standards, and lender requirements. Potential impacts will be identified, evaluated, and addressed through mitigation measures documented in an Environmental and Social Management Plan (ESMP), including monitoring and responsibilities.

Stakeholder engagement is an integral part of the ESIA process. A Stakeholder Engagement Plan (SEP) will guide consultations with affected communities, regulatory authorities, and other relevant stakeholders. Feedback received during consultations will be incorporated into project design and mitigation measures, ensuring transparency and alignment with international requirements.

## **1.2 Structure of ESIA study**

This ESIA report includes:

- **Chapter 1 (the current chapter):** Introduction and Background on the project for which the ESIA is developed, as well as the scope and objectives of the ESIA study
- **Chapter 2:** Description of the intended PV plant construction and operation phases and the expected environmental and social aspects
- **Chapter 3:** Description of the environmental baseline and social context in the project area
- **Chapter 4:** Description of the local regulatory framework, as well as the International Environmental and Social standards and requirements applicable to the project activities
- **Chapter 5:** Discussion of alternatives for different project components.
- **Chapter 6:** Assessment of the potential environmental and social risks and impacts and their mitigation measures.
- **Chapter 7:** The environmental and social management and monitoring plan for the PV plant
- **Chapter 8: Stakeholders Consultation**



## 2. Project Description

Nefer Menya for Renewable Energy project consists of a large-scale photovoltaic (PV) solar power facility integrated with a Battery Energy Storage System (BESS) in the desert hinterland of Menya Governorate, Egypt. The proposed project will comprise a 1,000 MW solar PV generation capacity, coupled with 600 MWh of battery storage capacity.

Nefer Menya for Renewable Energy will deploy high-efficiency mono-crystalline silicon photovoltaic (PV) modules mounted on horizontal single-axis tracking systems (1P dual-row configuration) to optimize solar energy capture throughout the day.

The project will be connected to the national grid through an overhead transmission line (OHTL) to be constructed by EETC.

### 2.1 Project Components

#### 2.1.1 Main Components

##### Component 1: Photovoltaic Solar field

- **Solar panels (monocrystalline silicon):** 1.9 million N-Type photovoltaic modules with anti-reflection coating applied to the PV panels, each with a peak power output of 610 watts peak. The monocrystalline silicon PV panels will be connected in series to produce DC output from incident irradiance. Bifacial technology will be used, which allows for maximizing the energy output.
- **Mounting structures:** To continuously orient the panels towards the sun, the project will adopt a single-axis horizontal tracking system. A single-axis tracking system will be installed with a maximum height of approximately 1.6 m at -60°/+60° turning angle range.
- **Inverter system:** The system uses 952 centralized inverters (1.1 MVA each) to convert the electricity generated by solar panels from DC to AC. This AC power passes through 33 kV medium-voltage switchgear, which controls and protects the electrical flow. Finally, the power is transferred to a pooling substation, where the voltage is increased to 220 kV for transmission to the national grid.
- **Switchgear:** This electrical equipment is designed to control, protect, and isolate medium voltage (33kV) circuits within a substation. It acts as a critical interface between the converted power and the high-voltage transformer system, where the voltage is stepped up to 220kV for long-distance transmission.

This equipment includes circuit breakers, disconnectors, relays, and protection systems to ensure operational safety and efficiency. It enables precise fault detection and isolation, minimizing disruption during failures while optimizing energy flow. By facilitating controlled switching operations, monitoring system conditions, and providing robust protection against overloads, short circuits, and other anomalies, switchgear plays an essential role in ensuring the reliability and stability of the electrical grid.

**Component 2: Battery Energy Storage System (BESS)**

A Solid-State Battery consists of multiple battery cells assembled into modules. Each cell contains a positive electrode, a negative electrode, and an electrolyte. The lithium-ion BESS primarily uses lithium nickel manganese cobalt oxide (NMC) or lithium iron phosphate (LFP) for their cathodes.

BESS will comprise multiple battery units or modules housed in shipping containers or suitable structures, delivered pre-assembled to the project site. These containers are typically elevated slightly off the ground and arranged in rows.

Supplementary infrastructure and equipment include temperature control equipment, which may be positioned between the battery containers.

**Key Components of the BESS**

- **Battery modules:** The BESS utilizes solid-state lithium-ion battery modules, arranged in series and parallel within weatherproof, insulated containers. The system has a total energy capacity of 600 MWh and a daily dispatchable throughput of 0.330 MWac / 0.660 MWh. It operates on one full charge/discharge cycle per day; once it reaches 100% State of Charge (SoC), it delivers Ancillary Services such as frequency regulation and voltage support.
- **Battery Cooling and Ventilation Systems:** using a liquid-cooled temperature control system.
- **Battery Management System (BMS):** To manage thermal conditions, a liquid-cooled temperature control system is used to maintain safe operating temperatures during charging and discharging. This system optimizes power consumption and prevents overheating, ensuring battery safety and performance.
- **Power Conversion System (PCS):** The PCS converts DC power from the battery modules into grid-compatible AC power and enables bidirectional power flow.
- **Control and Monitoring Systems:** Provide real-time performance data and remote-control capabilities through SCADA, sensors, and communication interfaces.
- **Auxiliary Systems:** Include lighting, emergency power, and fire protection systems to ensure safe and continuous BESS operation.



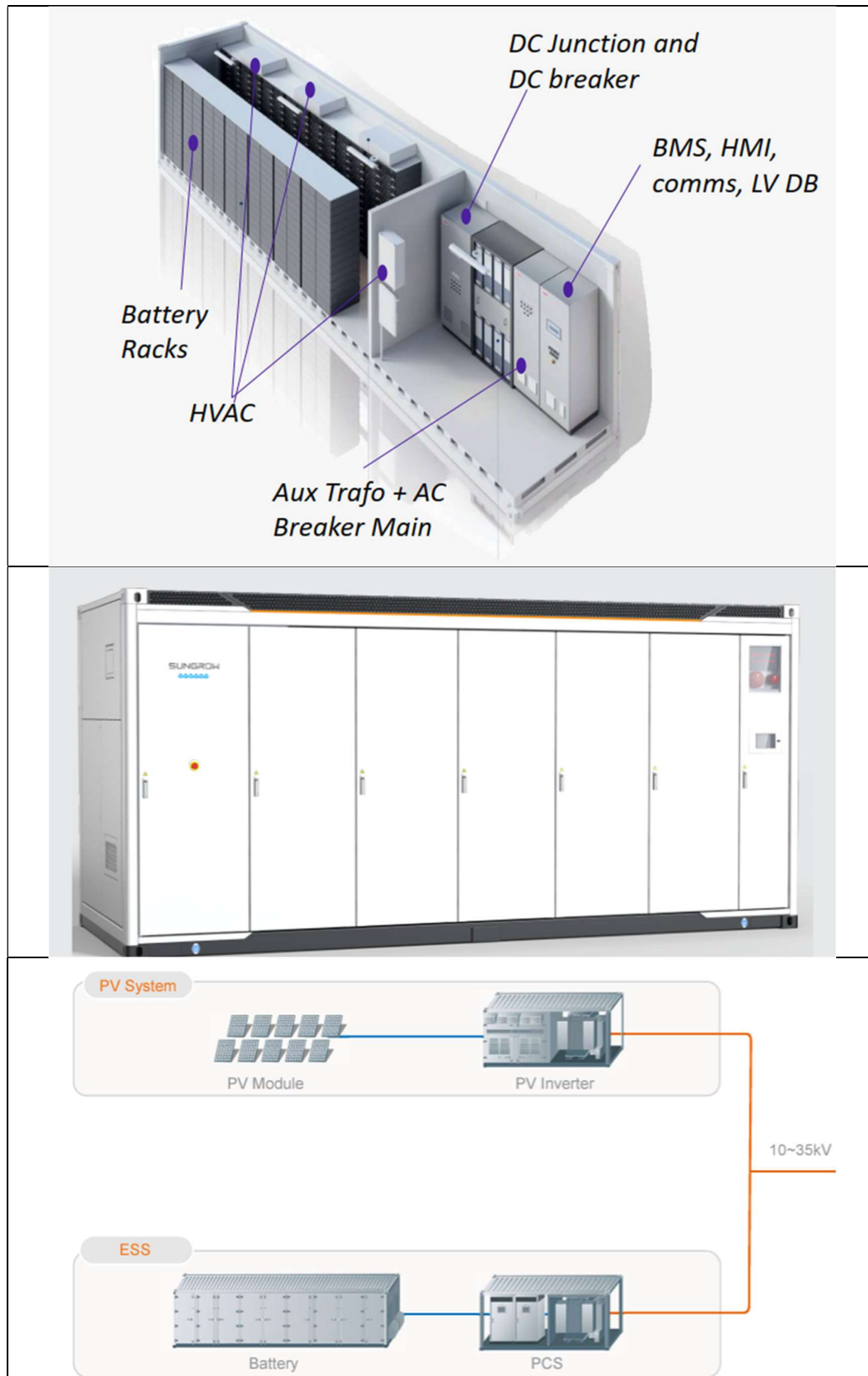


Figure 2-1: Battery Energy Storage System (BESS)

**Component 3: Connection to the grid**

This component involves the development of one main step-up substation within the project boundaries. This facility will ensure the efficient transmission of generated power, enhance operational flexibility, and maintain stability and reliability across the national grid.

A 33/220kV pooling substation within the site boundary, which will collect power from the solar field and BESS systems via 33 kV feeders. The substation will be equipped with 1,119 three-winding transformers, each rated at 8,870 kVA, to step up the voltage to 220 kV for grid export.

The stepped-up electricity will be transmitted via a high-voltage overhead transmission line (OHTL) to the designated grid interconnection point. The OHTL is not part of the project but is an associated facility to be constructed and operated by The Egyptian Electricity Transmission Company (EETC)

The general layout of the project components is depicted in Figure 2-2, and the alignment of the OHTL is shown in Figure 2-3.

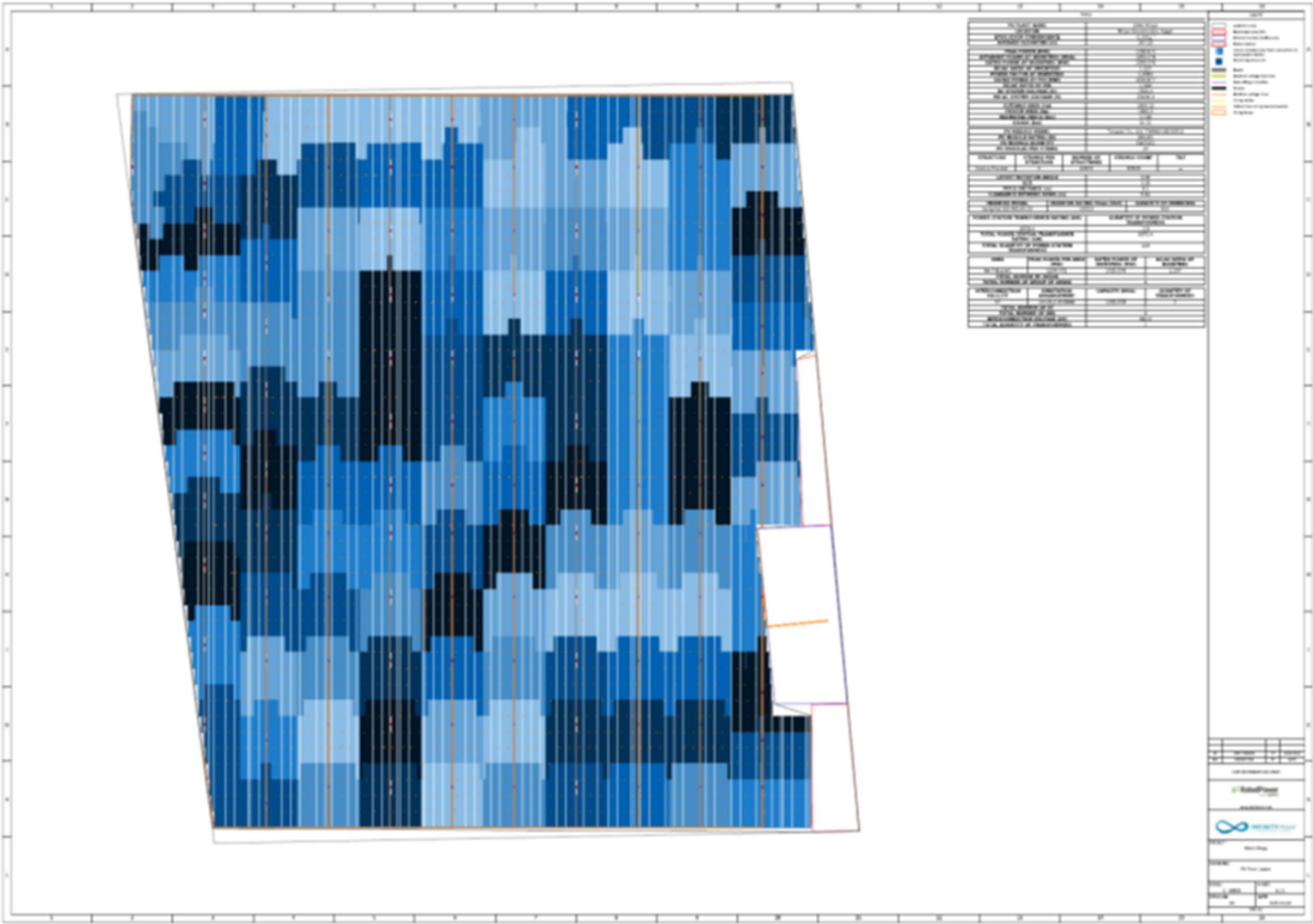


Figure 2-2: General layout of the Project and its components



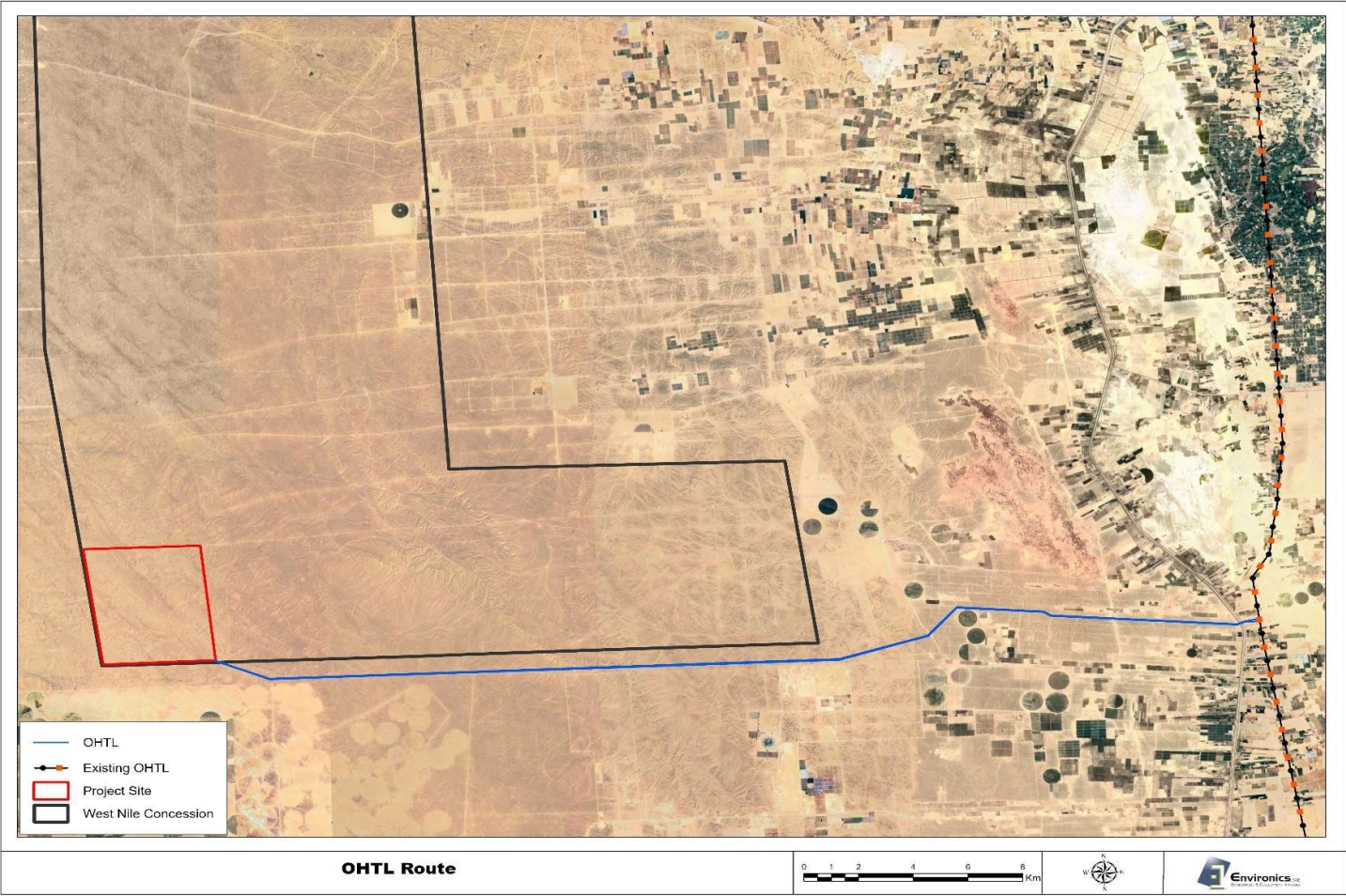


Figure 2-3: Associated OHTL route

## 2.2 Construction Phase

### 2.2.1 Project Schedule

The duration of the construction phase, covering site facilities, civil, electrical, and mechanical works, is expected to be ***approximately 15 months***.

### 2.2.2 Description of Construction Phase

Major on-site activities will include civil works, construction of buildings, main substation, and associated civil works (internal roads within the site, trenches, and foundations) installation of equipment and utilities, and testing and commissioning of equipment.

- ***Site preparation***

The site preparation activities include

- Clearing the site of rocks, levelling the ground
- Warehouse and temporary storage area preparation
- Establish laydown areas for equipment and materials

- ***Fencing and gates***

Perimeter fencing with main gates and emergency gates enclosing entire project area. Also, the HV substation area and O&M building shall be separately fenced for improved security and safety reasons.

- ***PV System installation***

The PV system installation involves several steps, including

- the installation of solar PV piles,
- PV module mounting structures
- Installation of PV modules.
- PV module looping works,
- installation of cleaning robots,
- Grounding systems
- Low Voltage (LV) and Medium Voltage (MV) trenching and cable laying
- Installation of inverters.

#### **BESS Components:**

The installation of BESS components will follow the finalization of the BESS foundation. This includes installing batteries, containers, inverters, auxiliary systems, transformers, and firefighting systems.

#### **Pooling Substation construction:**

- Construction of the Gas Insulated Substation (GIS) building and the main building.
- Installation of the main transformer
- Installation of the 220kV GIS.

Internal roads for handling construction equipment (construction material: tar or gravel) and operation activities



### 2.2.3 Labour

The direct labour force required for the project during construction is estimated to reach a peak of approximately 5,000 workers, including both skilled and unskilled personnel, when multiple activities (civil works, mechanical and electrical installation, logistics, and subcontracted services) are carried out simultaneously. The company will encourage contractors to maximize hiring workers from the local communities.

Permanent employees during operation are expected to be about 100 workers. According to the Nefer Menya for Renewable Energy project employment policy, priority will be given to local labour, provided they meet the qualification requirements for the available positions.

## 2.3 Service Units

### 2.3.1 Temporary Structures during the Construction Phase

#### a) Workers' Accommodation

The Project will adopt a mixed approach in this respect during the construction phase. While there will be a dedicated camp within the project site, contractors may also arrange off-site accommodation for part of the workforce, if needed, in rented housing within nearby towns or urban centres, subject to availability and capacity, and in a manner that avoids pressure on local housing markets and community services. Accommodation in smaller settlements where the housing market is not developed will be excluded. Priority will be given to the employment of local workers from Menya Governorate and surrounding areas, particularly for unskilled and semi-skilled positions, subject to the availability of suitably qualified personnel. Skilled and specialized workers may be sourced from other regions, as required.

The majority of unskilled (blue-collar) labor required for the project will be sourced from local communities and nearby villages, such as Abu Qurqas, Toukh El Kheil, Izbet Harbi, and Saft El Khammar, in addition to Minya City. Furthermore, consultations with governmental labor representatives indicate that Minya and its surrounding villages have an adequate supply of unskilled labor to meet the anticipated project requirements. Accordingly, accommodation needs for this category of the workforce are expected to be limited, given their proximity to and residence within the surrounding areas; however, if required, a limited number of accommodation units may be provided.

Accommodation requirements will primarily apply to skilled personnel, who constitute a minority of the project workforce. These workers are expected to be accommodated in Minya, which offers suitable residential capacity. Minya is located approximately 60 km from the project site and is connected via the Western Desert Road, which serves as the main transport corridor linking the site with surrounding settlements. Based on information provided by the Minya Governorate Information Center, the city offers a diverse stock of residential apartments appropriate for housing white-collar workers or blue collar workers if needed.

Once the next phase of project development is reached and the front-end engineering design phase is finalized, a more advanced level of assessment will be undertaken. This assessment will address potential environmental and social impacts, including traffic implications associated with the transport of workers, as well as commuting patterns and related impacts of locally recruited personnel traveling daily to and from the project site.

**Prefabricated Modular Camp Structures**

The camp structures will be made of prefabricated modular units constructed off-site and then assembled at the workers' accommodation site. The use of prefabricated modular units allows for faster installation and ease of dismantling once the construction phase is completed. The key materials used for the camp structures include:

- Walls: Galvanized steel frames with insulated panels, such as mineral wool or polystyrene-based insulation;
- Roofs: Lightweight metal sheets or tiles;
- Floors: Raised concrete or timber platforms;
- Windows: Aluminum or uPVC frames; and
- Doors: Solid wood or metal doors with appropriate locking mechanisms.

All camp structures will be designed to provide adequate ventilation, lighting, and thermal comfort for the occupants.

The workers accommodation facilities will be designed and managed in alignment with the Good International Industry Practice (GIIP) standards for human health and safety, the International Labor Organization's (ILO) "Workers' Housing Recommendation, 1961 (No. 115)", the IFC's and EBRD's joint "Workers' Accommodation: Processes and Standards" guidance note, 2009 and the EBRD's ESR2.

Contractors will manage and provide a comprehensive range of on-site amenities to ensure the well-being of the workforce. Specifically, contractors are responsible for the following aspects of worker welfare:

- Food and clean drinking water.
- Sanitation Services to maintain hygiene and health standards.
- Robust security measures to safeguard workers and equipment.
- Access to medical care, including on-site first aid and arrangements for medical emergencies.
- Laundry services to maintain personal hygiene.
- Means for workers to stay in touch with their families and communities, such as internet and phone services.
- Social and entertainment space
- Air-conditioned offices for employees
- Mess/eating facilities

This arrangement is designed to create a supportive and comfortable living environment for workers, facilitating efficient and effective construction operations.

When the construction work is completed, most of the temporary structures and facilities will be dismantled.

**2.3.2 Permanent Buildings during the Operation Phase**

Some facilities set up during the construction phase will be used in the operation phase as well. For the operation phase, permanent buildings required at the site to house employees and operation and maintenance (O&M) activities, will include:

- Warehouse facility: For storage of operational spare parts and maintenance equipment;
- Secured control room;
- Secured server room;
- Facilities at security gates, control and security gatehouse;
- Offices (air-conditioned) and administrative building;
- Kitchen/mess area,
- Segregated sanitary facilities with provisions for disabled persons;
- Prayer room;
- Guard Room: for security personnel and monitoring;
- Low-Voltage electrical building;
- Integrated Water Pump House; and
- Fire Water tank: essential for fire safety and emergency water supply.

## 2.4 Utilities

### 2.4.1 Water Supply and Storage

#### Construction Phase

##### **Water for Construction**

- Daily consumption is expected to be approximately 80-120 m<sup>3</sup>/day during the peak construction period.
- Water will be supplied from different water treatment plants upon the plan to be agreed with Menya Water and Wastewater company. Potential plants will include the nearest water treatment plant in Abu Qurqas at about 60km east of the project site.
- Water for construction activities will be supplied by water trucks.

##### **Water for Human use**

- Bottled drinking water will be provided for workers where consumption is expected to be approximately 25 m<sup>3</sup>/day during the peak construction period<sup>1</sup>
- Water for sanitary and hygiene purposes could amount to 400m<sup>3</sup>/day in peak construction period<sup>2</sup>. This is equivalent to 10 -20 water trucks/day during the peak construction period.
- Water for sanitary purposes and construction activities will be stored in tanks on site

#### Operation & Maintenance Phase

##### **Water for Human Use**

- O&M consumption is expected to be 8 - 10 m<sup>3</sup>/day only for office sanitary purposes and will be trucked to the site through water tankers.
- Bottled drinking water will be provided for workers where consumption is expected to be approximately 0.3 m<sup>3</sup>/day

##### **Water for Operation**

- Water storage tanks of appropriate capacity will be available for firefighting purposes. This is in addition to fire extinguishers which will also be distributed throughout the PV plant.

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<sup>1</sup> Assuming a high intake of 5 l/worker /day to account for the hot weather

<sup>2</sup> Assuming 60% of workers accommodated on site for which 100l/worker/day will be provided, and 40% are accommodated off-site for which 50l/worker /day will be provided.

- The project will not require water for cleaning purposes since only **dry cleaning** is anticipated for the PV modules. In the event of heavy humidity soiling or sandstorms, wet cleaning can be implemented. Such intervention is expected to take place twice a year with an estimated amount of water of about 5,400 m<sup>3</sup> per cleaning campaign. Such campaigns will use stored water to be promptly replenished.

#### **2.4.2 Wastewater**

##### **Construction Phase**

- Wastewater volumes are estimated at 340 m<sup>3</sup>/day<sup>3</sup>. This includes water from sanitation facilities, welfare facilities as kitchens, and other amenities provided for construction workers.
- Sewage tanks will be used for the collection of the generated wastewater.
- Wastewater tankers will frequently evacuate the holding tanks and transport it to the nearest wastewater treatment plant for final disposal by a licensed contractor.
- The nearest wastewater treatment plant in Markaz Aby Qurqas is located approximately 60km from the Project site.
- The volume of wastewater to be transported could be reduced substantially if grey water is collected separately and is used for dust suppression.

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<sup>3</sup> Calculated as 80% of water for human use

**Operation Phase**

- Wastewater volumes are expected to be around 7-8 m<sup>3</sup>/day.
- The generated wastewater will be collected in sewage tanks. The tanks will be emptied periodically by a licensed contractor to the nearest treatment plant for final disposal.
- There will be no discharge from the PV cleaning as cleaning will be performed under controlled, dry conditions. In exceptional cases requiring wet cleaning (e.g., after sandstorms or high humidity), water used will naturally evaporate or infiltrate into the arid soil, with no surface runoff anticipated.

**2.4.3 Fuel Supply****Construction Phase**

Diesel will be used for power generators for construction works as well as equipment operation. It will be provided through contractors.

**Operation Phase**

- A portion of the energy generated by the Project will be allocated to the lighting system, buildings, and the tracking system.
- Fuel will only be required for the emergency generator and will be sourced from the existing fuel stations through contractors.

**2.5 Decommissioning Phase**

The decommissioning phase will be conducted in accordance with applicable environmental regulations and best practices. While the possibility of a future project on the same site of NREA's concession is acknowledged, a thorough and responsible decommissioning process will be implemented. This approach ensures environmental compliance, minimizes potential risks, and maintains flexibility for any future development.

**A. Solar Panel and Mounting Structure Deactivation:**

- Careful detachment of solar panels from their mounting structures.
- Systematic disassembly of single axis tracking systems.

**B. Inverter and Electrical Component Deactivation:**

- Safe isolation and deactivation of inverters, transformers, and switchgear.
- Comprehensive testing and assessment of electrical components to determine suitability for reuse or recycling.
- Environmentally responsible disposal of any hazardous materials contained within electrical equipment.

**C. BESS Deactivation:**

- Controlled discharge and isolation of battery modules.
- Methodical disassembly and separation of battery components.
- Recycling or proper disposal of battery materials (e.g., lithium-ion) in compliance with environmental regulations.
- Proactive management of any potential electrolyte leakage or contamination.

## 2.6 Associated Facilities

These are associated facilities or activities that are not financed by lenders as part of the project but which, in the view of lenders, are significant in determining the success of the project or in producing agreed project outcomes. These are new facilities or activities: (i) without which the project would not be viable, and (ii) which would not be planned, constructed, expanded or carried out if the project did not exist (EBRD Environmental and Social Policy, 2024).

### 2.6.1 Overhead Transmission Line (OHTL)

The OHTL extending from the PV site for approximately 36 km connects the Project to an existing north-south High voltage transmission line running parallel to the Giza-Aswan Western Desert Road. The proposed OHTL route traverses reclaimed agricultural lands to ultimately connect to the existing OHTL.

The construction, operation, and maintenance of OHTL fall under the exclusive responsibility of the Egyptian Electricity Transmission Company (EETC). Therefore, a separate ESIA for the OHTL is required to be prepared by EETC and submitted to the Egyptian Environmental Affairs Agency (EEAA) for review and approval. The final route alignment and tower distribution will be confirmed during the detailed design phase. Typically, towers are spaced between 400 and 600 meters apart, depending on terrain and technical constraints.

**Annex 1** provides a high-level assessment of the potential E&S impacts and risks related to the OHTL. The construction, operation, and maintenance of OHTL fall under the exclusive responsibility of the Egyptian Electricity Transmission Company (EETC). In this respect, a separate ESIA for the OHTL is to be prepared by EETC and submitted to the the Egyptian Environmental Affairs Agency (EEAA) for approval.

## 2.7 Project Environmental and Social Aspects

An initial step in assessing potential changes to the baseline conditions resulting from the project and its activities is to identify its Environmental and Social (E&S) aspects. E&S aspects are defined as elements of an organisation's activities, products, or services that can interact with the baseline physical, biological, or social environments (ISO, 2015).

The construction and Operation and Maintenance (O&M) phases of a PV solar field and BESS will have specific E&S aspects resulting from activities that may lead to potential changes to baseline environmental and social systems. These are outlined below (

Table 2-1). The OHTL-specific E&S aspects are presented separately in the table.

### **2.7.1 PV Plant and BESS**

The following table presents the E&S aspects in relation to the PV Plant and BESS.

Table 2-1: E&amp;S aspects in relation to PV Plant and BESS

PV Plant and BESS		Construction	O&M
Land Uptake	Land Access Restriction	Project Site security; including security measures to protect project infrastructure and assets	Project Site security measures will restrict access to the land allocated for the Project.
	Land Transformation	<ul style="list-style-type: none"> <li>– Site clearance, grading, excavation, trenching, levelling, and paving will be required for:</li> <li>– Establishing the lay down area</li> <li>– Installing PV module and BESS foundations</li> </ul>	No additional land transformation .
	Land Acquisition	N/A (Project Site is on publicly owned land)	N/A
Transportation Demand		<ul style="list-style-type: none"> <li>– Transportation of construction machinery, equipment, and project components (e.g., PV modules, inverters, BESS units, etc...)</li> <li>– Transportation of water, fuel and other construction materials</li> <li>– Transportation of workers to and from construction sites and worker camps.</li> </ul>	Limited transportation requirements for the operation and maintenance workforce.
Workers influx		<ul style="list-style-type: none"> <li>– Skilled and non-skilled construction workers (site preparation activities, assembly, technical installations, etc.)</li> </ul>	Limited workforce
Workers Welfare		<ul style="list-style-type: none"> <li>– Large numbers of construction workers need to be provided, safe drinking water, adequate food, proper sanitation facilities, medical treatment and response, safety gear and PPE, and break facilities.</li> </ul>	Fewer O&M workers, however, workers will need safe drinking water, adequate food, PPE, medical treatment and response, and adequate rest and sanitation facilities.
Water Demand		<ul style="list-style-type: none"> <li>– Potable water for construction (workers' drinking water and sanitation facilities)</li> <li>– Dust suppression</li> <li>– Construction works including concrete and other construction requirements</li> </ul>	<p>Limited O&amp;M workforce, drinking, and sanitation facilities.</p> <p>Occasional module cleaning</p>
Noise & Vibration		<ul style="list-style-type: none"> <li>– Ramming machines and foundation work.</li> <li>– The operation of heavy equipment such as excavators, bulldozers, mixers, tippers, for site preparation and access road construction</li> </ul>	Minor workplace noise from transformers
Dust, Particulate Matter, and Gaseous Emissions		<ul style="list-style-type: none"> <li>– Site preparation (site clearing, grading, excavation), BESS infrastructure installation, and the construction of access roads.</li> <li>– Exhaust from Vehicles transporting construction</li> </ul>	<ul style="list-style-type: none"> <li>– Limited transportation of workers, and other O&amp;M materials.</li> <li>– The maintenance of transformers can cause the minimal emission of SF6.</li> </ul>



	materials and equipment, and workers to, and on, site. – Onsite diesel-powered generators	
<b>Wastewater Generation</b>	– Domestic waste from the large number of construction workers.	Limited generation from the workforce use of sanitation facilities.
<b>Waste Generation (Hazardous and non-hazardous)</b>	<p><b>Non-hazardous</b></p> <ul style="list-style-type: none"> <li>– Domestic waste from workforce (e.g., food waste, plastic/glass bottles, cans, paper)</li> <li>– Scrap materials such as unused or broken pieces of metal, wood, plastics, insulation, off cuts, and construction material packaging.</li> <li>– Concrete waste from foundation work</li> <li>– Construction of debris (e.g., sand, excess soil or rock)</li> </ul> <p><b>Hazardous</b></p> <ul style="list-style-type: none"> <li>– Spent solvents, paints, coatings, adhesives, hydraulic fluids, lubricant oils.</li> </ul>	<p><b>Non-hazardous</b></p> <p>Limited quantities of</p> <ul style="list-style-type: none"> <li>– O&amp;M material packaging (e.g., spare parts)</li> <li>– Domestic waste from workforce (e.g., food waste, plastic bottles &amp; cans, glass and mud)</li> <li>– Paper &amp; other office supplies</li> <li>– Cardboard.</li> </ul> <p><b>Hazardous</b></p> <ul style="list-style-type: none"> <li>– Absorbent material, waste oil from machinery, and lubricants</li> <li>– Empty containers of hazardous substances</li> <li>– Waste cleaning solvents</li> <li>– End of life lithium batteries</li> </ul>
<b>Glare</b>	N/A	Photovoltaic (PV) modules, due to their smooth and uniform surfaces, can reflect sunlight particularly during periods when the sun is at a low angle. This effect may cause localized glint or glare under specific conditions. However, for PV systems equipped with tracking mechanisms, such occurrences are limited to short periods of the day, as the module orientation adjusts to minimize reflection and optimize energy capture. Furthermore, the use of anti-reflective coatings and tilted panel installations significantly reduces the intensity and likelihood of glare
<b>Electromagnetic waves</b>	N/A	<ul style="list-style-type: none"> <li>– Substation and transformer</li> <li>– Switch gears</li> </ul>

### 2.7.2 Associated Facilities

The project's main E&S aspects are provided in the following Table.

Table 2-2: Project's main E&amp;S aspects and their main sources

E&S Aspect	Primary Source(s)	
	Construction	O&M
<b>Overhead Transmission Line (OHTL)</b>		
<b>Land Uptake and Physical Transformation</b>	<ul style="list-style-type: none"> <li>- Site clearing, leveling, grading, and compaction</li> <li>- Excavation for foundation construction</li> <li>- Excavation for OHTL tower foundations</li> </ul>	No further land transformation
<b>Land Acquisition</b>	Private property acquisition for construction of the bases of pylons (typically every 400 to 600 m).  Could affect wider area during construction	No further land acquisition; continued restricted use along RoW
<b>Obstruction of Air Space (Avifauna)</b>	N/A	Potential Collision/electrocution risk for migratory birds (if any)
<b>Electromagnetic Waves</b>	N/A	EMF from conductors
<b>Transportation Demand</b>	<ul style="list-style-type: none"> <li>- Equipment and tower transport.</li> <li>- Transportation of workers to and from project sites.</li> </ul>	Limited transportation requirements of the workforce and potentially for maintenance.
<b>Dust, Particulate Matter, and Gaseous Emissions</b>	<ul style="list-style-type: none"> <li>- Site preparation (site clearing, grading, excavation), and the construction of access roads.</li> <li>- Exhaust from Vehicles transporting construction materials and equipment, and workers to sites during tower construction</li> </ul>	Minimal from maintenance activities
<b>Noise &amp; Vibration</b>	Equipment operation and tower erection	N/A
<b>Waste Generation</b>	<b>Non-hazardous</b> <ul style="list-style-type: none"> <li>- Domestic waste from workforce (food waste, bottles, cans, paper)</li> <li>- Scrap from conductor wires, bolts, insulators, packaging, wood</li> <li>- Excavated soil and concrete debris from tower foundations</li> </ul> <b>Hazardous</b> <ul style="list-style-type: none"> <li>- Spent solvents, paints, coatings, adhesives, hydraulic fluids, lubricant oils</li> </ul>	Minor waste from maintenance and workforce

## 2.8 Area of Influence

The area of influence (Aoi) includes regions likely to be affected by the project and its directly managed activities and facilities. It also encompasses areas impacted by unplanned but predictable developments caused by the project, which may occur later or at different locations. Additionally, it covers areas where the project indirectly affects biodiversity or ecosystem services that are crucial to the livelihoods of local communities. The identified project E&S aspects within the project's direct AOI are described in the tables below. Impacts

within the potential indirect area of influence, if any, would be addressed in the impact assessment section.

### 2.8.1 Construction Phase

The anticipated AoI for each identified E&S aspect of the project during the construction phase of the PV plant and BESS is described below (Table 2-3).

**Table 2-3: Anticipated AoI for each E&S aspect (PV Plant and BESS) – Construction Phase**

E&S Aspects PV plant and BESS		Anticipated Aol
Land Uptake	Land Access Restriction	Project Footprint
	Land Transformation	
	Land Acquisition	N/A (the land is publicly owned and allocated for renewable energy)
Transportation Demand		<p>Main Roads Supporting Site Accessibility and Logistics</p> <ul style="list-style-type: none"><li>– Giza Aswan Road: A major north-south highway east of the project site, serving as the primary route for materials and equipment transport.</li><li>– Bani Mazar – El Wahat Road: A regional east-west road connecting the Nile Valley to El Wahat, facilitating cross-desert movement.</li></ul> <p>Roads from the nearest import port, Sokhna port that lies at a distance of about 273.3 km northeast to the project area include:</p> <ul style="list-style-type: none"><li>– The Hurghada – Ismailiya Road serves the port of Sokhna on the Red Sea.</li><li>– Ras Ghareb – El Menya Road: A regional connector from the Red Sea coast to Menya,</li><li>– Bridges crossing the River Nile leading to the Giza-Aswan Road</li><li>– Site Access Road from the Western Desert Road to the project site</li></ul>
Workers Influx		Communities in which workers might be accommodated
Water Demand		Water treatment plants and the community it serves
Waste Generation		The disposal facility where waste will be disposed off.
Wastewater Generation		The treatment plants where wastewater will be disposed of and the community it serves
Noise & Vibration		A general default distance of 350 m would be considered for dust effects, regardless of the receptor (EA, 2013, IAQM 2014) <sup>4</sup>
Dust/Particulate Matter/Gaseous Emissions		

The anticipated AoI for each identified E&S aspect of the project during the construction phase of the associated facilities (transmission Line, High Voltage Substation, and access roads) is described below (

<sup>4</sup> **Environment Agency (EA) (2013).** *Guidance on the assessment of dust from demolition and construction.* Bristol, UK: Environment Agency, **Institute of Air Quality Management (IAQM) (2014).** *Guidance on the assessment of dust from demolition and construction*

Table 2-4).

Table 2-4: Anticipated Aol for each E&amp;S aspect (associated facilities) – Construction Phase

E&S Aspects Associated Facilities	Anticipated Aol
Land Access Restriction	The project footprint of the substation, , and OHTL RoW
Land Transformation	Project Footprint includes the RoW of the transmission line, the substation site, and access roads
Transportation Demand	The same roads serving the Project
Water Demand	Water treatment plants and the community it serves
Wastewater Generation	The treatment plant where wastewater will be disposed of
Waste Generation	The disposal facility where waste will be disposed of.
Noise & Vibration	A general default distance of 350 m would be considered for dust effects, regardless of the receptor (EA, 2013)
Dust/Particulate Matter/Gaseous Emissions	

### 2.8.2 Operation and Maintenance Phase

The E&S aspects and their anticipated Areas of Influence (Aols) during the Operation and Maintenance (O&M) phase of the PV plant and BESS, are detailed in the Table below.

Table 2-5: Anticipated Aol for each E&amp;S aspect (PV Plant and BESS) – O&amp;M Phase

E&S Aspects PV Plant & BESS	E&S Aspect	Anticipated Aol
Land Uptake	Land Access Restriction	Project Footprint
	Land Transformation	Project Footprint
	Land Acquisition	N/A
Transportation Demand		Limited needs for the same roads as for construction for transportation during O&M
Workers Influx		N/A
Water Demand		Limited water needs during O&M will be trucked to the site
Wastewater Generation		Closest wastewater treatment plant that will be used
Noise & Vibration		<ul style="list-style-type: none"> <li>– Localized within the Project Site's boundaries.</li> <li>– Confined to the areas surrounding noise/vibration sources (e.g., inverters)</li> </ul>
Dust/Particulate Matter/Gaseous Emissions		N/A
Electromagnetic Radiation		Transformers area, switch gear area within the project premises
Glare and Glint		Ain road approximately 1km southern of the project site perimeter

The E&S aspects and their anticipated Aol during the O&M phase of the associated facilities are detailed in the Table below.

Table 2-6: Anticipated AoI for each E&amp;S aspect (associated facilities) – O&amp;M Phase

E&S Aspects Associated Facilities	E&S Aspect	Anticipated AoI
Transmission Line	Electromagnetic Radiation	RoW (25m at each side of the line)
	Air Space Obstruction	Air space above footprint

### 2.8.3 Estimated Area of Influence

Based on the tables above, the AoI during the construction phase extend to encompass transportation routes, nearby urban centers and worker accommodation areas. During operation, although the IFC standards do not define a specific extent of the AoI for solar panels' projects, previous studies proposed best practices that consider a buffer area of 1 km from the project site boundaries (ERM, 2018; Masdar, 2022).

### 3. Environmental and Social Baseline

The project is located within the West Nile NREA concession, situated in the western part of Menya Governorate, west of the Nile River, approximately 55 km west of Menya city. The site lies within a deserts and uninhabited part of the governorate, the nearest settlement is Izbet Harbi (Toukh El Kheil, Markaz El-Menya), situated about 43.5 km away. However, land reclamation for agriculture has advanced to the west of the Nile Valley and is now contiguous to the site from the south and is projected to continue to the west of the site.

#### 3.1 Physical Environment

Information was gathered from published material, previous reports, online meteorological data such as Meteoblue and Weatherbase, interpretation of geological and hydrogeological maps, analysis of satellite images and application of GIS analysis tools. Topographic maps are based on the Digital Elevation Model extracted from global mapper. Regional geology is acquired from Alsayyad et al. (2024). Groundwater information is obtained from the Geotechnical Encyclopedia (2003) and other local sources.

##### 3.1.1 Climate and Meteorology

The Project Site is situated within the western desert zone of Menya Governorate, characterized by an arid climate with high solar irradiance, hot and dry summers, mild winters, and a significant diurnal temperature variation typical of desert environments.

Climatic and meteorological conditions at the site were assessed using historical data obtained from the Meteoblue database and the CAPMAS Statistical Yearbook – Geography & Climate (2020). This assessment is based on records from the Menya Meteorological Station, located approximately 50 km east of the project site in the Nile Valley. While this station serves as the most reliable regional proxy, it is important to acknowledge that actual site conditions may be slightly hotter and more arid due to its deeper location within the desert hinterland.

The dataset covers an 11-year period (2012–2022) and includes key parameters such as temperature, precipitation, solar radiation, and wind speed and direction, providing a representative climatic baseline for this study.

##### Air Temperature

The average monthly temperature reaches its maximum value in June and July (36°C) and its minimum value in January (14°C), while the annual average is 20°C (Weatherbase, 2023).

The West Menya area is characterized by a typical desert climate, marked by extremely hot, dry summers and a pronounced diurnal temperature range. Summer temperatures often exceed 40°C<sup>5</sup>. Winters are cooler but remain dry. Table 4 summarizes seasonal temperature patterns using a 30-year climate dataset (1991–2020), including average daily maximum and minimum temperatures, as well as the estimated number of extreme heat days.

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<sup>5</sup> This might affect equipment performance and pose occupational health risks to workers especially during the construction phase

**Table 3-1: Seasonal Temperature Patterns (1991–2020) Based on 30-Year Climate Averages**

Season	Months	Mean Daily Max (°C)	Mean Daily Min (°C)	Extreme Days > 40°C
Winter	Dec – Feb	20 – 26	4 – 6	0 days
Spring	Mar – May	26 – 36	8 – 17	< 5 days
Summer	Jun – Aug	36 – 37	19 – 21	45 – 60 days
Autumn	Sep – Nov	31 – 35	15 – 19	5 – 15 days

Source: 30-year NEMS model re-analysis (meteoblue); field validation indicates a bias of less than  $\pm 0.5^{\circ}\text{C}$  at 40 m elevation.

July is typically the hottest month in the West Menya area, with daytime temperatures averaging around  $37^{\circ}\text{C}$  and occasionally reaching up to  $44^{\circ}\text{C}$ . Nighttime temperatures commonly fall to approximately  $21^{\circ}\text{C}$ , resulting in a diurnal temperature range of  $15\text{--}18^{\circ}\text{C}$ —a pattern typical of arid environments with high solar radiation and low atmospheric moisture. Relative humidity levels during peak afternoon hours (14:00) generally range between 25% and 35%, which can elevate the perceived temperature (heat index) by approximately  $2^{\circ}\text{C}$  above the actual air temperature, thereby amplifying thermal discomfort.

### Solar Radiation

The solar resource baseline for the West Menya site is derived from a 30-year satellite climatology (1991-2020) calibrated with ground stations of the Egyptian Meteorological Authority. Global Horizontal Irradiation averages  $2,380\text{ kWh m}^{-2}\text{ yr}^{-1}$ , with daily minimal of  $4.8\text{ kWh m}^{-2}$  in December and maxima of  $8.3\text{ kWh m}^{-2}$  in June, yielding 6.5 peak-sun-hours per day. Direct Normal Irradiation is slightly higher at  $2,560\text{ kWh m}^{-2}\text{ yr}^{-1}$ , and the diffuse fraction remains low (0.23–0.34), confirming the clear-sky desert regime essential for high PV yield (Adly et al, 2024).<sup>6</sup>

**Table 3-2: Solar Resource Characteristics at West Menya Site (1991–2020 Averages)**

Parameter	Annual Mean	Monthly Min (Dec)	Monthly Max (Jun)
Global Horizontal Irradiation (GHI)	$2,380\text{ kWh/m}^2\text{/year}$	$4.8\text{ kWh/m}^2\text{/day}$	$8.3\text{ kWh/m}^2\text{/day}$
Direct Normal Irradiation (DNI)	$2,560\text{ kWh/m}^2\text{/year}$	$4.3\text{ kWh/m}^2\text{/day}$	$8.0\text{ kWh/m}^2\text{/day}$
Diffuse Fraction	0.26	0.34	0.23
Peak Sun Hours (PSH)	6.5 h/day (annual)	4.8 h/day	8.3 h/day

### Day Length

The West Menya Project lies within Egypt’s subtropical desert zone and experiences typical day-length variations for its latitude, which are critical for solar energy generation modeling, construction logistics, and operational planning.

Based on sunrise and sunset data compiled from MAPLOGS solar tables for Menya Governorate, the region experiences the following daylight characteristics across the year:

<sup>6</sup> The solar radiation profile of West Menya provides optimal conditions for utility-scale PV power generation. The consistent availability of high GHI and DNI values, combined with minimal cloudiness and favorable tilt gains, supports a high and stable energy yield throughout the year.



Table 3-3: Seasonal Daylight Duration at West Menya Project Site

Date	Daylight Duration	Comment
21 December (Winter Solstice)	~10 hours 35 minutes	Shortest day of the year
21 March / 21 September (Equinoxes)	~12 hours 10 minutes	Equal day and night globally
21 June (Summer Solstice)	~13 hours 54 minutes	Longest day of the year

= This seasonal variation in day length—between winter and summer—is typical at latitude 28° North (where the project site is located).

### Relative Humidity

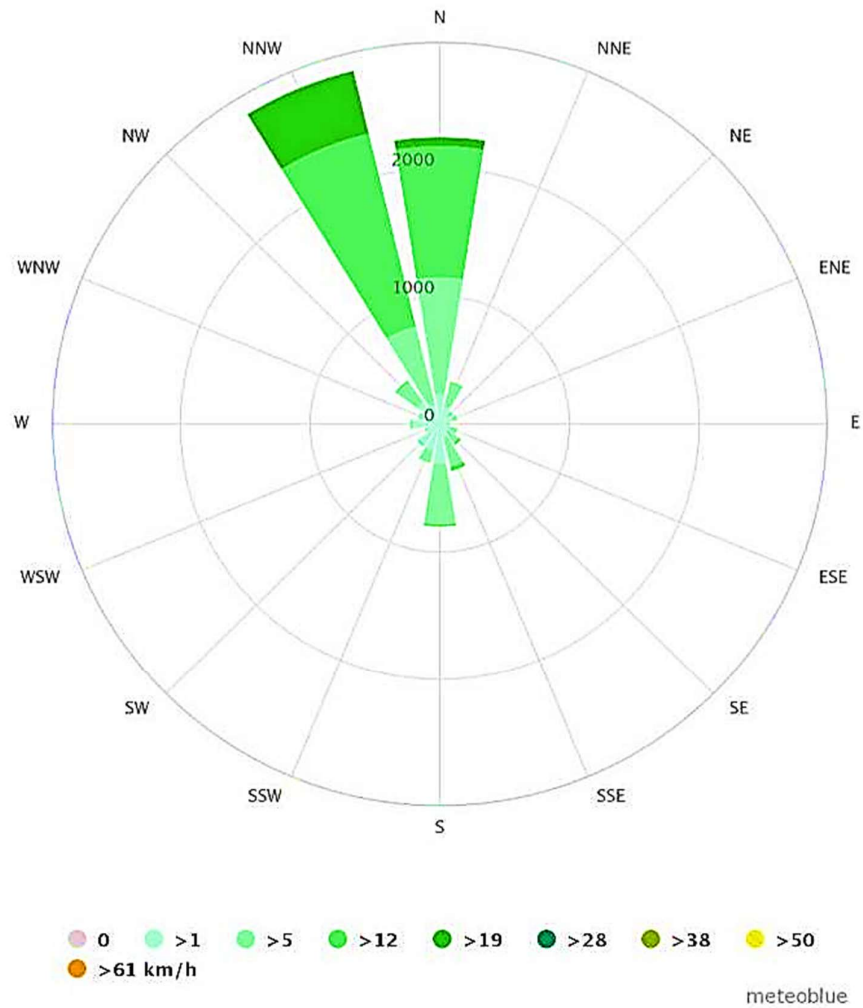
Based on long-term climate data for Menya City, the relative humidity (RH) profile demonstrates a clear seasonal variation typical of arid and semi-arid environments. The mean annual relative humidity is approximately 52%, reflecting moderate ambient moisture levels on average. However, there is a pronounced seasonal range, with minimum RH values of around 37% recorded in May, corresponding to the peak of the dry season, and maximum RH values reaching 67% in December, which marks the most humid period of the year.

Table 3-4: Average Monthly Relative Humidity (%), Menya City

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
RH (%)	63	56	52	43	37	40	46	51	53	55	61	67

### Wind Speed and Direction

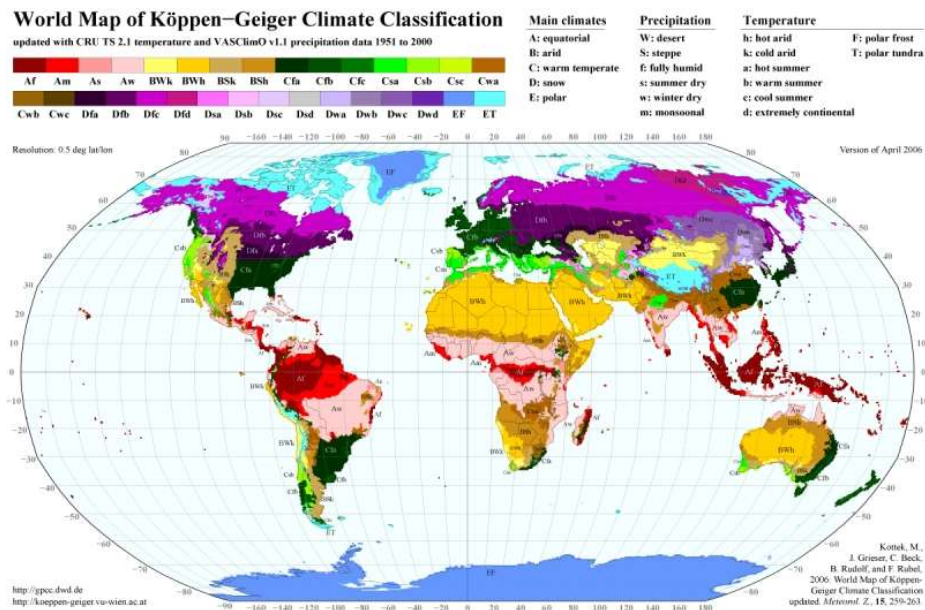
According to Meteoblue wind data for a period of 30 years, the wind direction in the project area is northern and north-northwest most of the year, while it is southern in a few periods at low speeds (Figure 3-1). As for wind speed rates, the average highest wind speed ranges from 38 to 50 km/h.



**Figure 3-1: Wind direction in Menya Governorate**  
 Source: Meteorological website – Weatherbase

### Precipitation

West Menya falls under the BWh category (hot desert climate) according to the Köppen-Geiger climate classification system. This means it experiences extremely arid to hyper-arid conditions, where rainfall is minimal to nearly absent in most years.



**Figure 3-2: Köppen–Geiger climate classification system**  
Source: <https://koeppen-geiger.vu-wien.ac.at/present.htm>

**Table 3-5: Summary of annual precipitation**

Parameter	Value
Long-term mean annual precipitation	0.2 mm
Mean number of rain days ( $\geq 1.0$ mm)	0.54 days yr <sup>-1</sup>
Probability of a rainy day (any given year)	0.15 %
Days without measurable precipitation	364.5 days yr <sup>-1</sup> (99.85%)

All calendar months exhibit traces of near-zero precipitation. Notably, June, July, and August consistently record 0.0 mm, confirming the absence of a summer rainfall regime. The highest monthly value—0.75 mm in March—remains hydrologically negligible for groundwater recharge or surface runoff.

**Table 3-6: Monthly Averages precipitation**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precip. (mm)	0.08	0.24	0.75	0.4	0.25	0	0	0	0.06	0.3	0.08	0.27

### Air Quality

The Project Site, covering 20.21 km<sup>2</sup>, is located in the West Nile NREA concession within the desert hinterland of Menya Governorate. It lies 33.5 km west of the Western Desert Road and 53.45 km south of the Bani Mazar–El Wahat Road. The area is remote, with no industrial or stationary emission sources nearby. The closest human activity includes agricultural developments from the 1.5 million feddan project to the west. Minor emissions may arise from occasional vehicle use on unpaved access roads. Overall, ambient air quality is expected to be excellent with respect to anthropogenic pollutants. However, the desert setting leads to naturally high levels of windblown dust. Particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub>) may peak during storm events.

### Sandstorms

A Sandstorm Frequency and Wind Regime Assessment was conducted by Environics (2023), based on a data extracted from Assiut weather monitoring station located at about 70 km south of the West Menya concession (the nearest station providing sandstorms data) The Menya station does not provide long term records for sandstorms. Storm data of 11 years (2012 to 2022) indicate that the maximum number of events of sandstorms (SA), dust storms (DU) or strong sandstorms (SS) during the 11 years occurred in March for 227 hours in 39 days. The minimum occurring events were recorded in August for 1 hour in 1 day.

Overall, the total number of sandstorms (SA), dust storms (DU) or strong sandstorms (SS) are 741 hours in 155 days during 11 years, as shown in Table 3-7 and Table 3-8. This represents 0.77% of total hours and almost 3.9 % of total days over the studies period.

**Table 3-7: Assiut monthly SA/DU/SS hours' events during 2012:2022**

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% Ratio
Hours	47	87	227	139	80	17	16	1	38	9	16	64	741	0.77%

**Table 3-8: Assiut monthly SA/DU/SS days' events during 2012:2022**

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% Ratio
Days	13	20	39	28	18	6	2	1	4	6	6	12	155	3.86%

### Sand Rising

The West Menya project site, located in the Western Desert fringe of Menya Governorate, is situated in a region that is highly susceptible to sand rising, primarily due to its loose, fine-textured surface soils, sparse vegetation cover, and prevailing wind regimes. The combination of flat topography and open desert expanses creates favorable conditions for aeolian processes, especially during the transitional seasons (spring and autumn) when wind speeds intensify.

Sand rising events in this region typically occur under sustained wind speeds exceeding 25–30 km/h, which are frequent during March to May and October to November and may be associated with Khamsin winds – a regional meteorological phenomenon characterized by strong, dry, and dusty winds originating from the south or southwest<sup>7</sup>.

While severe sand encroachment (dune migration) is not dominant at the site, based on current satellite imagery and landform surveys, localized sand drift may still occur, especially in disturbed or unprotected zones.

<sup>7</sup> These events can lead to:

- Surface erosion and the formation of mobile sand sheets and small dunes;
- Reduced visibility and hazardous working conditions;
- Mechanical wear and abrasion of equipment and exposed infrastructure; and
- Increased dust and particulate matter concentrations during high-intensity events.

### 3.1.2 Geology and Geomorphology

The project site lies within the Oligocene Katkut Formation (KF), near the Qatrani Formation (QF), in the western part of the Eocene Plateau. KF is mainly composed of limestone, chert gravel, and evaporites (gypsum, halite, anhydrite), while QF consists of calcareous sandstone and clay intercalations. Both formations are rich in quartz and calcite. The KF becomes more calcareous toward the northern Gebel Nashfa area. These sediments reflect deltaic to fluvio-marine depositional environments. The regional geology was mapped by Alsayyad et al. (2024).

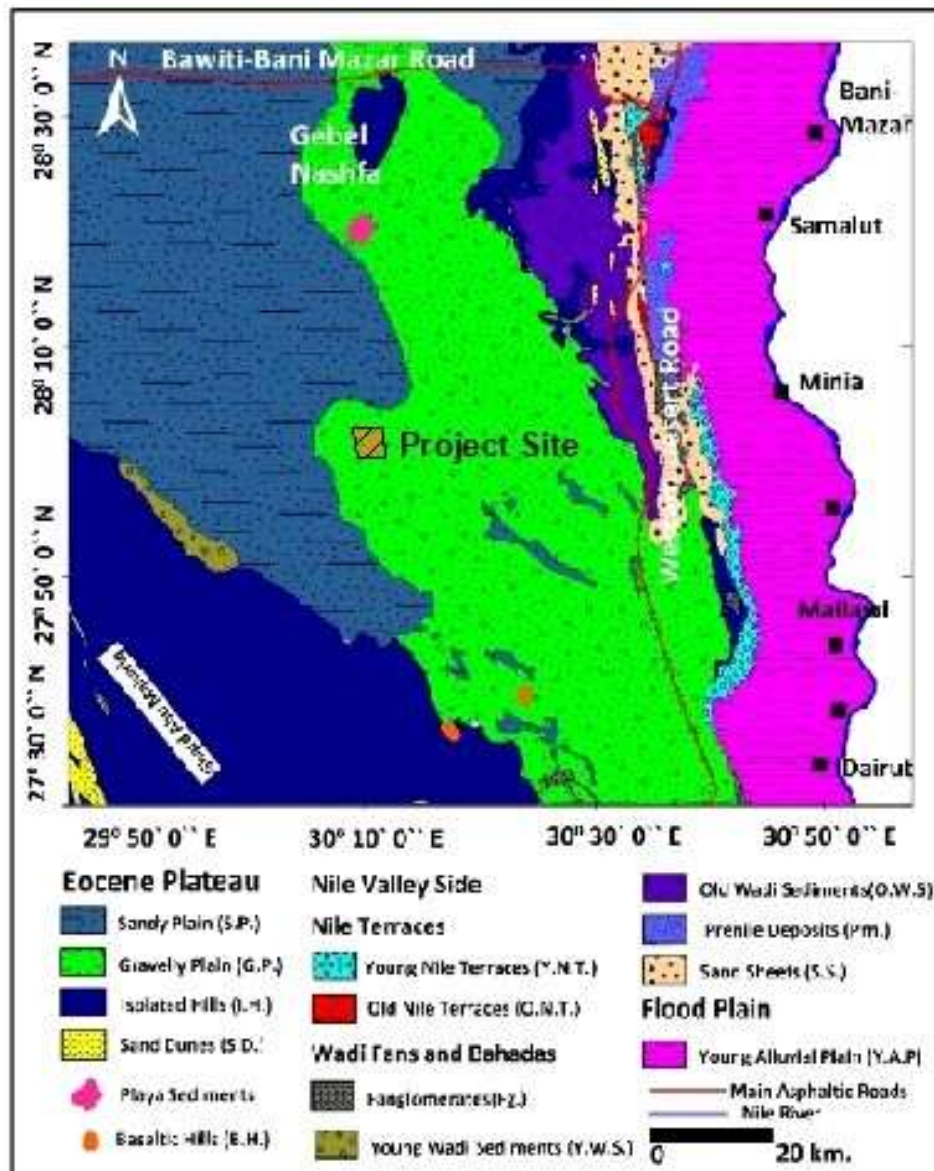


Figure 3-3: Main geomorphologic units of the West Menya Region

Source: Alsayyad et al. (2024)



The geomorphology of the West Menya concession is characterized by a dissected limestone plateau. Soil dominating the area is primarily Lithosols which is characterized by very low and low quality, poor parent material, coarse texture, shallow depth and not very gentle slope. The Project Site is located within a gravely plain. The November 2025 field visit indicated that the site is entirely composed of a bare sandy soil covered with gravel (Figure 3-4). Gravels are missing in low-lying areas, forming sandy gravel-free corridors.



**Figure 3-4: Photo showing the sandy soil covered with gravel of the area**

The nearest sand dune fields lie approximately 26 km northeast of the Project Site as shown in Figure 3-5. Given that the prevailing wind direction in the area is from the north and north-northwest, the site is not at risk of sand dune encroachment.

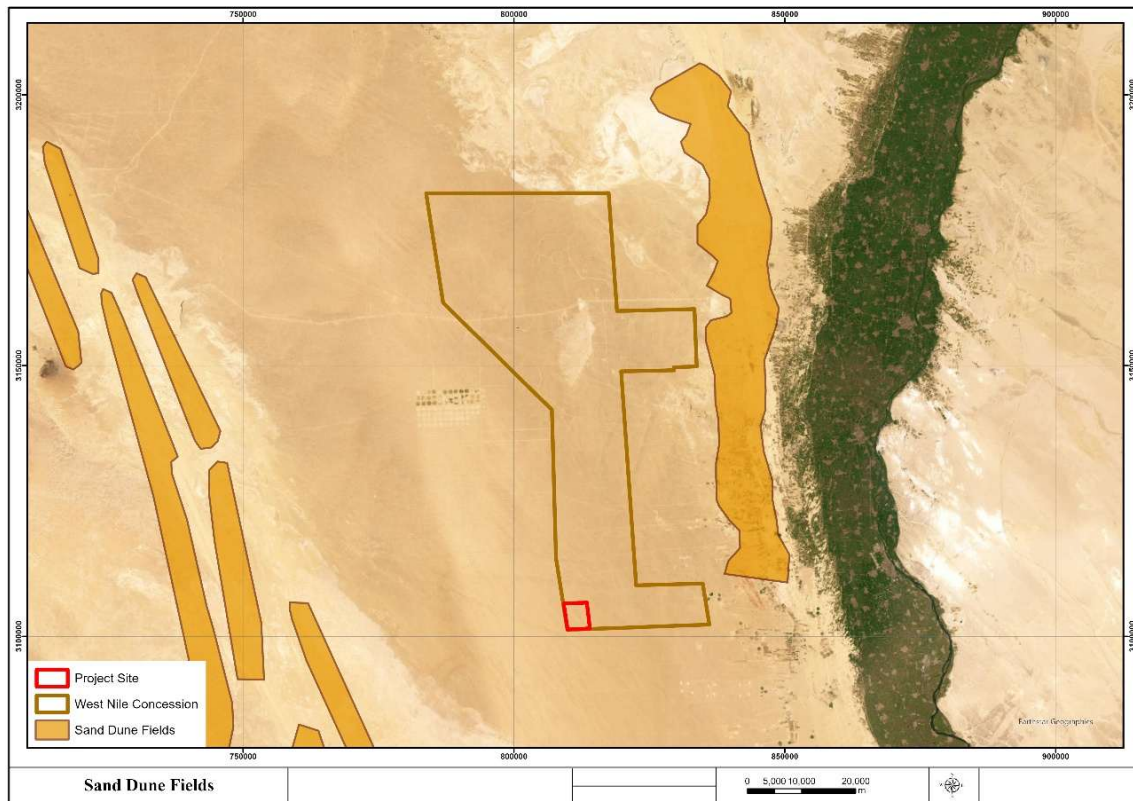


Figure 3-5: Sand Dune Fields Around the Project Site

### Topography

The Project Site is characterized by flat terrain. Within the site, elevations range from 90–100 m above MSL in the east and southeast, 120–130 m in the west and northwest, and 110–120 m in the central zone. These elevations were confirmed by GPS readings during the field survey. Overall, the site shows gentle elevation variation, supporting ease of access and construction.

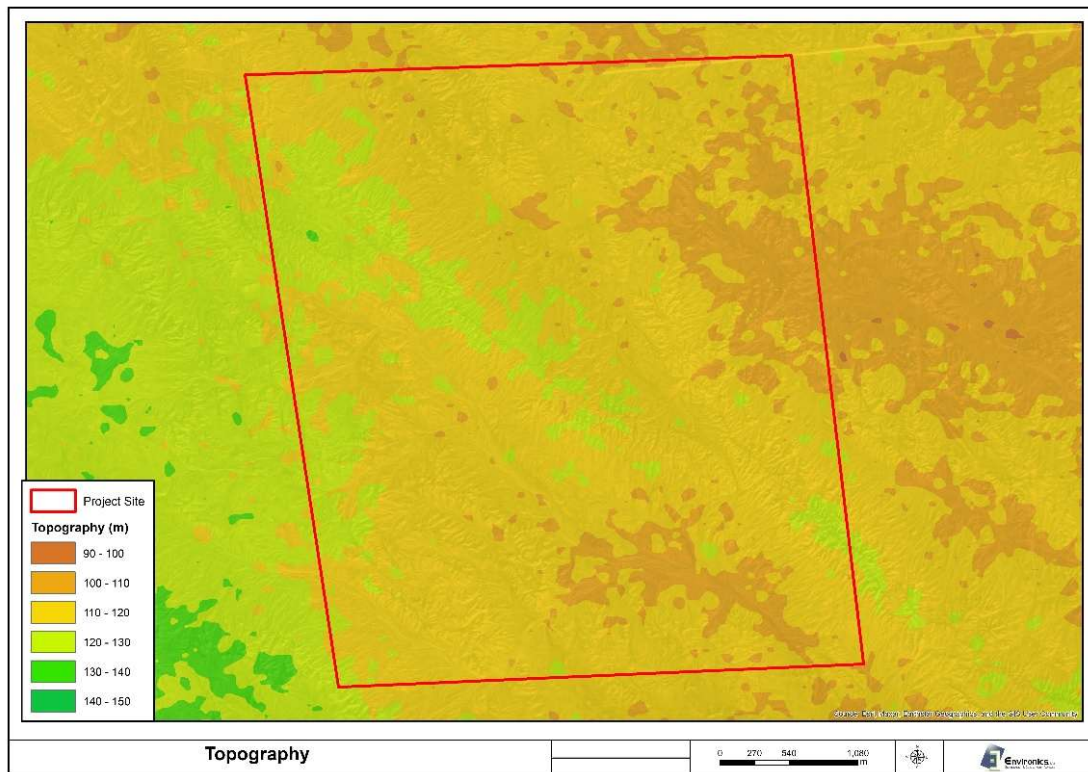


Figure 3-6: Topography of the Project Site

### Seismicity

The West Menya project site lies on the stable Western Desert platform, approximately 60–80 km west of the active Nile Valley fault system. The closest seismotectonic zones are:

- El-Menya–Sohag zone (ENSN designation) – scattered low-magnitude activity trending NW–SE
- Beni-Suef zone – located ~100 km north-east; recorded a ML 4.9 sequence in 1999 (epicentre  $\approx 29.1^\circ \text{ N}$ ,  $31.1^\circ \text{ E}$ )
- Cairo–Suez shear zone and northern Red Sea rift > 200 km to the east; their far-field effects are attenuated by the intervening Eocene limestone plateau Badawy and Abdel-Fattah, 2002).

The Project Site is located within a region of low to moderate seismic activity, located on the stable part of the African Plate interior, far from the active tectonic boundaries such as the Gulf of Suez–Red Sea Rift and the Dead Sea Transform Fault system. The area is not classified among Egypt’s primary seismic zones and has historically recorded few and infrequent seismic events, with low magnitudes and minimal ground shaking intensity.

According to the Egyptian Annual Seismic Bulletin (2023) issued by the National Research Institute of Astronomy and Geophysics (NRIAG), the seismic hazard in the Menya Governorate is low, the nearest seismic focus is approximately 88 km north of the project site, with a magnitude 2-3 on the Moment Magnitude Scale – ( $M_w^8$ ).

<sup>8</sup> The Moment Magnitude Scale ( $M_w$ ) is the standard scientific scale used to quantify earthquake size based on the total seismic energy released. It is derived from the seismic moment, which is calculated as the product



### 3.1.3 Hydrology

#### Surface Water

The West Menya Project Site is located in the arid hinterland of Menya Governorate, within the Western Desert fringe. The region is classified as hyper-arid, with mean annual precipitation less than 1 mm, and no perennial or seasonal surface watercourses within or near the project area.

No natural wadis (ephemeral drainage channels) or floodplains have been mapped within the project footprint or surrounding buffer zones. Remote sensing analysis and topographic evaluations confirm that the site lies outside the influence of any major watershed or runoff.

Additionally, the area lacks lakes, ponds, wetlands, or surface reservoirs, and no water is supplied from Nile-fed canals or irrigation networks.

#### Flash Flood Hazards

The region where the Project Site lies is marked by flat to gently undulating terrain, extremely low rainfall, and an absence of developed drainage systems. Based on long-term hydrometeorological and geomorphological records, the area presents a negligible risk of flash flooding. Average annual precipitation is less than 1 mm, and while rare convective storms may trigger localized runoff, no defined wadis or drainage networks intersect the project area. Historical records confirm the absence of flood-related events at or near the site (UNESCO, 1979; EMA, 2023).

Topographic analysis using SRTM and ASTER GDEM datasets confirms that the site is geographically isolated from major flood-prone basins such as those associated with the Eastern Desert and Red Sea escarpments. Infrequent rainfall may cause limited sheet flow, but such events are short-lived and quickly infiltrate the highly permeable calcareous-sandy soils of the Katkut Formation (Elwan, 2021). Runoff potential is minimal, due to the soil's high infiltration capacity and low surface sealing.

#### Groundwater

The following information has been obtained from the Geotechnical Encyclopedia (2003), Moneim et al. (2016) and Alsayaad et al. (2024):

- The main aquifers underlying West Menya Governorate are, from top to bottom, the Quaternary Alluvium Aquifer, the Oligocene Sand Aquifer, the Middle Eocene Limestone Aquifer (Samalut Aquifer), and the Lower Cenomanian Sandstone Aquifer (Nubian Sandstone Aquifer).
- The Quaternary aquifer comprises the Pleistocene sub-aquifer, covering the Nile Valley and desert fringes, with high groundwater productivity.
- The Middle Eocene limestone aquifer (Samalut aquifer) and Oligocene sand aquifer are underlying the western desert of the Governorate. These aquifers are the main sources of water and have high potential.

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of rock rigidity, average fault slip, and the rupture area. This scale provides more accurate and consistent measurements than the Richter scale, particularly for moderate to large earthquakes.

In the West Menya concession, the depth of the aquifer varies between 120 to 140 m, and piezometric head<sup>9</sup> range from 45 to 74 meters, depending on the specific location. Notably, the Quaternary aquifer in this area contains water with salinity levels ranging from 2500 to 3500 parts per million (ppm), classifying it as NaCl type water (Al Amar, 2012).

According to the hydrogeological map of Egypt (Figure 3-7), the West Nile concession extends from the Eocene to Oligocene aquifers, while the Project Site is located on the gravely Oligocene aquifer. The iso-salinity distribution of the Nubian Sandstone Aquifer (NSA) within the West Menya concession ranges from west to east from 1000 to above 2000 ppm. However, NSA iso-salinity in the Project Site is above 1000 and less than 2000 ppm.

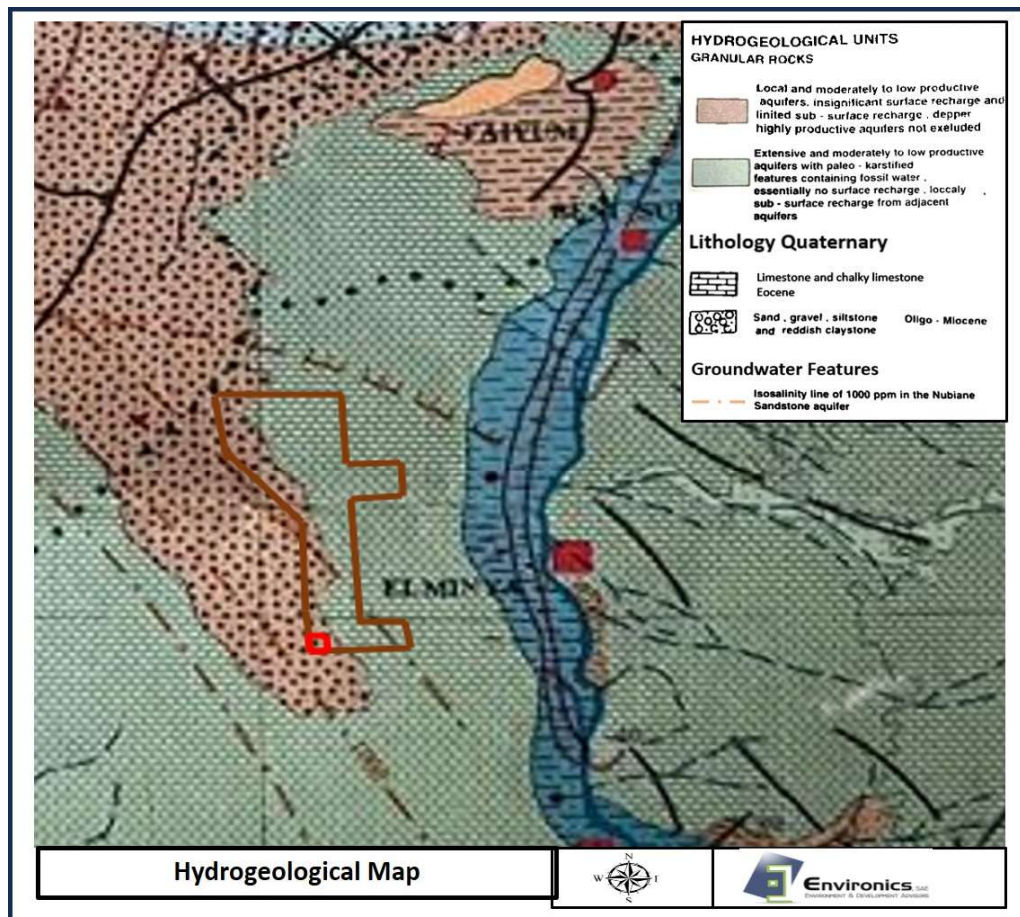


Figure 3-7: Hydrogeological map of the NREA West Menya Concession

The sandy Oligocene aquifer's lithological characteristics, such as grain size and sorting, greatly influence its hydraulic properties, including effective porosity, hydraulic conductivity, and transmissivity. In the northwest of West Menya, where the Qatrani Formation predominates, these properties are enhanced, making the aquifer more productive. Conversely, in the southeast, where the Katkut Formation is dominant (in the Project Site), the aquifer's potential decreases due to poorer sorting.

<sup>9</sup> the elevation to which water rises to under pressure

Mineral composition directly affects groundwater quality. It was revealed that the Oligocene Aquifer is ferruginous in the south and gypseous in the southeast, leading to higher concentrations of iron and sulfate in the. Despite these variations, the groundwater in this aquifer is generally fresh, Alsayyad et al. investigation of a number of wells in the region found total dissolved solids (TDS) ranging from 521 mg/l to 940 mg/l, except for one site where contamination has led to increased salinity (Alsayaad et al., 2024).

### 3.2 Biological Environment

Information and data on the species/features of the wider area<sup>10</sup> that could be also present in the project's Area of Influence (See Section 2.8) were gathered from direct observations, published material and previous reports, analysis of satellite images and from recent studies performed by Environics and other entities.

Accordingly, data and information on biodiversity of the Project Site and surroundings were mainly obtained through:

- Published material and previous reports, analysis of satellite images and recent studies performed by Environics and other entities;
- A field survey performed by Al Amar (2012) targeting the entire NREA West Menya Concession;
- The ornithological survey performed by Ecoda (2012), also targeting NREA West Menya Concession;
- References with maps showing empirical records and projected species' range, such as Baha El Din (2006) for herpetofauna, BirdLife International (2025) for avifauna and Basuony *et al.* (2010) and Hoath (2009) for mammals;
- BirdLife International database;
- The IUCN Red List of Threatened Species;
- Integrated Biodiversity Assessment Tool (IBAT)<sup>11</sup>;
- Migratory Soaring Birds Tool (MSBT);
- Avian Sensitivity Tool for Energy Planning (AVISTEP)<sup>12</sup>; and
- Professional judgment based on analysis of information obtained from literature on the wider area.

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<sup>10</sup> The wider area includes the area surrounding the project site which encompasses the same habitat and features of the project site and having a reasonable geographical extent to include all environmental and social aspects/receptors that might interact with project activities.

<sup>11</sup> IBAT is a web-based map and reporting tool developed as partnership among BirdLife International, Conservation International, IUCN, and UN Environment World Conservation Monitoring Centre. The tool provides a metric of "biodiversity significance", namely, Rarity-weighted species richness. It is visualized through a map that shows the relative importance of each ~10km (30 arc-seconds) grid cell in terms of its aggregate contribution to the global distribution of species of mammals, birds, amphibians, crabs, crayfishes and shrimps.

<sup>12</sup> BirdLife International has developed AVISTEP to identify where renewable energy could impact birds and should therefore be avoided.

Gathered information were confirmed and/or refined through a field survey of the Project Site and its surroundings carried out on the 4<sup>th</sup> of November 2025. Given the extent of the wider area, an initial assessment based on analysis of satellite images was carried out before undertaking the field survey. This step resulted in the preliminary identification of the land use sets and habitat types of the entire study area and provided an initial identification the area features and landmarks. Accordingly, a number of locations were preliminarily selected for field investigations, representing the different habitat types of the area.

The visit was not limited to the Project Site, but included other habitat types within the wider area, in order to document the ecological difference and variation between other habitat types (particularly the nearby reclaimed agricultural lands) versus the arid desert habitat characterizing the Project Site.

In this respect, field investigations included the following:

- Locations along a northern track (starting from the asphalt road) taken to approach the site, which included reclaimed agricultural lands on both sides;
- Locations within the desert environment preceding access to the site;
- Locations along a southern track used to exit the site (locally called “Al Ain” track), which also included reclaimed agricultural lands on its southern part; and
- Several locations within the Project Site and its Aol.

Figure 3-8 shows the field visit route, locations and the area main landmarks.



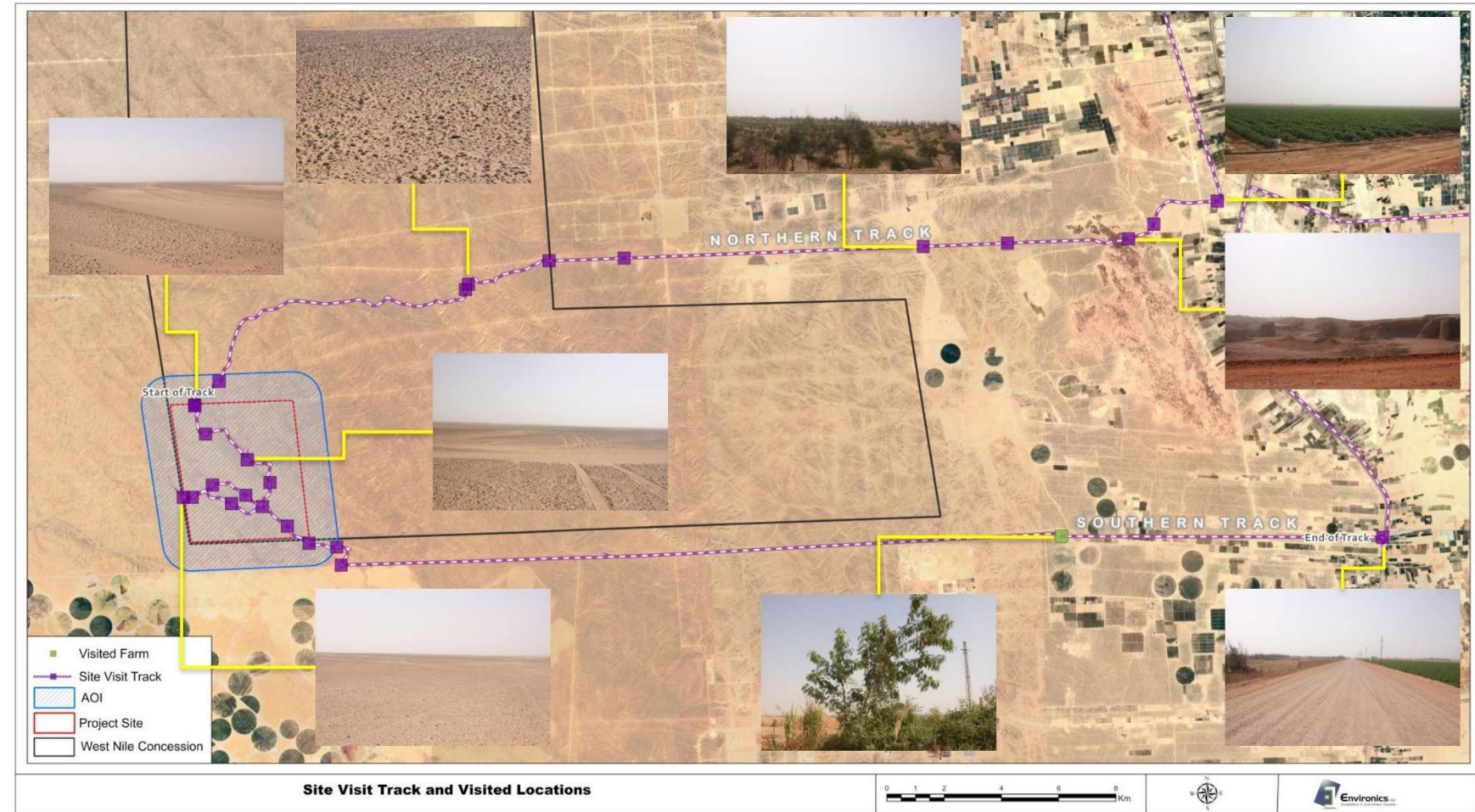


Figure 3-8: Field visit route (dotted line) and visited locations (squares)

### 3.2.1 Eco-geographic Location

The Project Site is located in the Egyptian Western Desert (WD) which covers about two thirds of the total area of Egypt. This desert extends from the Mediterranean coast in the north, to the Egyptian – Sudanese border in the south, the Nile Valley and Delta in the east, and to the Egyptian – Libyan border in the west.

The WD can be divided into three principal physiographic regions; the Miocene Northern Plateau (which slopes towards the Egyptian Mediterranean coast), the Middle Limestone Plateau (where the Kharga, Dakhla, Farafra, Bahariya, and Fayoum oases are located), where the proposed project site is located, and the Nubian Sandstone Plateau (NSP)

The West Nile Concession, where the Project Site is located, lies eco-geographically within the Middle Limestone Plateau of the Western Desert that is substantially a dry sand plateau with very little or no precipitation (EEAA, 1993).

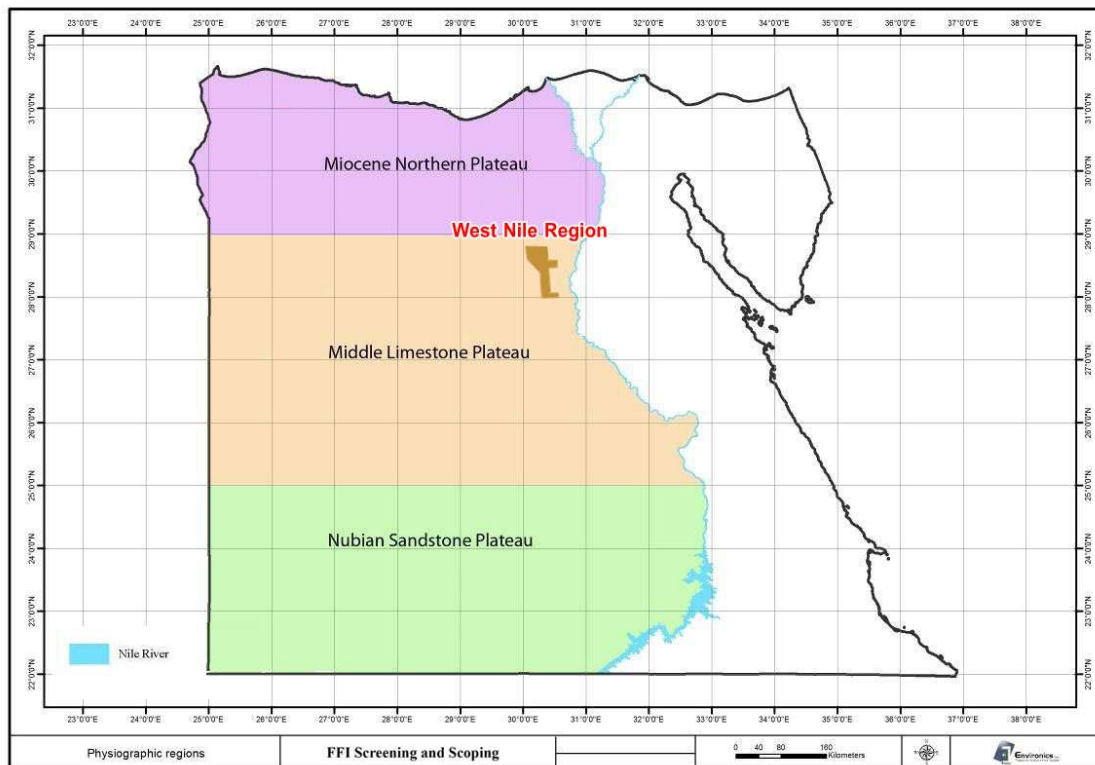


Figure 3-9: Location of NREA West Menya Concession in relation to physiographic regions

### 3.2.2 The Project Wider Area

The Project Site is eco-geographically located in the Middle Limestone Plateau of the Western Desert. The site falls administratively in Menya Governorate, whose wider area includes four main types of habitats, to which biodiversity is adapted.

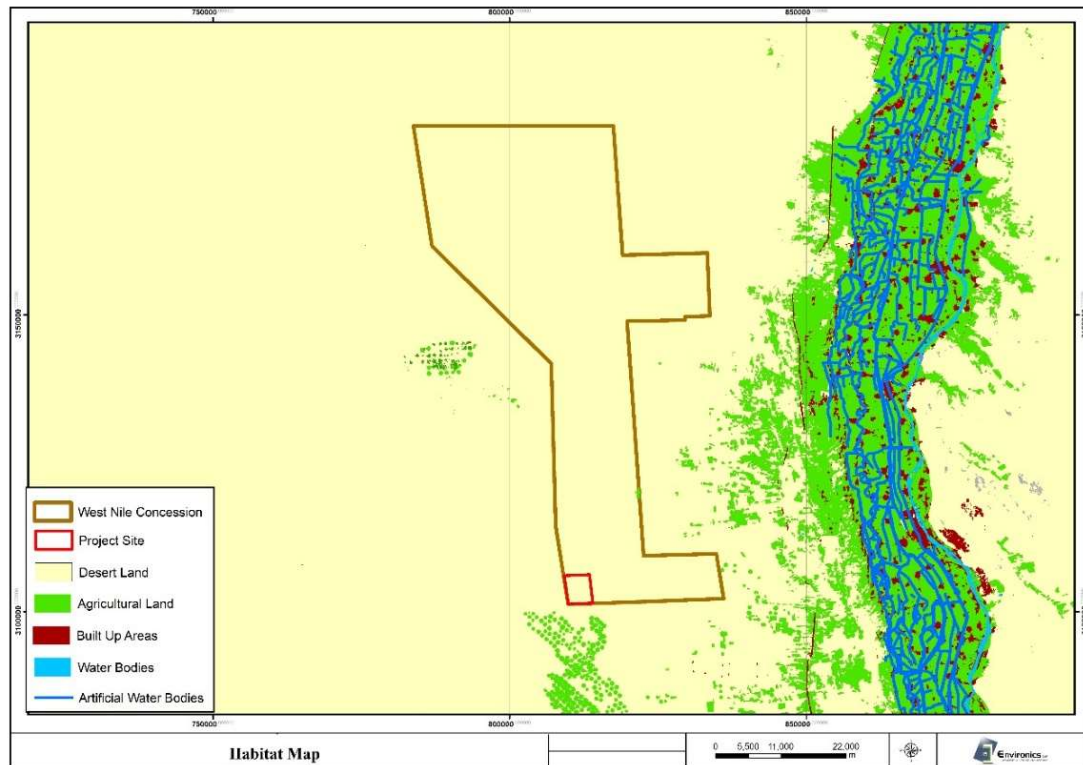


Figure 3-10: Habitat types of the Project Area

A description of the four main habitats of the wider area and their characteristic biodiversity is provided below.

**a) Nile Valley Farmlands**

The Nile Valley farmlands, located approximately 47 km east of the project site, are intensively cultivated and anthropogenically altered habitats. Despite being highly modified, these areas support a diverse assemblage of weedy vegetation, naturalized exotic species, and foreign-origin crops. Vegetation along canal and drain banks contributes to habitat heterogeneity, which in turn supports a wide range of fauna. The Nile Valley is almost connected to the Project Site through a corridor of reclaimed agricultural lands.



Figure 3-11: View of the Nile at Menya

Amphibians typical of the Nile Valley include the African Common Toad (*Sclerophrys regularis*), Nile Ridged Frog (*Ptychadena nilotica*), and Bedriaga's Frog (*Pelophylax bedriagae*), which thrive in irrigated fields and water bodies. Reptiles found in the area include geckos such as the Turkish Gecko (*Hemidactylus turcicus*) and White Spotted Gecko (*Tarentola annularis*), skinks, and snakes such as the Egyptian Cobra (*Naja haje*), Diced Snake (*Natrix tessellata*), and Striped Sand Snake (*Psammodromus sibilans*) (IUCN, 2025; Baha El Din, 2006).

The farmlands host numerous resident breeding birds, including Cattle Egret (*Bubulcus ibis*), Common Kestrel (*Falco tinnunculus*), Spur-winged Lapwing (*Vanellus spinosus*), Palm Dove (*Spilopelia senegalensis*), and Graceful Warbler (*Prinia gracilis*), among others. The Nile Valley is also a critical migratory corridor, part of the Palearctic-African flyway, used extensively during spring and autumn migrations. It also functions as a wintering ground for numerous migratory species (EEAA, 1993).

Mammals commonly observed in the Nile Valley include small and medium-sized generalist species such as the Long-eared Hedgehog (*Hemiechinus auritus*), African Grass Rat (*Arvicanthis niloticus*), Red Fox (*Vulpes vulpes*), Egyptian Mongoose (*Herpestes ichneumon*), and Afro-Asiatic Wildcat (*Felis lybica*).

Due to agricultural expansion and habitat connectivity, several of these species—particularly adaptable generalists—are likely to colonize nearby reclaimed agricultural lands adjacent to or within the broader project area. This includes species such as Cattle Egret, Black Rat (*Rattus rattus*), and Red Fox, which are already observed in similar landscapes (EEAA, 1993; IUCN, 2025).

#### b) Urban and Rural Habitats

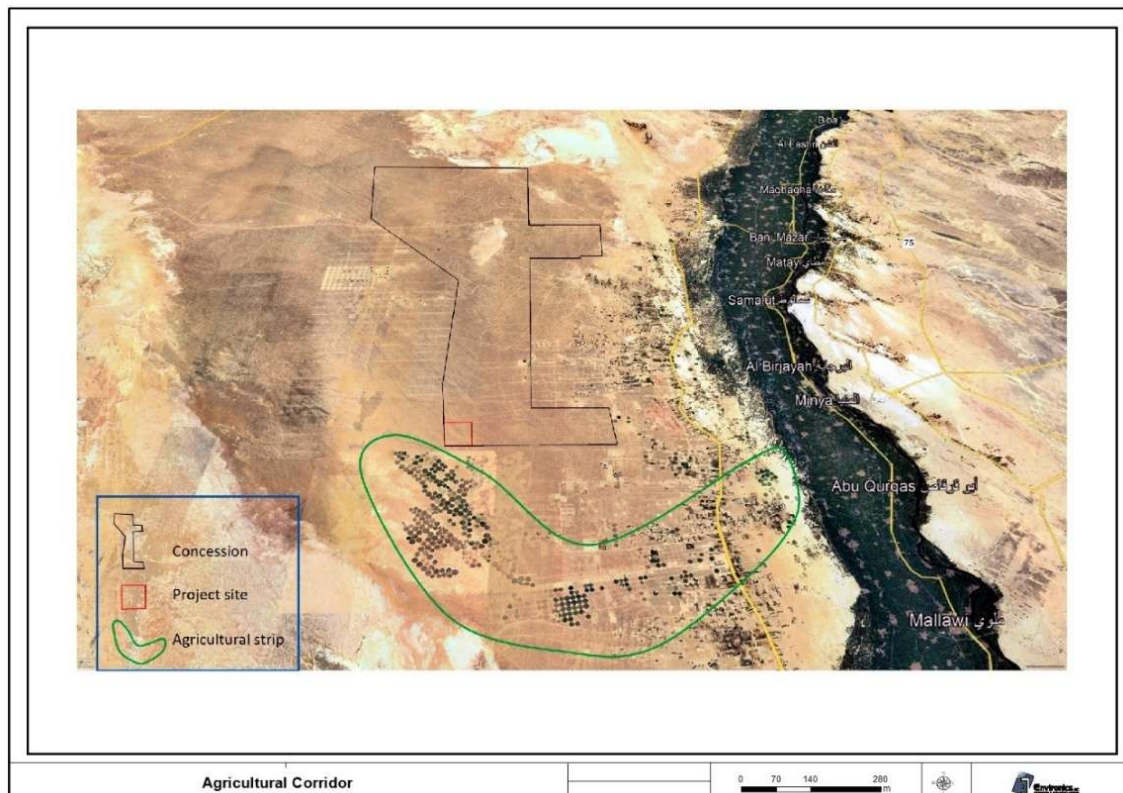
There are urban and man-made habitats scattered throughout the Nile Valley farmlands and reclaimed agricultural lands, such as towns and villages, banks of canals and drains, roadsides, railways and wastelands. These habitats are mainly home to exotic plants and trees introduced for ornamental purposes or as windbreakers, as well as opportunistic



fauna associated with human activities such as feral dogs and cats, rats, mice, and several species of birds.

### c) Reclaimed Agricultural Lands

Several reclaimed agricultural areas, including mega agricultural projects, exist near the West Menya Project Site, with the closest located approximately 1 km to the south. These irrigated and vegetated lands serve as ecological attractors, drawing species from the nearby Nile Valley that would not typically inhabit the arid desert environment. The expansion of agriculture has thus created a vegetated corridor extending from the Nile Valley into the desert, enhancing local biodiversity in proximity to the project site (Figure 3-12).



**Figure 3-12: Reclaimed agricultural lands forming a vegetated corridor starting from the Nile Valley and extending into the desert**

Wildlife from the Nile Valley is expected to gradually disperse into these newly formed agrarian habitats. Pioneer species are typically birds and large mammals with high dispersal capacity. Common avian colonizers include the Palm Dove (*Spilopelia senegalensis*), Cattle Egret (*Bubulcus ibis*), House Sparrow (*Passer domesticus*), and Hooded Crow (*Corvus cornix*). Among mammals, the Red Fox (*Vulpes vulpes*) and African Wolf (*Canis lupaster*) are expected to have already established themselves in nearby reclamation zones.

The ongoing transformation of desert lands into agricultural use facilitates the spread of Nile Valley mesic species into formerly arid ecosystems. This includes commensal and invasive species that can outcompete and displace native desert fauna. For instance, the Red Fox has

been documented replacing the native Rüppell's Sand Fox (*Vulpes rueppellii*) in various reclamation zones such as the New Valley, Fayum Depression, and Bahariya Oases. Similarly, species like the House Mouse (*Mus musculus*) and Cairo Spiny Mouse (*Acomys cahirinus*) have been observed displacing indigenous desert rodents, even in remote areas like the Acacia groves of the Western Desert.

In addition, these irrigated lands may offer suitable stopover habitats for migratory birds due to the availability of food, water, and shelter. However, according to local farmers, the use of these sites by migratory species is not yet occurring.

During the field visit, a northern track was followed to approach the site. Reclaimed agricultural plots, alternated by lands under development and undeveloped desert lands, were present on both side of this track.



**Figure 3-13: Reclaimed agricultural land located at the beginning of the northern track**



**Figure 3-14: Undeveloped desert land along the northern track**



**Figure 3-15: Levelling of a desert land for agricultural reclamation**



**Figure 3-16: Reclaimed agricultural land located near the end of the northern track**

In addition, a farm located along the southern (exit) track was visited by the team (Figure 3-17). Local farmers mentioned that the main cultivations of the farm and other farms of the area include prickly pear, guava, mango, peach, pear and olive trees.



Figure 3-17: View of the visited farm

Other plants and trees of the farm included Christ's Thorn Jujube (*Ziziphus spina-christi*) cultivated for its edible ripe fruits and Flamboyant (*Delonix regia*), grown as an ornamental tree. Flowers for honeybee breeding are also cultivated.



Figure 3-18: Guava tree  
(*Psidium guajava*)



Figure 3-19: Christ's Thorn Jujube  
(*Ziziphus spina-christi*)





Figure 3-20: Flamboyant (*Delonix regia*) cultivated as an ornamental tree

#### d) Middle Limestone Plateau Desert

Menya Governorate encompasses a large area of the Middle Limestone Plateau of the Western Desert characterized by a substantially dry sand plateau with very little or no precipitation. Outside of its depressions and oases, the only other habitats available are bare ground habitats (EEAA, 1993). The presence of water and vegetation in reclaimed desert farmlands is expected to attract species from the Nile Valley that would otherwise avoid the desert habitat. Due to the plateau's aridity, most of it is totally devoid of flora, save for a few desert-adapted floral species distributed as scattered, isolated shrubs throughout the plateau. This scattered distribution of flora is commensurate with the scattered distribution of fauna, which tend to include species adapted to such harsh desert environs. The Project Site is located in the northeastern part of this plateau.

Baha El Din (2006) designates this part of the Western Desert as poor in herpetofauna, where no more than 8-9 species of reptiles occur or are predicted to occur. The most widespread are Saharan species well adapted to sandy hyper-arid habitats, including Nidua Fringe-fingered Lizard (*Acanthodactylus scutellatus*), Elegant Gecko (*Stenodactylus sthenodactylus*), Saharan Sand Snake (*Psammophis aegyptius*) and Desert Horned Viper (*Cerastes cerastes*).

Resident desert birds include Greater Hoopoe-lark (*Alaemon alaudipes*), Cream-coloured Courser (*Cursorius cursor*), Spotted Sandgrouse (*Pterocles senegallus*), Bar-tailed Lark (*Ammomanes cinctura*), White-crowned Wheatear (*Oenanthe leucopyga*) and Brown-necked Raven (*Corvus ruficollis*).



Figure 3-21: Greater Hoopoe-lark (*Alaemon alaudipes*) recorded in the project's wider area by Environics in September 2018

Deserts are generally avoided by migratory birds due to the lack of food, water, and shelter and birds tend to fly around or over the desert rather than crossing it directly due to the harsh environmental conditions (BirdLife International, 2025; Biebach, 1990). On the other hand, as previously mentioned, the nearby reclaimed agricultural lands have created suitable stop-over sites where birds might rest and feed.

Typical mammal species of this desert environment include Lesser Egyptian Jerboa (*Jaculus jaculus*), Lesser Egyptian Gerbil (*Gerbillus gerbillus*) and Rüppell's Sand Fox (*Vulpes rueppellii*) (Hoath, 2009; Basuony et al., 2010).

During the field visit, the desert area preceding access to the project site was investigated in several locations. The area is composed of a bare sandy soil covered with gravel. Gravel is missing in low-lying areas, forming sandy corridors. This desert area and the Project Site (which is an extension of this area) share exactly the same landscape and geomorphological features.



Figure 3-22: Desert area in close proximity to the Project Site composed of a bare sandy soil covered with gravel. Note the gravel-free corridors in low-lying areas

### 3.2.3 The Project Site

The Project Site lies within a hyper-arid desert landscape that differs markedly from surrounding ecological regions, such as the Nile Valley farmlands and reclaimed agricultural corridors. These contrasting habitat types highlight the need for site-specific ecological investigation, particularly because most prior biodiversity surveys in the region have focused on areas of known or expected ecological richness, often overlooking the harsh, arid desert ecosystems.

To address this gap and ensure that the ESIA baseline reflects true on-ground conditions, the environmental team conducted a targeted *in situ* biodiversity field survey. This was designed to validate or correct regional biodiversity assumptions derived from literature and secondary sources.

Before field deployment, a detailed analysis of recent satellite imagery was undertaken to assess habitat structure and homogeneity across the 20.21 km<sup>2</sup> project footprint. The analysis confirmed that the site consists of a single, uniform, arid desert habitat, lacking distinct ecological micro-zones.

To effectively sample this homogeneous landscape, the survey started in the wider desert area and continued onsite where 13 representative survey points, covering the Project Site and its AoI, were surveyed (see Figure 3-8). Each point has been surveyed within a radius of approximately 500 meters, and additional transect-based observations have been made along the route connecting the survey points. This spatial strategy ensured a complete coverage of the site and provided a comprehensive ecological characterization of its ecological and geomorphological attributes.

### 3.2.4 Biodiversity

Desktop information on biodiversity specific to the project area is mainly based on the field surveys performed by Al Amar (2012) targeting flora and fauna, and Ecoda (2012), targeting avifauna. These surveys covered the entire NREA West Menya concession, with only one survey point falling within the Project Site, as shown in Figure 3-23.

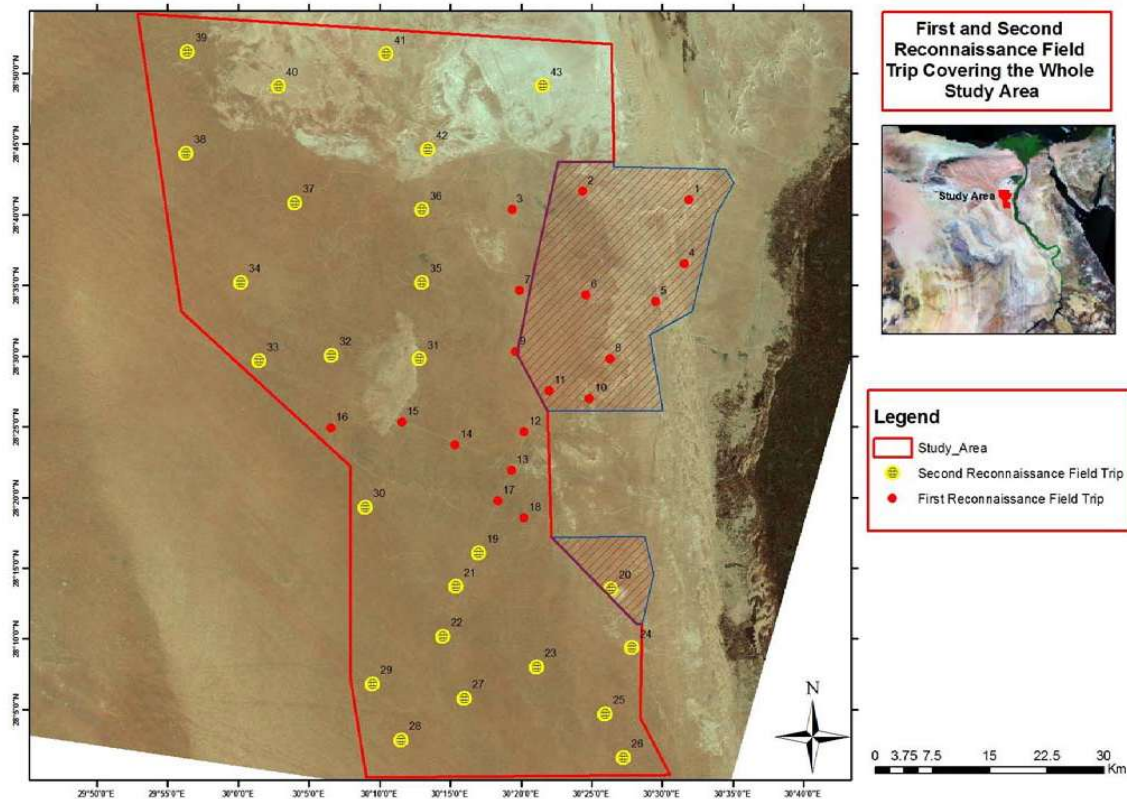


Figure 3-23: Survey points covered by Al Amar survey in 2012

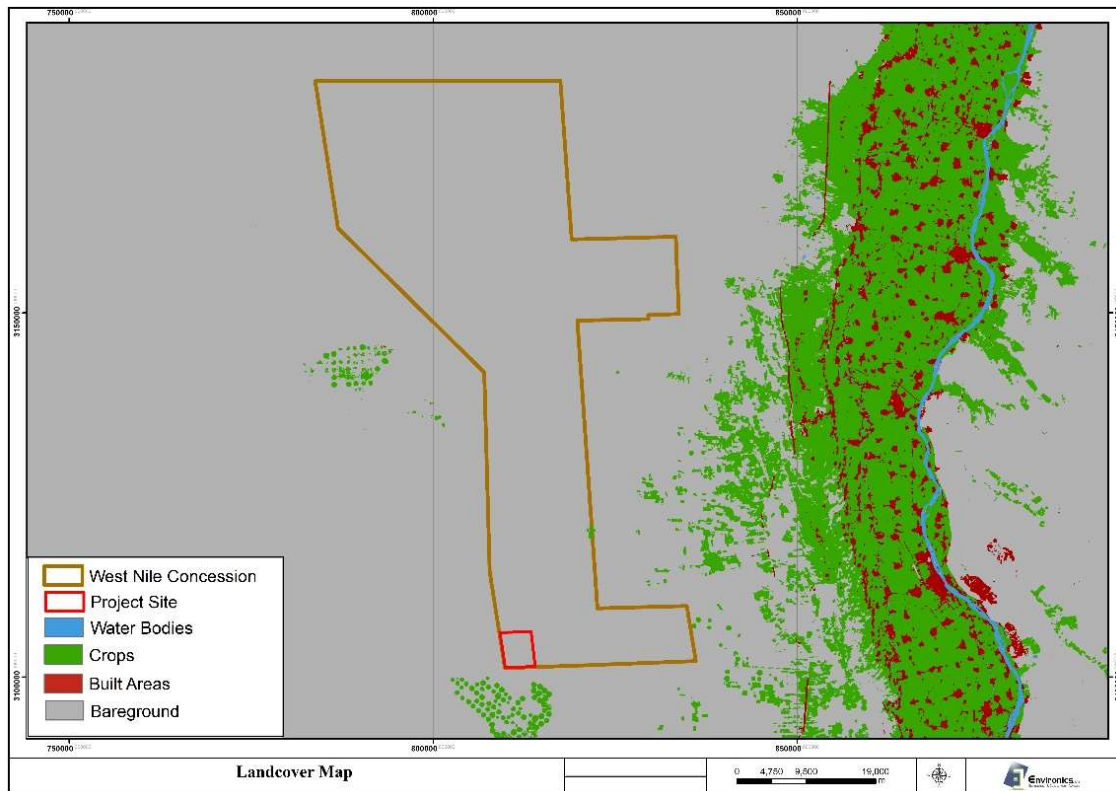
Source: Al Amar (2012)

Despite the large area covered, Al Amar recorded a total of 17 species of plants and 23 species of animals (mostly insects: 16 species of insects, one species of arachnida, one species of reptiles and 5 species of birds). Accordingly, the study concluded that the NREA West Menya concession is very poor in flora and fauna and shows a very low density, probably due to the climatic conditions. The very few recorded plant and animal species are common in the Egyptian desert, while no endemic or threatened species were recorded.

#### a) Habitats

According to the Copernicus Land Cover Map Viewer, the dominant habitat and land cover at the Project Site, as well as throughout the NREA West Menya concession, is characterized by a bare soil. Scattered vegetation, mainly resulting from land reclamation for agriculture, is visible outside the NREA West Menya concession (Figure 3-24).





**Figure 3-24: Habitat types of the NREA West Menya concession**

The field visit confirmed that the Project Site is an extension of the desert area described in Section 3.2.2 - d) Middle Limestone Plateau Desert, and consists of a single, homogeneous, arid desert habitat entirely composed of a bare sandy soil covered with gravel, with gravel-free sandy corridors present in low-lying areas.



**Figure 3-25: View of the Project Site at different locations showing its uniformity**



At the macro level, the landscape and the habitats of the Project Site and surrounding desert are overall similar and repetitive, with no significant variation in landscape features at the micro level. The landscape shows very limited altitudinal variability and is generally flat, providing easy access to the site.

### Natural and modified habitats

In accordance with EBRD ESR6 (EBRD, 2024) and IFC PS6 (IFC, 2012), habitat types are categorized into natural and modified habitats. The entire Project Site is categorized as a “natural habitat”. Modified habitats (reclaimed agricultural lands) occur in the close vicinity, but outside the Project Site.

### b) Flora

The Middle Limestone Plateau is extremely arid, practically rainless and perennial plant life was historically confined to, and associated with, the oases. Recently, the numerous agricultural projects, including large-scale projects are constantly irrigated with groundwater, have created large extensions of modified habitats similar to the farmlands of the Nile Valley, which sustain perennial vegetation.

Outside these oases and reclaimed agricultural lands, plant life is mostly ephemeral and depends on the occasional cloud bursts, which are incidents that may happen once every several years. This type of vegetation is classified by Kassas (1966) as “accidental vegetation” (EEAA, 1993).

The plant life of the NREA West Menya concession belongs to this type and the area is almost devoid of vegetation. Investigations on the concession carried out by Al Amar (2012) reported most of the region as a desert with small patches of vegetation from which only 17 plant species were recorded (Table 3-9).

**Table 3-9: List of plant species recorded in the NREA West Menya concession**

Species	Family	Frequency (%)	IUCN status
<i>Cornulaca monacantha</i>	Chenopodiaceae	18	NE
<i>Haloxylon salicornicum</i>		11	NE
<i>Salsola imbricata</i>		24	NE
<i>Capparis decidua</i>	Capparaceae	13	LC
<i>Ochradenus baccatus</i>	Resedaceae	2	LC
<i>Vachellia tortilis</i>	Mimosaceae	4	LC
<i>Monsonia nivea</i>	Geraniaceae	27	NE
<i>Fagonia arabica</i>	Zygophyllaceae	40	NE
<i>Zygophyllum coccineum</i>		8	NE
<i>Tamarix nilotica</i>	Tamaricaceae	13	LC
<i>Deverra tortuosa</i>	Apiaceae	8	NE
<i>Hyoscyamus muticus</i>	Solanaceae	6	NE
<i>Conyza bonariensis</i>	Asteraceae	6	NE
<i>Pulicaria undulata</i>		4	NE
<i>Sonchus oleraceus</i>		2	NE
<i>Symphyotrichum squamatum</i>		2	NE
<i>Stipagrostis plumosa</i>	Poaceae	47	NE

Source: Al Amar (2012)

All recorded species are classified as common in other Egyptian deserts, having a very low economic value, with no threatened or endemic species identified.

There are newly reclaimed fields about 1 km away from the Project Site, in addition to the adjacent 1.5-feddan Project Site, both characterized by the presence of introduced agricultural floral species.

On the other hand, results of the November 2025 survey indicate that the Project Site is totally devoid of vegetation.

### c) Fauna

Field surveys in the NREA West Menya concession conducted by Al Amar (2012) recorded very few species of animals, mostly insects. Recorded species included 17 insect and arachnid species, only one reptile, five resident birds, while Ecode (2012) recorded 15 migratory birds. No mammals were recorded during these surveys. However, six mammalian species might occur in the area and, possibly, in the Project Site. Moreover, the recent presence of water and vegetation in some reclaimed desert farmlands around the Project Site is expected to attract species from the Nile Valley that would otherwise avoid the desert habitat.

#### • Invertebrates

Sixteen insect species of insects and one Arachnid species have been recorded from the NREA West Menya concession during the survey carried out by Al Amar (2012), as shown in Table 3-10. Most of the recorded species have not yet been evaluated (NE) in the IUCN Red List, while *Crocothemis erythraea* is classified as Least Concern (LC), and none is currently listed as threatened.

**Table 3-10: Invertebrate species previously recorded in the NREA West Menya concession**

Faunal group	Species		IUCN status
	Scientific name	English name	
Insects and arachnids	<i>Crocothemis erythraea</i>	Scarlet Dragonfly	LC
	<i>Schistocerca gregaria</i>	Desert locust	NE
	<i>Calosoma chlorostectum</i>	Ground beetles	NE
	<i>Cataglyphis bicolor</i>	Sahara Desert ant	NE
	<i>Coccinella undecimpunctata</i>	Eleven-spot ladybird	NE
	<i>Blaps polychresta</i>	Egyptian beetles	NE
	<i>Sehirus morio</i>	Burrower bugs	NE
	<i>Naupactus sp.</i>	White-fringed beetle	NE
	<i>Formica sp.</i>	Field ants	NE
	<i>Cyrtobagouse sp.</i>	Fungus weevils	NE
	<i>Tricaridodrynerus guerini</i>	Wasps	NE
	<i>Wohlfahrtia magnifica</i>	Spotted flesh fly	NE
	<i>Rhodnius sp.</i>	Kissing bugs	NE
	<i>Lepisma saccharina</i>	Paramites	NE
	<i>Heterocera</i>	Butterfly	NE
	<i>Cicindela flexuosa</i>	Metallic beetles	NE
	<i>Cheiracanthium pelasgicum</i>	Long-legged sac spiders	NE

Source: Al Amar (2012)

Although not recorded during the surveys (neither by Al Amar, nor by Environics), scorpions are expected to be present among the invertebrate fauna of the region. On the other hand, no invertebrates were recorded at the Project Site during the November 2025 survey.

- **Herpetofauna**

Only one reptile species was recorded by Al Amar (2012), namely the Red-spotted Lizard (*Mesalina rubropunctata*), which is categorized as LC by the IUCN (2025). Although the Middle Limestone Plateau of the Western Desert (where the Project Site is located) is poor in herpetofauna, according to literature, other species of reptiles might be present. These include lizards such as Nidua Fringe-fingered Lizard (*Acanthodactylus scutellatus*), and snakes, such as Saharan Sand Snake (*Psammophis aegyptius*) and Desert Horned Viper (*Cerastes cerastes*), as mentioned in Section 3.2.2 – d) Middle Limestone Plateau Desert. Threatened species might also occur (see Section 3.2.5). However, no signs indicating the presence of reptiles were noticed at the Project Site.

- **Avifauna**

Based on a previous ornithological surveys covering the NREA West Menya concession, five resident bird species were recorded by Al Amar (2012), while 15 migratory birds were reported during autumn 2011 and spring 2012 by Ecoda (2012).

#### Resident birds

Table 3-11 shows the resident birds recorded by Ecoda (2012).

**Table 3-11: Resident bird species previously recorded in the NREA West Menya concession**

Species		IUCN status
Scientific name	English name	
<i>Corvus ruficollis</i>	Brown-necked Raven	LC
<i>Lanius excubitor</i>	Great Grey Shrike	LC
<i>Ammomanes deserti</i>	Desert Lark	LC
<i>Bubulcus ibis</i>	Cattle Egret	LC
<i>Pterocles coronatus</i>	Crowned Sandgrouse	LC

Source: Al Amar (2012)

In addition to the above-mentioned species, other resident desert birds might also occur (see Section 3.2.2 – d) Middle Limestone Plateau Desert). Moreover, the Greater Hoopoe-lark (*Alaemon alaudipes*) had been previously recorded by Environics in 2018. The presence of the Cattle Egret among the recorded species (a typical bird of agricultural fields) provides a clear indication of the consequences of desert reclamation for agriculture in terms of Nile Valley species' expansion. None of these resident bird species is threatened and all the recorded species are common and widespread.

#### Migratory birds

Table 3-12 shows the list of recorded migratory species recorded by Ecoda (2012), as well as their IUCN global status. Ecoda concluded that the NREA West Menya concession does not meet any of the criteria developed by BirdLife International and

is not of international importance for any species during autumn and spring migration. In comparison to locations at the Red Sea, the migratory activity in the study area is extremely low. Accordingly, Ecoda assessed the importance of the study area for migrating soaring and gliding birds as very low. In addition to the Nile Valley, the vegetated areas in the oases and larger wadis may have a higher importance for local and roosting birds.

**Table 3-12: Migratory birds recorded in NREA West Menya concession and their global status**

Species		IUCN global status
English name	Scientific name	
Egyptian Vulture	<i>Neophron percnopterus</i>	EN*
Booted Eagle	<i>Hieraetus pennatus</i>	LC
Short-toed Snake Eagle	<i>Circaetus gallicus</i>	LC
Steppe Eagle	<i>Aquila nipalensis</i>	EN
Black Kite	<i>Milvus migrans</i>	LC
Common Crane	<i>Grus grus</i>	LC
European Honey Buzzard	<i>Pernis apivorus</i>	LC
Eurasian Buzzard	<i>Buteo buteo</i>	LC
White Stork	<i>Ciconia ciconia</i>	LC
Harrier	<i>Circus spp.</i>	--
Levant Sparrowhawk	<i>Accipiter brevipes</i>	LC
Eleonora's Falcon	<i>Falco eleonora</i>	LC
Common Kestrel	<i>Falco tinnunculus</i>	LC
Lesser Kestrel	<i>Falco naumanni</i>	LC
Red-footed Falcon	<i>Falco vespertinus</i>	VU**

\*VU at the Mediterranean level; \*\*CR at the Mediterranean level

Source: Ecoda (2012)

Ecoda (2012) did not provide an identification of Harrier (*Circus sp.*) records at the specific level. On the other hand, the Western Marsh-harrier (*Circus aeruginosus*) and Pallid Harrier (*Circus macrourus*) are the most common harriers occurring in the Western Desert. The latter is categorized as globally NT by the IUCN.

BirdLife International species distribution maps indicate the presence in the area of four threatened species. These are the Egyptian Vulture (*Neophron percnopterus*) as passage migrant and native breeding and the Steppe Eagle (*Aquila nipalensis*), Red-footed Falcon (*Falco vespertinus*) and Saker Falcon (*Falco cherrug*) as passage migrants. The latter has not been recorded during the 2011-2012 ornithological survey carried out by Ecoda (2012), while the other three are consistent with this survey.

On the other hand, the presence of these species within the project wider area, is not reported in local literature and Tharwat (1997) does not include the Western Desert within the range of these species. This may be due to the few numbers of dedicated bird surveys carried out before the increment of renewable energy development projects in the area.

#### **Area assessment using Migratory Soaring Birds Tool**

Additionally, according to a regional assessment using the Migratory Soaring Birds Tool (MSBT), the NREA West Menya concession sensitivity is classified as “potential,

score: 0.000", indicating that the region has the least sensitivity to soaring migratory birds (Figure 3-26).

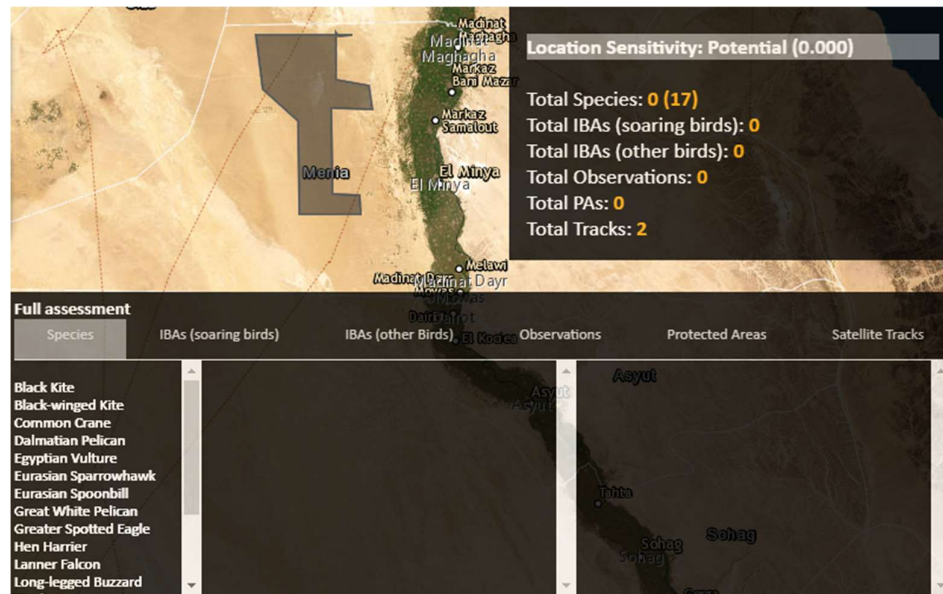


Figure 3-26: Sensitivity of NREA West Menya concession to migratory soaring birds based on MSBT

The same assessment using MSBT was carried out at the Project Site level (in or around the Project Site within a 5 km diameter buffer). The results were the same of those of the regional assessment, as the sensitivity of this area is classified as "potential, score: 0.000" and has the least sensitivity to soaring migratory birds (Figure 3-27).

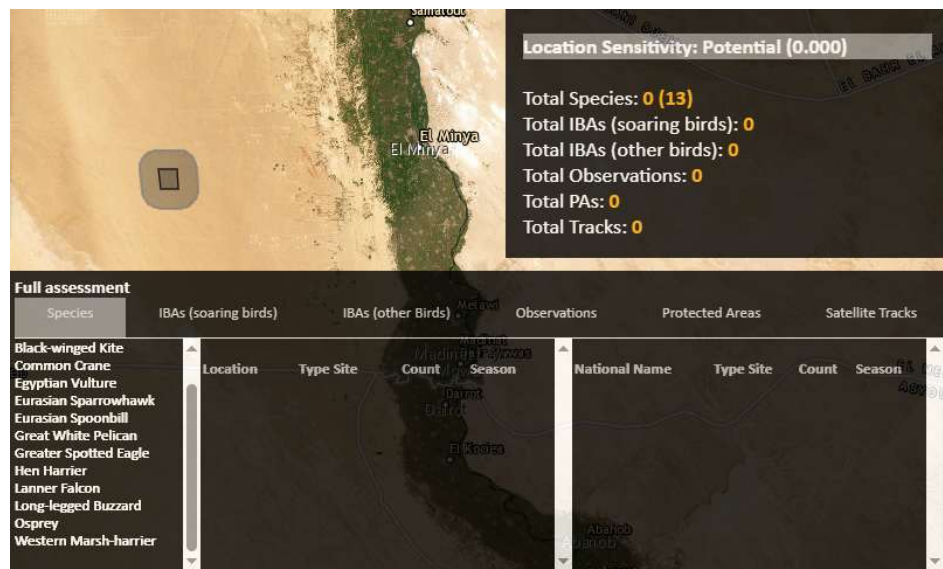


Figure 3-27: Sensitivity of the Project Site to migratory soaring birds based on MSBT

According to the assessment, 13 migratory bird species may occur in or around the Project Site within a 5 km diameter buffer, as shown in Figure 3-27 and Table 3-13. Three of these birds, namely Egyptian Vulture, Black Kite and Common Crane, had been recorded by Ecoda (2012).

**Table 3-13: Migratory birds potentially occurring in and around the Project Site using MSBT**

Species		IUCN status
English name	Scientific name	
Egyptian Vulture	<i>Neophron percnopterus</i>	EN*
Black-winged Kite	<i>Elanus caeruleus</i>	LC
Black Kite	<i>Milvus migrans</i>	LC
Common Crane	<i>Grus grus</i>	LC
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	LC
Eurasian Spoonbill	<i>Platalea leucorodia</i>	LC
Great White Pelican	<i>Pelecanus onocrotalus</i>	LC
Greater Spotted Eagle	<i>Clanga clanga</i>	VU
Hen Harrier	<i>Circus cyaneus</i>	LC*
Lanner Falcon	<i>Falco biarmicus</i>	LC**
Long-legged Buzzard	<i>Buteo rufinus</i>	LC
Osprey	<i>Pandion haliaetus</i>	LC***
Western Marsh-harrier	<i>Circus aeruginosus</i>	LC

\*VU at the Mediterranean level; \*\*NT at the Mediterranean level; \*\*\*EN at the Mediterranean level

#### **Assessment of avian sensitivity in relation to PV development using AVISTEP**

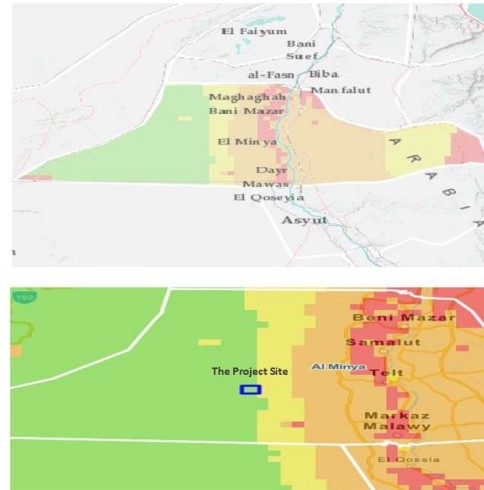
BirdLife International has developed AVISTEP – the Avian Sensitivity Tool for Energy Planning to identify where renewable energy could impact birds and should therefore be avoided. AVISTEP provides users with spatial heat maps depicting potential avian sensitivity in relation to the several types of energy infrastructure including Solar Photovoltaic. Each 5km x 5km cell within the heatmaps has a sensitivity score. These scores have been grouped into four categories of sensitivity, namely: Low, Moderate, High and Very High.

Based on AVISTEP, most of the project site falls within a green zone of low risk to bird populations. The eastern peripheral area lies within a yellow zone, representing a moderate risk (Figure 3-28).



## Avian Sensitivity

Sensitivity Level	Km <sup>2</sup> of Country Per Sensitivity Level	% of Country
Low	10,618 km <sup>2</sup>	34%
Moderate	5,804 km <sup>2</sup>	18%
High	11,627 km <sup>2</sup>	37%
Very High	3,334 km <sup>2</sup>	11%



**Figure 3-28: Area sensitivity to bird populations based on AVISTEP**

Although the wider area has witnessed some changes, the Project Site and its Area of Influence (AoI) are still an undeveloped desert habitat, similar to how it was at the time of the Ecoda survey. The Project Site is totally devoid of vegetation with no suitable habitats for migratory birds to land or rest.

Accordingly, with the limited vegetation, food and shelter, and due to the proximity of the Nile Valley and very close vicinity of reclaimed agricultural lands, it is highly unlikely that most of the species listed earlier would intentionally land in this location. In fact, the environment of the project area is likely to be a "bird barrier" where birds would actively avoid flying over or landing in the area due to its harsh conditions, resulting in a "migration bottleneck" over more suitable habitats (in this case, the Nile Valley)".

However, it is possible that some bird species might still be seen in the wider desert area (and possibly at the project site), albeit rarely, and usually under specific circumstances, as follows:

- Accidental landings: Birds migrating or traveling through the area might be forced to make an emergency landing due to exhaustion, bad weather, or injury.
- Stopovers during migration: Some bird species, especially raptors and waders, might use this area as a brief stopover during their migration, even if it's not an ideal habitat.
- Birds blown off course: Strong winds or sandstorms could blow birds off their intended course, leading them to land in this area unintentionally.

In normal conditions, given the limitedness or even absence of attractive features for birds, such as food sources, water, shelter or perching and roosting sites, it is reasonable to predict that bird presence in this area will be extremely low. References supporting this prediction include:

- A study on bird migration patterns in the Sahara Desert found that "*birds tend to fly around or over the desert rather than crossing it directly due to the harsh environmental conditions*" (Biebach, 1990);
- A study on the ecology of desert birds found that "*bird density and diversity are typically low in desert environments due to the limited availability of resources*" (MacLean, 2004);
- "Birds and Climate Change" by the IUCN states that "*birds tend to avoid areas with extreme temperatures, lack of water, and poor habitat quality*" (IUCN, 2010); and
- "BirdLife International" website states that "*deserts are generally avoided by birds due to the lack of food, water, and shelter*".

In addition to the above, during the field visit, the site has been entirely investigated through a large number of survey points (covering the entire site and its AoI) as well as other habitat types within the wider area, in order to document the ecological difference and variation between other habitat types (particularly the nearby reclaimed agricultural lands) versus the arid desert habitat characterizing the Project Site.

Results of the survey indicated that the whole site is composed of a single, homogeneous, arid desert habitat entirely composed of a bare sandy soil covered with gravel, totally devoid of vegetation. No locations of potential interest to avifauna and/or wildlife requiring further investigations were recognized.

Moreover discussions with neighbouring farms operators, who were asked about potential birds landing in nearby reclaimed agricultural areas, reported that no landing or even sightings of migratory species.

Although reclaimed agricultural lands are known to attract species from the Nile Valley, yet these species are not adapted to the desert environment and will not venture into the desert where the project site is located. Moreover, the team investigated the presence of potential avian colonizers. However, even the most common species with high dispersal capacity (such as the Palm Dove *Spilopelia senegalensis*, Cattle Egret *Bubulcus ibis*, House Sparrow *Passer domesticus*, and Hooded Crow *Corvus cornix*) were not present.

The above support the idea that birds tend to avoid areas with harsh environmental conditions, such as the harsh sandy desert environment of the Project Site and its AoI.

- **Mammals**

Although no mammals were recorded neither during the survey carried out by Al Amar (2012) nor the November 2025 survey, rodents such as gerbils might be present. Moreover, some threatened species might be found in the part of the Western Desert encompassing the NREA West Menya concession, as reported in literature. However, they are expected to occur in the area as vagrant species (see Section 3.2.5).



### 3.2.5 Ecological Sensitivities

#### a) Species of Conservation Concern

The following sections identify and describe species of conservation concern (i.e., threatened, endemic, highly sensitive, keystone species) from the above-mentioned species that could potentially inhabit or visit the Project Site or localities in close proximity to it.

However, it should be taken into consideration that the size of the Project Site is negligible when compared to the vast geographical size of the Western Desert (WD), in addition to the fact that the species mentioned above are listed based on their habitat preferences and species distribution maps, and none have been formally recorded from within the Project Site or from areas in close proximity to it. Thus, the probability of their actual occurrence within the Project Site is considerably low and, even if one or more of these species were present onsite, alternative habitats would be readily available, and their avoidance of the Project Site is not likely to cause any significant effect on their population levels.

- **Flora**

The Project Site is located in an arid desert environment totally devoid of vegetation. The few vegetation recorded from the wider area (the NREA West Menya concession) is composed of scattered shrubs, which are common and widespread in the Western Desert of Egypt.

- **Fauna**

#### *Herpetofauna*

Three reptiles reported in literature from the wider area are nationally threatened. These are the Desert Monitor (*Varanus griseus*) and the Nubian Spitting Cobra (*Naja nubiae*) both classified as NT, as well as the Theban Sand Boa (*Eryx colubrinus*) categorized as VU. On the other hand, the three species are categorized as LC at the global level by the IUCN.

#### *Avifauna*

Table 3-14 presents the threatened migratory birds potentially passing over the Project Site based on the Ecoda survey and results of the MSBT assessment.

**Table 3-14: Threatened migratory species potentially passing over the Project Site**

Scientific name	Common name	IUCN status		Source
		Global	Mediterranean	
Egyptian Vulture	<i>Neophron percnopterus</i>	EN	VU	- Ecoda (2012) - BirdLife International (2025) - MSBT (2025)
Steppe Eagle	<i>Aquila nipalensis</i>	EN	NE	- Ecoda (2012) - BirdLife International (2025)
Red-footed Falcon	<i>Falco vespertinus</i>	VU	CR	- Ecoda (2012) - BirdLife International (2025)
Saker Falcon	<i>Falco cherrug</i>	EN	CR	BirdLife International (2025)

Scientific name	Common name	IUCN status		Source
		Global	Mediterranean	
Greater Spotted Eagle	<i>Clanga clanga</i>	VU	NE	MSBT (2025)
Hen Harrier	<i>Circus cyaneus</i>	LC	VU	MSBT (2025)
Lanner Falcon	<i>Falco biarmicus</i>	LC	NT	MSBT (2025)
Osprey	<i>Pandion haliaetus</i>	LC	EN	MSBT (2025)

In terms of the Project Site's value to migratory avifauna, a key point relevant to considering the airspace utilized by avifauna is that the airspace is "anchored" to an important terrestrial area from which avifauna could take advantage. In other words, the airspace is typically considered with respect to the ecological use of terrestrial habitat and not "on its own" (IFC, 2023). In the present case, the Project Site does not provide any resources to avifauna "on its own". As such, the Project Site and the surrounding desert environment are of no ecological use to migrating avifauna. On the other hand, avifauna might utilize the nearby reclaimed agricultural lands as fueling and resting stations.

#### Mammals

Table 3-15 shows some species of conservation concern reported from the Western Desert encompassing the NREA West Menya concession.

**Table 3-15: Threatened mammals possibly occurring in the NREA West Menya concession**

Scientific name	Common name	National status	IUCN status
<i>Gazella dorcas</i>	Dorcas Gazelle	VU*	VU
<i>Vulpes zerda</i>	Fennec Fox	EN	LC
<i>Hyaena hyaena</i>	Striped Hyena	LC	NT
<i>Canis lupaster</i>	African Wolf	DD	LC
<i>Felis lybica</i>	Afro-Asiatic Wildcat	NE	LC

Source: National status based on Basuony et al. (2010)

\* Probably currently EN and possibly CR (expert opinion)

The Fennec Fox (*Vulpes zerda*) could be present within or around the Project Site, as this fox is mainly recorded in Egypt from the WD, including the harsh environs of the southern WD. The Fennex fox is categorised as LC at the global and Mediterranean levels, however, it is nationally classified as EN species, as it is mainly threatened by heavy trapping pressure for the pet trade.

Although the Dorcas Gazelle (*Gazella dorcas*) has the capacity to inhabit a wide range of arid and semi-arid habitats, including sparsely vegetated rocky and/or sandy plains, and the margins of sandy desert, it is unlikely to frequent or inhabit the Project Site as its range in Egypt has been drastically reduced due to habitat loss and hunting activities (Hoath, 2009; Basuony et al., 2010; IUCN, 2025). Moreover, according to Chammem et al. (2008), gazelles tend to avoid areas where agricultural development has occurred, but do not seem to be disturbed by livestock. Therefore, their presence in the nearby reclaimed agricultural lands is not anticipated.

Accordingly, *Gazella dorcas* is highly unlikely to be encountered onsite, which lacks suitable foraging habitats, nor in the nearby modified habitats.

#### b) Key Biodiversity Areas

The Project Site does not encompass any Key Biodiversity Areas (KBAs), including Protected Areas (PAs) legally protected by the Egyptian Government, BirdLife International designated Important Bird Area (IBAs), or PlantLife International designated Important Plant Areas (IPAs).

Furthermore, there are no KBAs located in close proximity to the Project Site, nor within its wider area. The closest ecologically sensitive area is Wadi El Rayan Protected Area, located 106 km north of the Project Site (Figure 3-29).

Wadi El Rayan is a formally declared protected area by the Egyptian Government and recognized as an Important Bird Area (IBA) by BirdLife International, Important Plant Area (IPA) by PlantLife International and a Ramsar site (wetland of international importance) according to the Ramsar convention.

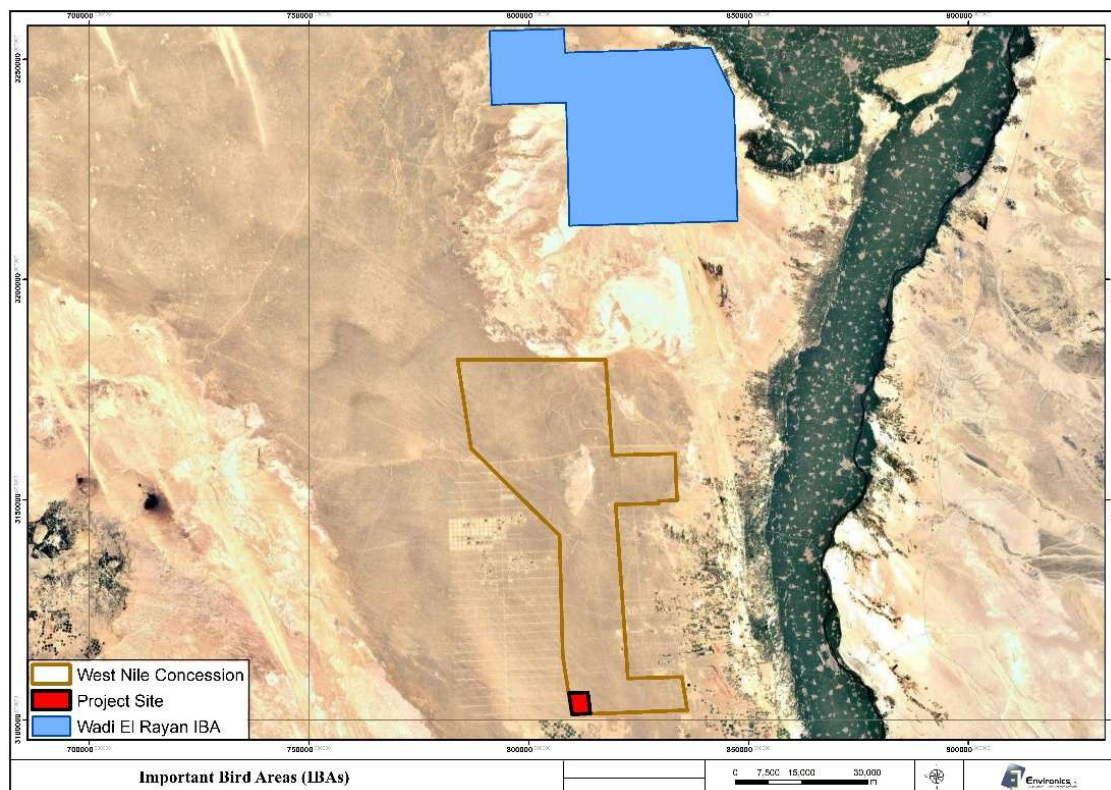


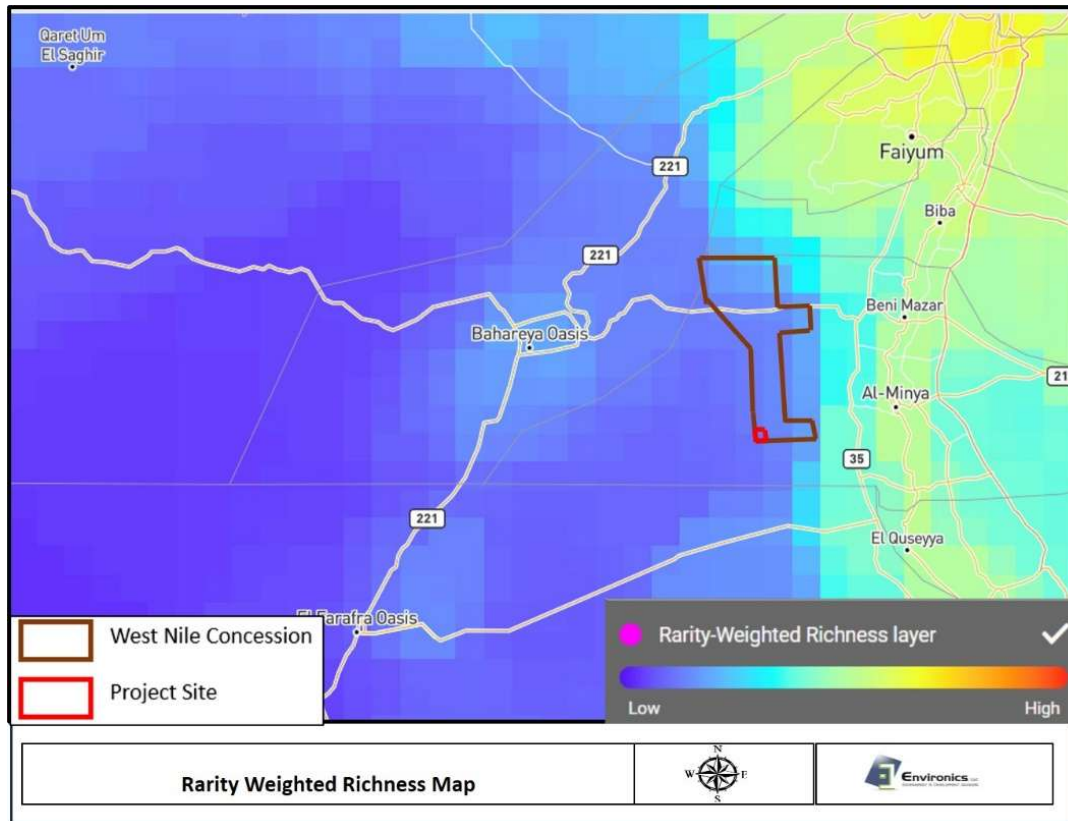
Figure 3-29: Closest ecologically sensitive areas to the NREA West Menya concession

#### 3.2.6 Ecological Value and Significance

The Integrated Biodiversity Assessment Tool (IBAT) is a web-based map and reporting tool developed as partnership among BirdLife International, Conservation International, IUCN, and UN Environment World Conservation Monitoring Centre. According to this tool, the biological significance of an area can be represented by the rarity-weighted richness, i.e., Relative

importance in terms of its aggregate contribution to the global distribution of species of mammals, birds, amphibians and other fauna.

IBAT indicates that the NREA West Menya concession, including the Project Site, is of low rarity-weighted richness, i.e., its relative importance is low to the global distribution of different categories of species (Figure 3-30).



**Figure 3-30: Rarity-weighted richness of the NREA West Menya concession**

Source: Integrated Biodiversity Assessment Tool

### 3.2.7 Ecosystem Services

Paragraph 2 of IFC Performance Standard 6 (PS6) defines ecosystem services as the benefits that people, including businesses, derive from ecosystems (IFC, 2012; 2019). Ecosystem services are organized into four types:

- (i) Provisioning services, which are the products people obtain from ecosystems such as food, freshwater, timber, fibers and medicinal plants;
- (ii) Regulating services, which are the benefits people obtain from the regulation of ecosystem processes such as surface water purification, carbon storage and sequestration, climate regulation and protection from natural hazards;
- (iii) Cultural services, which are the nonmaterial benefits people obtain from ecosystems and may include natural areas that are sacred sites and areas of importance for recreation and aesthetic enjoyment; and
- (iv) Supporting services, which are the natural processes that maintain the other services.

**a) Provisioning services**

The Project Site is not being currently utilized by humans; thus, no benefits are derived from the bare ground covering the entirety of the Project.

On the other hand, agricultural reclaimed lands, including mega national agricultural projects, are present close to the NREA West Menya concession (see Figure 3-36 in Section 3.3.5 – Land Uses). Groundwater used to irrigate these lands is also an important provisioning service. In addition, marble quarries are also present around the Project Site (Alsayaad et al., 2024).

**b) Regulating services**

The site's contribution to ecosystem processes (such as pollination, seed dispersion, etc.) is insignificant, again, due to its barren, species poor nature, particularly in terms of its lack of vegetation cover.

**c) Cultural services**

The Project Site does not entail any elements that would allow for recreational use, aesthetic enjoyment, and there are no indications of its current or historical use by humans for spiritual or other cultural purposes. This has been confirmed by interviewees during the site visit.

**d) Supporting services**

The Project Site's contribution to nutrient cycling processes and primary production are insignificant, given its lack of vegetation cover. Moreover, its contribution is further limited by the sites hyper-aridity and the Project Site's geographical size compared to vastity of the Western Desert.

**3.2.8 Critical Habitats**

As per EBRD ESR6 (EBRD, 2024), a critical habitat refers to the most sensitive biodiversity features in a defined area, which meets at least one of the following criteria:

**Criterion 1: Highly Threatened or Unique Ecosystems**

Areas entailing highly threatened or unique ecosystems, including rare or irreplaceable ecosystems that provide critical functions, or those supporting unique biological communities.

**Criterion 2: Critically Endangered or Endangered Species**

Habitats that support endangered or critically endangered species, according to the IUCN Red List of Threatened Species.

**Criterion 3: Endemic and Restricted Range Species**

Habitats of significant importance to endemic or geographically restricted species.

**Criterion 4: Migratory and Congregatory Species**

Habitats that are of critical importance to the survival of migratory or congregatory species.

**Criterion 5: Key Evolutionary Processes**

Areas that are critical for the continued evolution of species or for key evolutionary processes.

The occurrence of the above features does not automatically qualify habitat as critical habitat, and this is dependent on the proportion of such a critical habitat-qualifying feature being present in a project area. Quantitative thresholds derived from the IUCN Key Biodiversity Area Standard and aligned with IFC Guidance Note 6 (IFC, 2019) are then applied to determine whether any of the features are likely to qualify habitats as critical (EBRD, 2024).

EBRD ESR6 also considers Priority Biodiversity Features (PBFs), which are features that are considered particularly irreplaceable or vulnerable, but at a lower priority level than critical habitats. On the other hand, PBFs are not considered in IFC PS6. PBFs include:

- (i) Threatened habitats;
- (ii) Vulnerable species;
- (iii) Significant biodiversity features identified by a broad set of stakeholders or governments; and
- (iv) Ecological structure and functions needed to maintain the viability of priority biodiversity features.

As for CH, PBF criteria iii and iv have no predetermined conditions. For these criteria, the assessment must rely on expert judgement.

**a) Ecologically Appropriate Area of Analysis**

The scale at which a CH determination takes place depends on underlying ecological processes for the habitat in question and is not limited to the Project Site boundaries or its Area of Influence (Aol).

EBRD Guidance Note (EBRD, 2023) mentions that the study area may need to be expanded to fully encompass the Ecologically Appropriate Area of Analysis (EAAA) for features that require additional focused study. In most cases, that will mean the landscape-level distribution of the feature requiring study, again considering the ecological patterns, processes and functions that are necessary to maintain it. The EAAA should consider the distribution and connectivity of such features in the landscape and the ecological processes that support them.

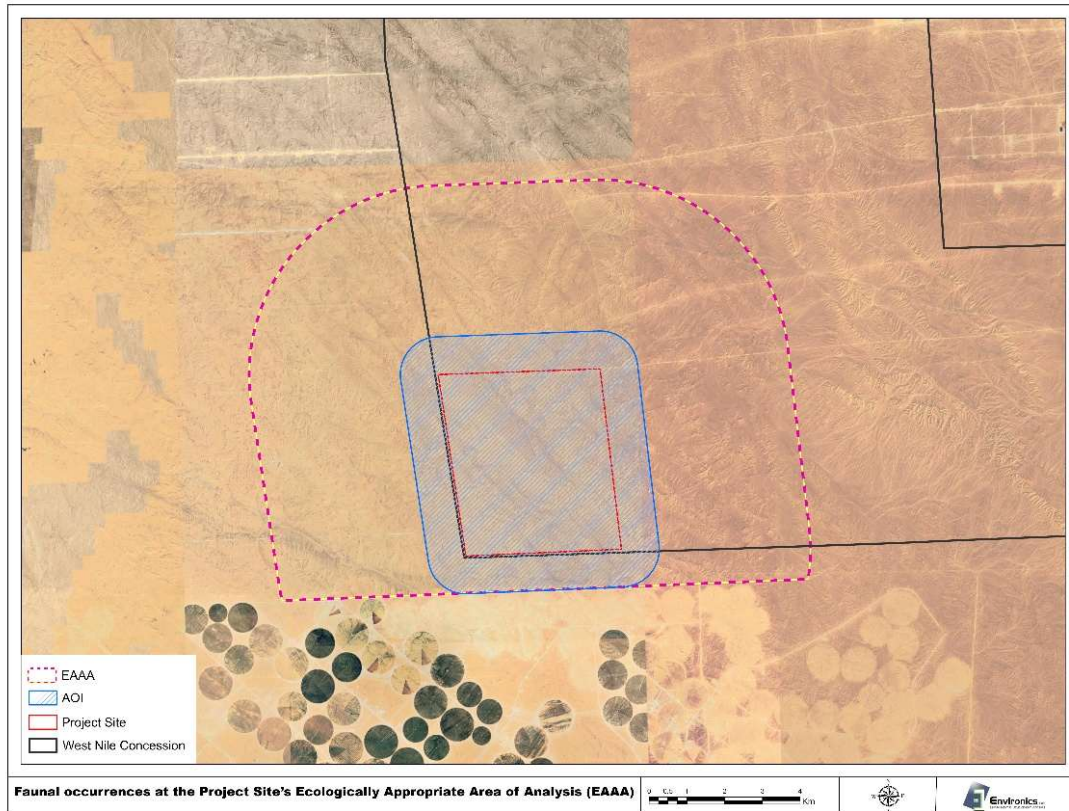
In addition, Paragraph 59 of IFC Guidance Note (IFC, 2019) states *“the project should identify an ecologically appropriate area of analysis to determine the presence of critical habitat for each species with regular occurrence in the project’s area of influence, or ecosystem, covered by Criteria 1-4. The client should define the boundaries of this area taking into account the distribution of species or ecosystems (within and sometimes extending beyond the project’s area of influence) and the ecological patterns, processes, features, and functions that are necessary for maintaining them”*.

For the present project, the EAAA considers, therefore, the Project Site and its Aol, as well as the extension of the site’s single and uniform desert habitat. The EAAA is delimited as follows (Figure 3-31):

- It includes the project footprint and its Aol;
- It includes the extension of the site’s single habitat type;



- It extends northwards, eastwards and westwards up to a distance of 5 km from the boundaries of the project site; and
- It extends southwards to the borders of the project's AoI, to exclude reclaimed agricultural lands which constitute a different habitat type.



**Figure 3-31: Ecologically Appropriate Area of Analysis (EAAA) for the PV Project Site**

The EAAA is entirely composed of a natural desert habitat and covers a large area of around 143 km<sup>2</sup>. This area is wide enough to determine the presence of critical habitat for each species with regular occurrence in the Project's AoI or ecosystems (including those extending outside the boundaries of the project's AoI) covered by Criteria 1-4.

#### **b) Results of the Screening Exercise**

Potential PBF- and CH-triggering species/features have been screened against the PBF/CH criteria and thresholds.

##### **Priority Biodiversity Features**

The species/features of the EAAA do not meet any of the PBF criteria except for Criterion ii (VU species). The thresholds for this criterion are as follows:

- EAAA supports < 0.5% of global population OR < 5 reproductive units of a CR or EN species;
- EAAA supports VU species; and
- EAAA for regularly occurring nationally or regionally listed EN or CR species

The thresholds for this criterion also consider CR and EN species, although the criterion mentions VU species only. These thresholds are less stringent than those applied to qualify an area as CH. In this respect, in addition to VU species, CR and EN species have also been screened against the PBF thresholds for Criterion ii.

Accordingly, the following threatened species (VU, EN and CR) have been identified as PBFs:

- Reptiles:
  - Theban Sand Boa (*Eryx colubrinus*), VU (nationally); and
  - Desert Monitor (*Varanus griseus*), which is globally listed as LC and nationally categorized as a NT species. However, it could currently possibly qualify as VU as the NT status was assessed by Baha El Din in 2006. Therefore, it is herein considered using the precautionary approach.
- Migratory birds that could occur under specific circumstances, as follows:
  - Egyptian Vulture (*Neophron percnopterus*), EN (globally) and VU (Mediterranean);
  - Steppe Eagle (*Aquila nipalensis*), EN (globally);
  - Red-footed Falcon (*Falco vespertinus*), VU (globally) and CR (Mediterranean);
  - Saker Falcon (*Falco cherrug*), EN (globally) and CR (Mediterranean);
  - Greater Spotted Eagle (*Clanga clanga*), VU (globally);
  - Hen Harrier (*Falco biarmicus*), VU (Mediterranean); and
  - Osprey (*Pandion haliaetus*), EN (Mediterranean).
- Mammals, possibly present as vagrants:
  - Fennec Fox (*Vulpes zerda*), EN (nationally).

Although the EAAA cannot be considered to “support” these species, there is a possibility of their occurrence in the area and are herein considered PBFs using a precautionary approach.

### Critical Habitats

The species/features of the EAAA do not meet the CH criteria, except for Criterion 2 (Critically Endangered and/or Endangered Species), which is met by five species. These are:

- Egyptian Vulture (*Neophron percnopterus*), IUCN global status: EN
- Steppe Eagle (*Aquila nipalensis*), IUCN global status: EN
- Saker Falcon (*Falco cherrug*), IUCN global status: EN; IUCN regional status (Mediterranean): CR
- Osprey (*Pandion haliaetus*), IUCN regional status (Mediterranean): EN
- Fennec Fox (*Vulpes zerda*), IUCN global status: LC; national status: EN

These species have been assessed against the thresholds for Criterion 2, which are:

- (a) EAAA supports  $\geq 0.5\%$  of the global population AND  $\geq 5$  reproductive units of a CR or EN species;
- (b) EAAA supports globally significant population of VU species necessary to prevent a change of IUCN Red List status to EN or CR, and satisfies threshold (a); and
- (c) EAAA for important concentrations of a nationally or regionally listed EN or CR species.

The EAAA neither supports globally important concentrations of these species nor nationally/regionally important concentrations qualifying the area to meet the thresholds for Critical Habitat.

In fact, the EAAA, including the Project Site and its Aol, is composed of arid desert lands devoid of vegetation. Such habitat dominates at the regional level and is common and recurring throughout the Western Desert. Moreover, even if one or more species of conservation concern was found to be present in the area, their extremely limited numbers would not trigger any of the thresholds for this criterion. Therefore, the likelihood of the Project Site or the localities in close proximity entailing any CHs is virtually non-existent as the entire EAAA consists of bare desert soils which excludes the presence of CH-triggering species/features. This has been verified through field surveys, which have confirmed that the EAAA is extremely poor in biodiversity.

Accordingly, the screening process indicates that the EAAA does not qualify as CH as none of the criteria/thresholds apply to the biodiversity and/or features of the area.

### 3.3 Socio-Economic Environment

This section describes the socio-economic baseline and demographic characteristics of the Project Site's wider area, focusing, as possible, on the closest and most accessible areas to the Project Site. In this respect, the socio-economic baseline information is mainly provided at the governorate level, unless otherwise indicated.

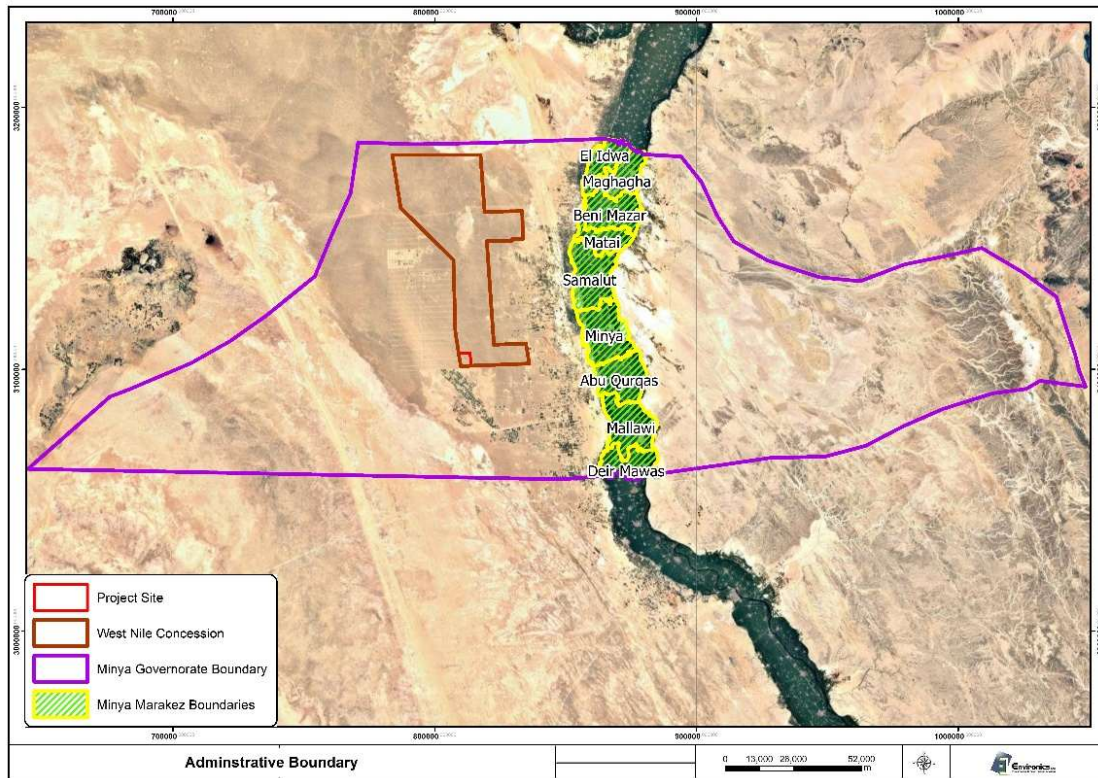
This baseline information includes general information on the labor force, population, transportation and health infrastructure, sewage disposal and treatment facility availability, and potable water supply sources in the Project Site's wider area. The cultural heritage of the wider area is also briefly summarized. Furthermore, land use types within the Project Site and its immediate vicinity are also described.

The majority of the information described below is derived from secondary sources including the Center for Documentation of Cultural and Natural Heritage (CULTNAT), the Central Agency for Public Mobilization and Statistics (CAPMAS), the official media and public relations apparatus of the Egyptian state and the official Menya Governorate website.

Additional contextual information was derived from primary sources, including a site visit and stakeholder consultations conducted during the period 3-5 November 2025.

#### 3.3.1 Governorate Background and Administrative Divisions

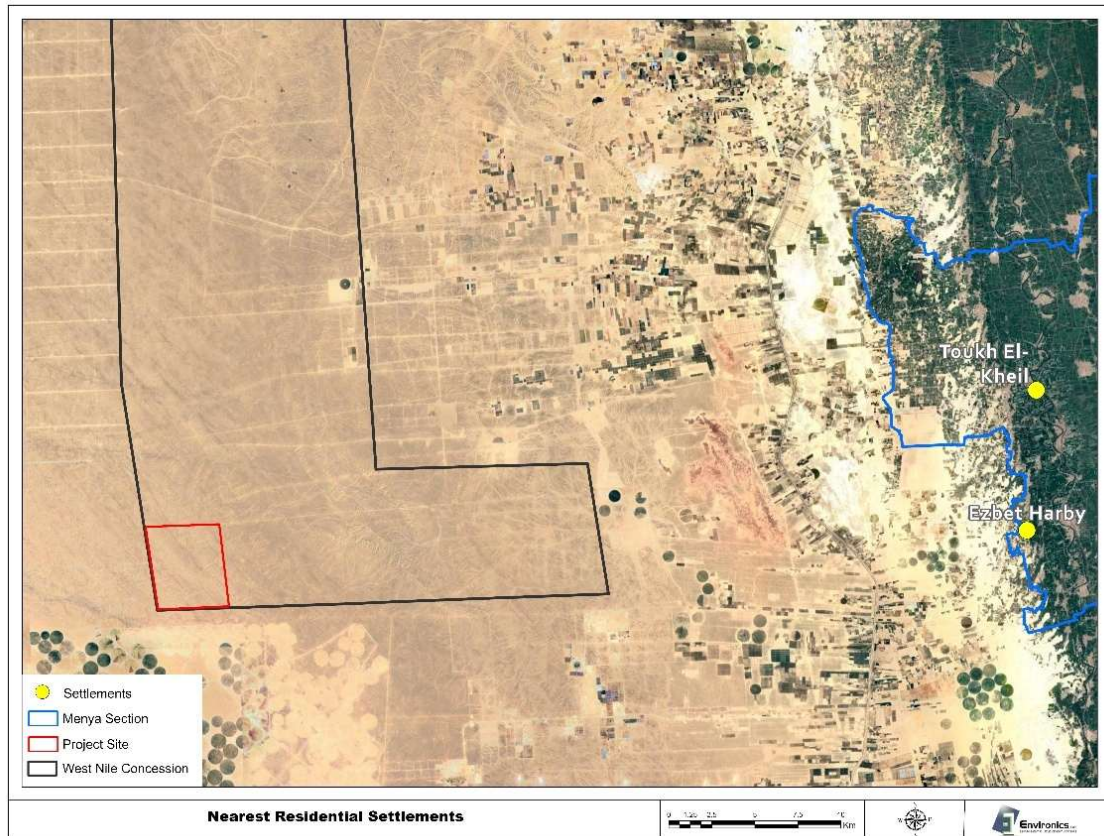
The proposed project is located in the Western Desert of Menya Governorate, at about 55 km from Menya city. The total area of Menya Governorate covers 32,279 km<sup>2</sup>, representing about 3.22% of Egypt. The populated area is around 5,293.88 km<sup>2</sup>, representing 16.4% of the total governorate's area. The governorate is divided administratively and encompasses nine administrative centers (*Markaz*, plural *Marakez*), nine cities, 61 rural local units, 360 villages and 1,715 hamlets (*Kafr*) and settlements (*Nagaa*). The nine *Marakez* of Menya Governorate are: Al Adwah, Maghagha, Bani Mazar, Matay, Samalut, El-Menya, Abu Qurqas, Mallawi and Deir Mawas.



**Figure 3-32: Menya Governorate borders and administrative centers in relation to the NREA West Menya concession and the Project Site**

Although the project is within the administrative borders of Menya Governorate, it is not officially affiliated to a specific administrative Markaz in Menya, as shown in Figure 3-32. The village of Izbet Harbi, (Toukh El Kheil Local Unit, Markaz El-Menya) is the closest settlement to the project, located at a distance of about 50 km (Figure 3-33).





**Figure 3-33: Location of Markaz El Menya, Toukh El Kheil Local Unit and Izbet Harbi in relation to the Project Site**

On the other hand, Menya Governorate officials reported that the project area falls under Toukh El Kheil Local Unit of Markaz El-Menya. This was confirmed during meetings with officials from Saft El Khammar and Toukh El Kheil.



**Figure 3-34: Saft El Khammar Local Unit**



**Figure 3-35: Toukh El Kheil Local Unit**

### 3.3.2 Population

The population of Menya Governorate has grown significantly since the 2017 census. As of 2025<sup>13</sup>, the governorate boasted an estimated 6,511,377 inhabitants, up from 5,497,095 in 2017<sup>14</sup>—a rise of approximately 18.5% over six years. The governorate covers approximately 32,279 km<sup>2</sup>, yielding an average density of 202 people per km<sup>2</sup> of 2025. Rural residency continues to dominate: an estimated 81% of Menya's population lives in rural areas, compared to Egypt's national average of 57%.

The population of Markaz El-Menya in 2017 was 676,181 people, equivalent to 12.3% of the total population of the governorate.

#### Urban/rural distribution

Table 3-16 provides an estimate of the urban/rural distribution in Menya Governorate. Urban/rural percentages are based on CAPMAS estimates for Menya Governorate as of 2023.

**Table 3-16: Estimated urban/rural distribution**

Area Type	Approximate %	Estimated Population
Urban	19%	1,226,239
Rural	81%	5,227,653

Source: CAPMAS (2023a)

#### Population by gender

The gender ratio is approximately 103.6 males per 100 females. The population distribution by gender and residence is shown in Table 3-17.

**Table 3-17: Population distribution by gender and residence in Menya Governorate**

Residence	Male	Female	Total
Rural	2,625,418	2,458,160	5,083,578
Urban	608,031	587,426	1,195,457
Governorate Total	3,233,449	3,045,586	6,279,035

Source: CAPMAS (2023a)

#### Age structure

Table 18 below shows the age structure in Menya Governorate. Percentages are based on the total population of the governorate 2017.

**Table 3-18: Age structure in Menya Governorate**

Age Group	Male	Female	Total	% of Total
0–4	417,131	392,412	809,543	15%
5–14	639,736	594,265	1,234,001	22%
15–44	1,299,500	1,228,329	2,527,829	46%
45–59	301,730	280,421	582,151	11%
+60	176,870	166,701	343,571	6%
<b>TOTAL</b>	<b>2,834,967</b>	<b>2,662,128</b>	<b>5,497,095</b>	<b>100%</b>

Source: CAPMAS (2017)

<sup>13</sup> Central Agency for Public Mobilization and Statistics (CAPMAS). Annual Statistical Yearbook of the Arab Republic of Egypt, 2025.

<sup>14</sup> Central Agency for Public Mobilization and Statistics (CAPMAS). *Population Census of the Arab Republic of Egypt, 2017*.



## Households

There are no settlements in the site as well as within the West Nile concession as a whole. Settlements are predominantly clustered around the Nile Valley and its surrounding areas. The estimated households present in urban and rural areas are shown in Table 3-19.

**Table 3-19: Estimated households in Menya Governorate**

Residence	Population	Estimated Households	% of Total Households
Rural	5,083,578	1,058,544	80%
Urban	1,195,457	253,508	20%
<b>Total</b>	<b>6,279,035</b>	<b>1,312,052</b>	<b>100%</b>

Source: CAPMAS (2023a)

### 3.3.3 Education

Illiteracy rate among those over 10 years reached 27% in Menya in 2016, which is higher than the national average of 25%. Illiteracy rate among females is (45%) higher than males (29%) in the governorate (CAPMAS, 2016).

Some children drop out of school as sometimes low-income families encourage their children to work for extra income. Table 3-20 shows the number and percentage of the labor force in Menya Governorate.

**Table 3-20: Number and percentage of the labor force (10 years & above) by education status and gender in Menya Governorate, 2016**

Gender	Illiterate	Read & write	Below intermediate	Intermediate	Above intermediate	University degree	Above university degree	Total
Males	2938	1458	1534	141	4398	468	1343	12218
Females	1576	333	412	45	1321	86	715	4489
total	4554	1792	1947	186	5718	553	6958	16707
Total (%)	27.3	10.7	11.6	1.1	34.2	3.3	11.7	

Source: CAPMAS (2016b)

Table 3-21 below shows the number of different secondary education schools. While females represent 49% of the total population, they only represent 43.7% of the general secondary enrolment. On the other hand, females represent 51.7 % of the secondary technical enrolment with a clear concentration in commercial education. It is also remarkable that females are highly represented in industrial secondary education ( 40.8% of total enrolment).

**Table 3-21: Secondary education types across the governorate by number and sex of students for 2015/2016**

#		General secondary education	Industrial secondary education	Commenrcial Secondary education	Hotel secondary education	Agricultural secondary education
Number of schools		105	45	16	2	90
Number of Students	Males	29235	39441	9173	401	2612
	Females	22662	27159	27890	128	0

Source: CAPMAS (2018)

Menya Governorate includes primary, preparatory, and secondary education schools. There is also one public and two private universities in Menya. The number of schools in the governorate reached 3,005 in 2016/2017, totaling up to 28,250 classes. The governorate also includes a school for the deaf and dumb and 25 vocational centers offering craft training and vocational development (IOM & TNS, 2014). Reportedly, Toukh El Kheil has one primary school, one preparatory school and one secondary school, while no technical schools are available in the area.

Menya University remains the governorate's central higher education institution, enrolling approximately 57,930 students in 2019 (Menya University, 2019). The recent Lotus University, inaugurated in 2019, has introduced additional faculties to increase access.

The 2023–2024 Citizen Investment Plan earmarked EGP 362 million (8% of the total) to pre-university education and EGP 736 million (16%) to higher education infrastructure at the national level (Ministry of Planning and Economic Development, 2023a).

### **3.3.4 Economy and Employment**

Menya's employment landscape is shaped by structural constraints typical of Upper Egypt. Nationally, unemployment stood at 7.1% in 2023 (CAPMAS, 2023c), with higher rates among women and youth. Regional data suggests Menya's rate may exceed 10%, particularly for young graduates and female job seekers (World Bank, 2022a).

Employment in Menya remains predominantly informal and agricultural. Nationally, 25% of Egypt's workforce is engaged in agriculture; this figure is likely higher in Menya due to its rural dominance (CAPMAS, 2022). Female labor force participation remains low (≈15% nationally), and lower still in conservative, rural regions like Menya (UN Women, 2021).

The informal economy is driven by agriculture, construction, retail, and family-owned trades. Public sector jobs continue to dominate formal employment, particularly in education and healthcare. To address underemployment and skills gaps, programs like the World Bank's Upper Egypt Local Development Program (UELDP) support entrepreneurship and vocational training (World Bank, 2022b).

In the 2023–2024 Investment Plan, EGP 445 million was allocated for industrial and employment infrastructure, with a focus on youth and women (Ministry of Planning and Economic Development, 2023b).

On the other hand, although Menya is mainly an agriculture-oriented governorate, various industrial activities have been established, particularly in food processing, spinning and textile, and chemical industries.

#### **a) Key economic sectors**

##### *Agriculture*

Agriculture is considered the main economic activity in the governorate of Menya. It is known for cultivating cotton, onions, wheat, maize, clover and sugar cane. Clover and wheat are the most important crops, representing 80% of the total winter crops. Maize is the main summer crop, representing 67% of the summer crops' cultivations (Information

& Decision Support Center, 2014). Moreover, Menya represents one of the top four major producers of sugar cane (El-Sharif et al., 2009). In 2016, the agriculture sector employed about 45% of the labor force in the governorate (CAPMAS, 2016b). Large parts of desert land around the Project Site have been reclaimed for agriculture, relying on groundwater resources for irrigation.

#### b) Main occupations

The total labor force was 1,670,700 in 2016; those employed were 1,475,800 while 194,900 were unemployed. This unemployment rate of 11.6% is relatively lower than the national rate of 12.5% according to CAPMAS. The rate of unemployed males in Menya Governorate is 44.54% of the total unemployed persons (CAPMAS, 2017; 2016b). Table 3-22 shows the age structure of the unemployed persons in Menya.

**Table 3-22: Age structure of the unemployed persons (10 years & above) in Menya Governorate (hundreds) in 2016**

Gender	Up to -15	-20-24	-25-29	-30-34	-40-44	-50-54	60-64	Total
Males	154	509	98	65	28	12	2	868
Females	215	371	212	242	33	6	0	1081
Total	369	881	310	308	61	18	2	1949
Total (%)	18.9	45.2	15.9	15.8	3.1	0.9	0.1	100

Source: CAPMAS (2017)

Table 3-23 presents the education level of unemployed persons across the governorate. It shows that more than half of the unemployed persons are of intermediate technical education and 20% are university graduates, implying a negative relationship between the level of education and employment<sup>15</sup>.

**Table 3-23: Education level of unemployed persons (10 years & above) in Menya Governorate (hundreds) in 2016**

Gender	Illiterate	Read & write	Below intermediate	Intermediate	Intermediate technical	Above intermediate (technical but precollege)	University degree & above	Total
Males	66	20	88	40	441	21	194	868
Males (%)	3.38	1.03	4.51	2.05	22.62	1.07	9.95	
Females	182	37	25	4	595	22	215	1081
Females (%)	9.33	1.89	1.28	0.20	30.52	1.12	11.03	
Total	247	57	114	44	1036	43	409	1949
Total (%)	12.7	2.9	5.8	2.3	53.2	2.2	21	100

Source: CAPMAS (2016b)

<sup>15</sup> This might be related to the fact that the governorate is mostly rural and thus not providing opportunities to people with higher education.

Table 3-24 presents the main characteristics of Menya Governorate's labor market.

**Table 3-24: Main characteristics of the labor market in Menya Governorate (hundreds) in 2016**

Item	Value
Total labor force (thousand persons)	16707
Number of employed persons (thousand persons)	14759
Number of unemployed persons (thousand persons)	1949
Labor force (% of population)	30
Rate of unemployment (%)	11.6
Females (% of work force)	29
Unemployment rate of higher education graduates (%)	21
Unemployment rate of intermediate and above intermediate education graduates (%)	57.7

Source: CAPMAS (2016b)

**c) Labor force engagement in economic activities and women participation in the workforce**

As previously mentioned, agriculture is the main economic activity and employs a considerable portion of the labor force (about 45%). Agriculture also represents the highest portion of female employment. Table 3-25 presents the distribution of employment in Menya in different economic activities.

**Table 3-25: Distribution of labor force in economic activities by sex (hundreds) in Menya in 2016**

Labor force	Agriculture & Fishing	Mining & Quarrying	Manufacturing	Electricity	Water services
Male	4749	89	587	48	146
Female	1864	0	87	3	5
Total	6613	89	674	51	151
Labor force	Construction & Building	Trade, retail, wholesale & repair	Transportation & Storage	Hotel & restaurants	Communication
Male	1500	1035	729	262	27
Female	20	327	0	17	4
Total	1520	1362	729	279	31
Labor force	Finance & insurance	Real estate	Scientific & technical specialties	Administrative	Social services
Male	50	13	72	43	771
Female	4	0	18	2	211
Total	54	13	90	45	982
Labor force	Education	Health	Arts & Culture	Other services	Domestic for other families
Male	747	165	25	228	64
Female	506	128	8	24	181
Total	1253	293	33	252	245

Source: CAPMAS (2016b)

Menya has a low female participation rate in the governorate's labor market of 29%. Moreover, they are underpaid where the Gender Pay Gap (GPG) is equal to 44.5% in favor of males which is considered the highest across Egypt (IARIW & CAPMAS, 2015).

**d) Child labor**

Poor families tend to have their children work to gain extra income. Exact figures are not available as surveys are not conducted in that matter, which will still be deceiving due to its illegal nature. Although there are many laws that regulate child labor under certain conditions, specifying ages and standards, agricultural children's workers are not addressed within the national labor laws (Sekeeker, 2008).

### 3.3.5 Land Uses

The NREA West Menya concession has been designated for renewable energy projects, including wind and solar panel installations. According to data from the Sentinel-2 10 m land use/land cover dataset provided by Esri, the concession is surrounded by reclaimed agricultural lands (Canal Sugar Project), located 1 km south of the Project Site, as well as the adjacent 1.5 million feddan project to the west. To the north of the Project Site, there is a quarry area covering 24 km<sup>2</sup>.

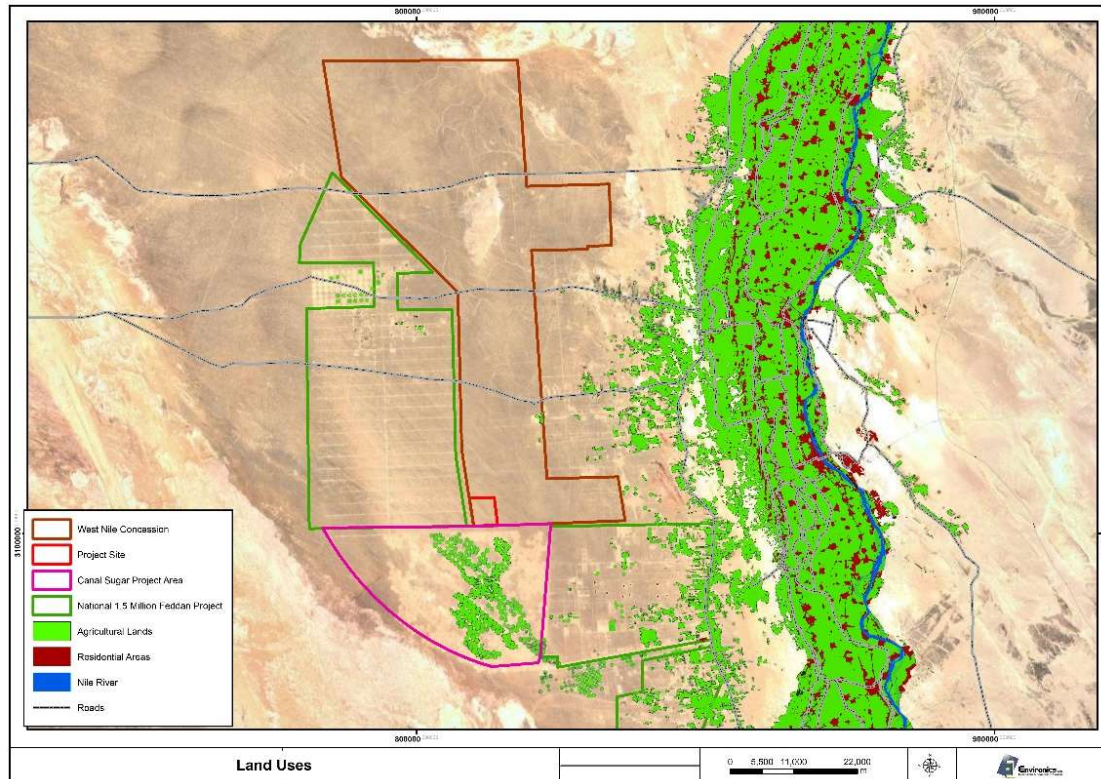


Figure 3-36: Land uses within and around the NREA West Menya concession

There are also oil wells (wells 72, 73, 74, 75), as shown in the map developed by Alsayaad et al. (2024). However, these are at a considerable distance from the project site.



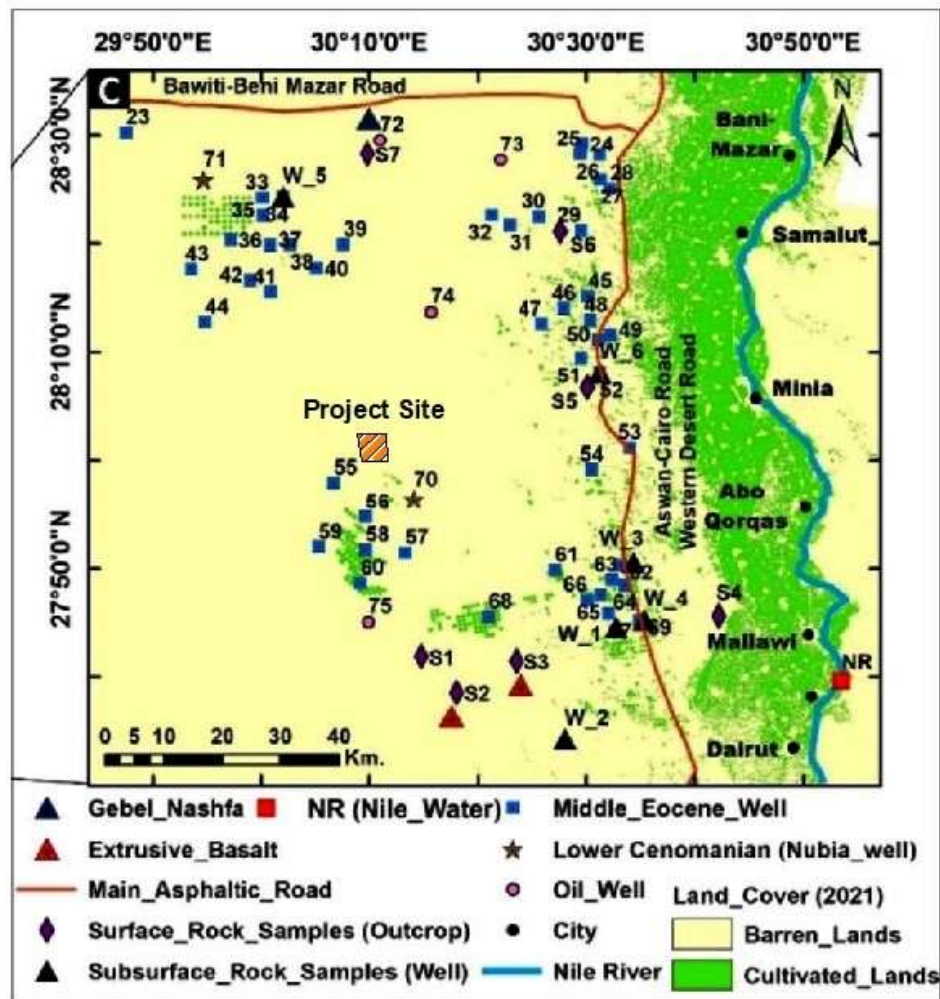


Figure 3-37: Wells located in proximity of the Project Site

Source: Alsayaad et al. (2024)

### 3.3.6 Infrastructure, Utilities, and Services

In terms of essential services, the NREA West Nile Concession does not have access to telephone, natural gas, a water network, or a sewage network.

#### a) Energy Supply

Concerning power supply, the nearest power substation is the 500 kV substation located in Samalut, situated in the Nile Valley approximately 50 km from the Project Site.

#### b) Potable Water Supply

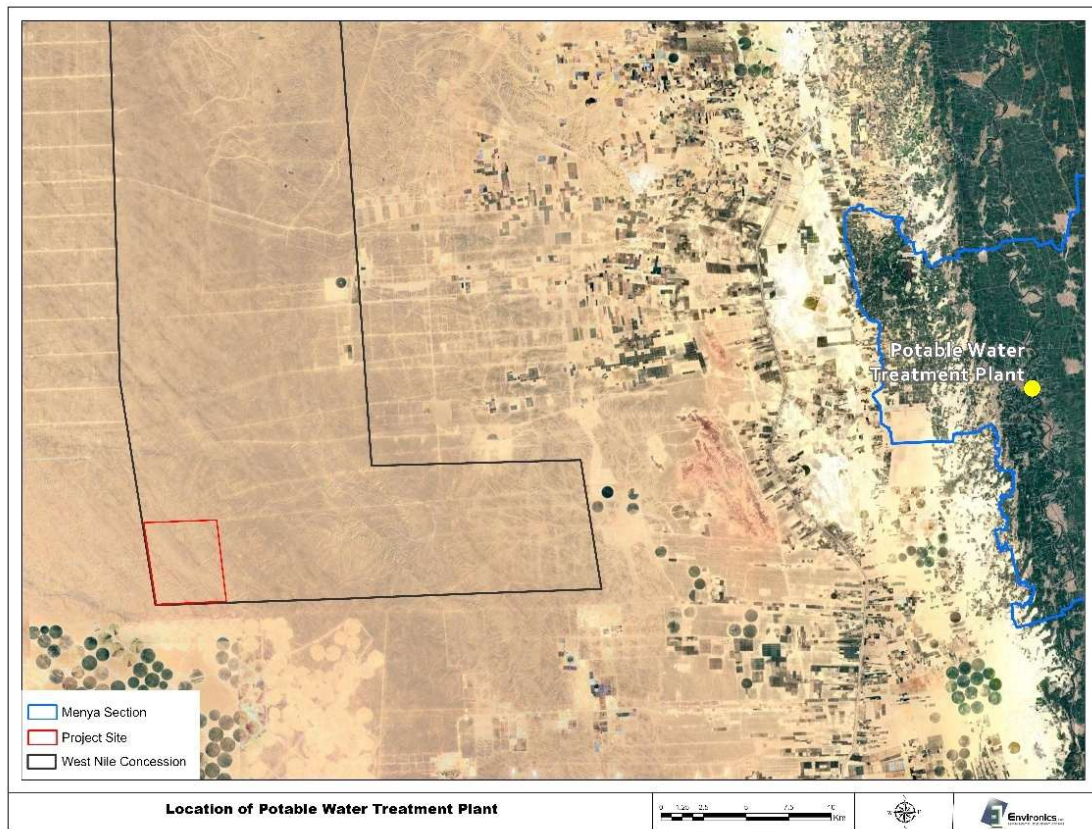
Table 3-26 shows the production and consumption rates of potable water across the governorate as well as the number of water stations.

**Table 3-26: Total potable water stations, sources, production and consumption in Menya (1000 m<sup>3</sup>/day) in 2015/2016**

Number of stations		Total quantity of water produced (million m <sup>3</sup> )		Total water produced	Total water consumed
Surface water	Groundwater	Surface water	Groundwater		
80	119	228.5	59.2	287.7	186.7

Source: CAPMAS (2016c)

Officials at Toukh El Kheil Local Unit reported that the potable water treatment plant located at Toukh El Kheil is the closest plant able to provide water to the project. The distance between the project site and the Potable water treatment plant is approximately 49 km (Figure 3-38). On the other hand, they also reported that the area experiences frequent water shortage, especially in summer, when the water consumption increases, and the water plant cannot meet such increasing seasonal demand.



**Figure 3-38: Location of Toukh El Kheil Potable Water Treatment Plant**

The water plant was visited on the 5<sup>th</sup> of November 2025. It has a production capacity of 60 liters/sec, i.e. about 5,184 m<sup>3</sup>/day<sup>16</sup>. Water treatment takes place through sand bed filtration and chlorine dosing. The station manager reported that the capacity of the plant has not been increased since its establishment and there are no current plans for expansion to meet the continuously growing population demand. He also mentioned that a larger plant, with a production capacity of approximately 8,000 m<sup>3</sup>/day, is located in Towa Village.



Figure 3-39: Potable water treatment plant at Toukh El Kheil

There is also a potable water treatment plant in Saft El Khammar with the same production capacity of 60 liters/sec, as well as four artesian water stations located in Abu Yakoub, El Obayed, Bashkateb and Saft El Khammar (Menya Governorate Information Center, 2025).

#### c) Sewage Disposal and Wastewater Treatment

About 25% of the population living in Menya has access to the public sewage systems, while 13% have no access to any kind of sanitation. The rest of the governorate mainly depends on open-bottom tanks or septic tanks to dispose of sanitary waste (General Authority for Urban Planning, 2017).

Officials at Toukh El Kheil Local Unit reported that the closest wastewater treatment plant to the Project Site is located in Markaz Abu Qurqas at around 60 km from the project site. Moreover, there is a wastewater treatment plant in Saft El Khammar with a treatment capacity of 120 liters/sec, which is about 50km east of the project site. (Menya Governorate Information Center, 2025).

#### d) Health Infrastructure

There are five governmental and 6 private hospitals in Markaz El Menya (Menya Governorate Information Center, 2025).

<sup>16</sup> It is noted that the water demand for the project at its peak is a substantial 10% of the plant's production capacity.

Table 3-27: Types of hospitals in Markaz El Menya

Hospital name	Type	Address	Number of beds	Specialization
Menya General Hospital	Governmental	Ibn Khassib Street, Menya	0	External clinics only
Misr El Horra Hospital	Governmental	Misr – Aswan Agricultural Road, in front of the Old Mansoura Bridge	67	General
Menya Chest Hospital	Governmental	Misr – Aswan Agricultural Road, Western District, Menya	82	Chest
Menya Ophthalmology Hospital	Governmental	Saad Zaghloul Street, Menya	25	Ophthalmology
Menya Fever Hospital	Governmental	Hommeyat Square, Menya	87	Infectious diseases
Sharia Society Hospital	Private	Abu Hilal, Menya	41	All specializations
Omar Ibn El Khattab Hospital	Private	Abu Hilal, Menya	40	All specializations
Horus Hospital	Private	Wabour El Nour Street, Menya	15	Ophthalmology
Abu El Seoud Hospital	Private	Al Shorafaa Village, Menya	54	All specializations
Menya National Hospital	Private	Saad Zaghloul Street, Menya	42	All specializations
Dar Al Hilal Hospital	Private	Tahnasha Village, Menya	42	All specializations

Source: Menya Governorate Information Center (2025)

There are also five healthcare units in Saft El Khammar with five beds each, but no general hospitals. These healthcare units are located in Saft El Khammar, Abu Yakoub, Demshao Hashem, Mansheyet El Dahab Al Qebleya and Mansheyet El Dahab Al Baharya. Specializations include Internal Medicine, Dentistry, Women's Health and Obstetrics and Family Planning (Menya Governorate Information Center, 2025).

Moreover, there are two ambulance stations at Balansoura and Village 8 (Menya Governorate Information Center, 2025).

#### e) Solid Waste

Menya Governorate is implementing several municipal waste management projects. Three sanitary landfills are currently under construction in the West Menya, Tuna El-Gabal and Al-Adwa (Egyptian Cabinet Presidency website, 2025).

Moreover, a contract has been recently signed with a private sector company for the management and operation of a municipal waste recycling plant in the Al-Adwa district, with a minimum processing capacity of 150 tons per day (Egyptian Cabinet Presidency website, 2025).

Currently, there is a sanitary landfill of 15 feddans, in the Western Desert hinterland, next to the site designated for the construction of a waste recycling plant. However, the landfill is not operational as the associated waste recycling plant has not been constructed yet. On the other hand, there is a dumping site of 5 feddans located in the Western Desert hinterland of Toukh El Kheil Village (Menya Governorate Information Center, 2025).



#### f) Road Transportation Infrastructure

The closest paved road to the project site is the Giza–Aswan West Desert Road, located about 40 km to the east, followed by the Beni Mazar–El Wahat Road, located approximately 60 km to the north. Moreover, several unpaved tracks serve the surrounding land reclamation projects; these tracks originate from the Giza–Aswan Road and generally run in an east–west direction as shown in Figure 38.

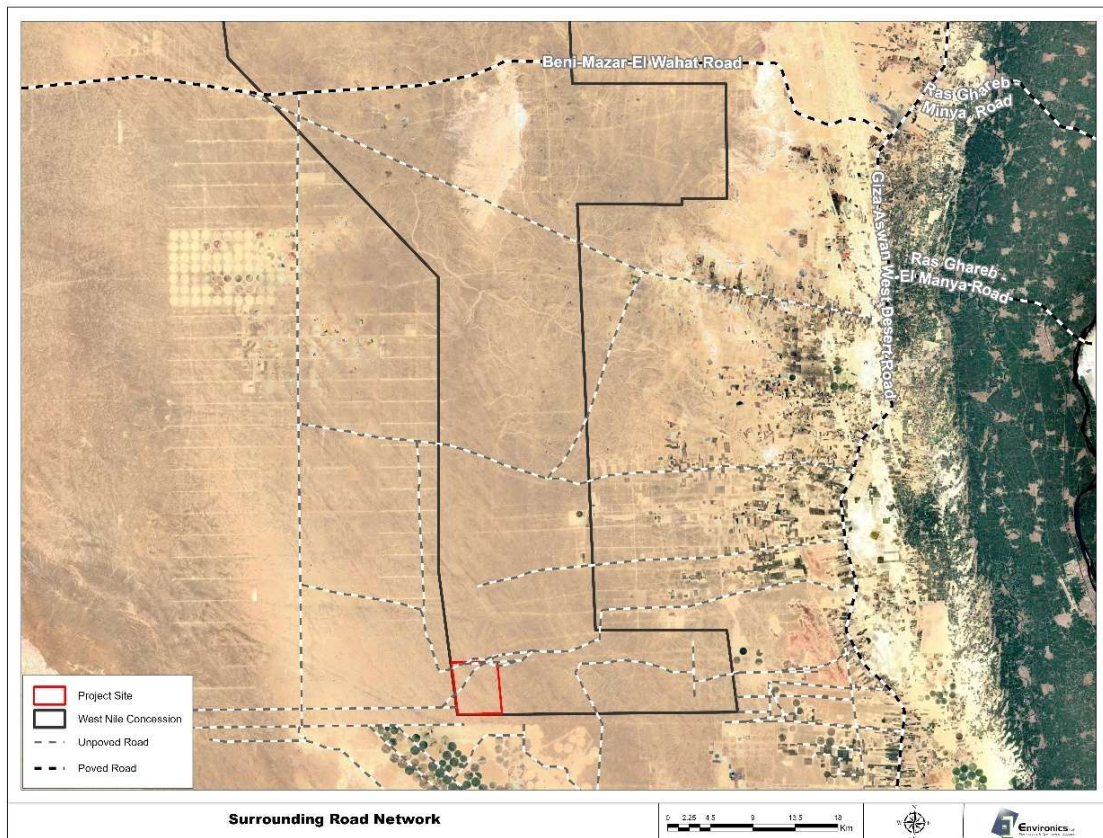


Figure 3-40: Road network of the Project Area

#### g) NGOs

According to the Ministry of Social Solidarity (2026), a total of 527 non-governmental organizations (NGOs) operate in Menya Governorate within Abu Qurqas, Markaz El-Menya, and Menya City, that are the main administrative centers close to the project site. These NGOs are active in several development and social service sectors.



Table 3-28 presents the distribution of NGOs by field of activity across the administrative areas.

Table 3-28: NGOs in Menya Governorate

Field of Activity	Abu Qurqas	Markaz El Menya	Menya City
Pensioners	0	1	1
Educational Activities	10	15	20
Administration and Organization	0	0	1
Economic Development	5	1	9
Population Development	1	0	0
Friendship Among Peoples	0	0	1
Health Activities	1	3	9
Youth Empowerment and Rehabilitation	0	0	1
Local Community Services	19	20	28
Environmental Protection and Conservation	0	4	4
Consumer Protection	1	0	0
Cultural, Scientific and Religious Services	26	33	26
Family Care	0	0	0
Childhood and Motherhood Care	7	11	37
Care for Persons with Disabilities	0	0	5
Social Assistance	58	56	112
Provision of Loans	0	0	1
<b>Total</b>	<b>128</b>	<b>144</b>	<b>255</b>

Source: Ministry of Social Solidarity (2026)

### 3.3.7 Archeology and Cultural Heritage

Menya Governorate is rich in historical heritage, with 39 recorded archaeological sites. The nearest recorded archaeological site in West Menya is the ancient city of *Oxyrhynchus* (Al-Bahnasa), located approximately 71 km northeast of the project area (Kwok and Peters, 2020). Additionally, the Beni Hassan tombs, situated on the eastern bank of the Nile, are located about 67 km from the Project Site.

According to the Archaeological Map of Egypt (2026) issued by the Geographical Information Center of the Supreme Council of Antiquities, there are no registered or known antiquities or cultural heritage sites within the Project Site. However, as the Project Site may not have been specifically surveyed in detail, it is possible that sites of cultural significance remain unidentified. In this context, a chance finding procedure should be applied.

Regarding the intangible cultural heritage, based on UNESCO's List of Intangible Cultural Heritage (ICH) in Egypt, none of the identified ICH elements are practiced within the Project Site. However, some elements may be practiced within Menya governorate, examples including local artistic and historical traditions such as local handicrafts and folkloric performances and Cultural Festivities, where the governorate hosts major Christian and Islamic festivals that are key to its intangible heritage, particularly around the monasteries of Gabal El-Tayr and the religious sites in Al-Bahnasa areas at about 65 and 75 km from the project site respectively.

## 4. Regulatory Framework and International Standards

This section summarizes the environmental and social legislation and regulations of relevance to the project. They were identified according to the type of proposed activity as described in Chapter 2 and the characteristics of its geographic location as described in Chapter 3. Consideration is first given to the national legislations pertaining to the execution of the ESIA, followed by a review of guidelines of international financing institutions for environmental requirements relevant to the project as well as the company's sustainability, Environmental, Health and Safety (EHS) framework requirements.

### 4.1 National Legislation

#### 4.1.1 ESIA Regulations

In accordance with Article 29 of the Law No. 4 of 1994, the Environment Law, and the amendments of some of its provisions stated in Law No. 9 of 2009 and Law No. 105 of 2015, and its Executive Regulations (ERs), the project proponent is required to prepare an Environmental Impact Assessment (EIA) for new projects and expansions or modifications within existing facilities.

Pursuant to Law No. 4 of 1994 and its ERs, the proponent is required to submit an Environmental Impact Assessment (EIA) to the Competent Administrative Authority (CAA) or the licensing authority prior to the commencement of the project. The CAA or the licensing authority is responsible for verifying all required data, before forwarding the EIA study to the EEAA for review. For the proposed project, the CAA is the New and Renewable Energy Authority (NREA).

EEAA may request the proponent to provide additional data, or clarifications, and if the required data is not provided within 15 working days, the EEAA will return the study to the CAA for completion and resubmission. EEAA will provide its opinion within 30 working days from the date of receipt of all required data. The CAA shall notify the project proponent of the results of EEAA assessment. The project proponent has the right to appeal in writing the result of the assessment within 30 days from the date of his notification following which non-response constitutes implicit approval.

Based on the EEAA projects categorization lists issued in June 2023, projects are classified into four categories according to their environmental impacts:

- **Category A:** Projects with minor or limited environmental impacts.
- **Category B:** Projects that may result in moderate environmental impacts.
- **Category Scoped B:** Projects with potentially significant environmental impacts due to certain components, but not the project type itself. An EIA study is required, focusing on the major component, but without public consultation.
- **Category C<sup>17</sup>:** Projects with potentially significant environmental impacts. This category requires a full-scale EIA study, including public consultation and disclosure as a main component.

According to the project categorization lists issued by the Egyptian Environmental Affairs Agency (EEAA) in June 2023, the proposed 1000 Megawatt Alternating Current (MWac) Photovoltaic (PV) Plant with a Battery Energy Storage System (BESS) is classified under the

<sup>17</sup> Category C project according to the EEAA classification list is equivalent to an EBRD 'A' project categorization

National EIA Categorization (2023) as a Category Scope B project. s. Accordingly, a public consultation meeting is not required for this category of projects under national regulations..

On the other hand, the EEAA's EIA Categorization Lists (June 2023) specify that an overhead transmission line (OHTL) exceeding 5 kilometers is classified as a Category C project, which requires a public consultation and disclosure as part of the environmental assessment process. As the OHTL is approximately 36 km, this categorization will apply to the ESIA to be prepared by EETC.

#### 4.1.2 Air Quality

Environmental Law No. 4 of 1994 and its subsequent amendments detail the maximum permissible limits for gaseous emissions and ambient air pollutants.

Specifically, Article 36 of the law and Article 37 of Executive Regulation (ER) No. 1095 of 2011 define the emission thresholds for exhaust gases from engines and vehicles. Additionally, Article 35 of the law, together with Article 34 of ER No. 1741 of 2005 (as amended by ER No. 710 of 2012), sets the maximum allowable concentrations for key ambient air pollutants. These include sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), inhalable particulate matter (PM<sub>10</sub>), and total suspended particulates (TSP) — airborne particles up to 100 micrometres in diameter.

For comparative purposes, both the Egyptian legal thresholds and selected international maximum limits are presented in Table 4-1 below.

**Table 4-1: Maximum permissible air pollutant concentrations**

Pollutant Concentration (µg/m <sup>3</sup> )	Threshold Source (National Legislation/International Requirements)	Area Type	Maximum Allowable Air Pollutant Threshold (over a specified time-period)			
			1 hour	8 hours	24 hours	1 year
Sulphur Dioxide	ERs of Law 4 of 1994	Urban	300	-	125	50
	EU <sup>18</sup>		350	-	125	20
	WHO		-	-	125	-
	IFC	N/A	-	-	20	-
Carbon Monoxide	ERs of Law 4 of 1994	Urban	30	10	-	-
	EU		-	10	-	-
	WHO		-	-	7	-
	IFC	N/A	30	10	-	-
Nitrogen Dioxide	ERs of Law 4 of 1994	Urban	300	-	150	60
	EU		200	-	-	40
	WHO		-	-	120	40
	IFC	N/A	400	-	150	-
Total Suspended Particles	ERs of Law 4 of 1994	Urban	-	-	230	125
	EU		-	-	-	-
	WHO		-	-	-	-
	IFC	N/A	-	-	230	90
PM <sub>10</sub>	ERs of Law 4 of 1994	Urban	-	-	150	70
	EU		-	-	50	40
	WHO		-	-	150	70

<sup>18</sup> <https://www.europarl.europa.eu/factsheets/en/section/193/environment-policy>

	IFC	N/A	-	-	150	70
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The specified maximum permissible limits outlined above are mainly relevant to the construction phase of the proposed Project, during which these air pollutants are expected to be emitted.

In case of discrepancies between the national regulations and international guidelines or standards, projects are required to adhere to whichever threshold, standard, or guideline is more stringent.

Annex 6 of the Executive Regulations for Law No. 4 of 1994 (amended by decree 964 of 2015), states the maximum permissible limits for air pollutants from power generation (Table 4-2).

**Table 4-2: Maximum limits of air pollutants from generators**

Pollutant	IFC Standards			Egyptian Standards	
	Maximum Limit for Emissions (mg/m³ from exhaust)			Maximum Limit for Exhaust Emissions (mg/m³)	
	Natural Gas	Diesel		Natural Gas	Diesel
Carbon monoxide (CO)	N/A	N/A		150	250
Sulphur dioxide (SO <sub>2</sub> )	N/A	3% <i>The 3% value refers to the maximum sulfur content in liquid fuel as defined in the IFC General EHS Guidelines (2007) and is used as the basis for estimating SO<sub>2</sub> emissions rather than representing an exhaust emission concentration.</i>		100	400
Nitrogen oxides (NOx)	200 (spark ignition)	Bore Size Diameter < 400 mm	1,600	600	600
	400 (dual fuel)	Bore Size Diameter ≥ 400 mm	1,850		
	1,600 (pressure ignition)				
Total Particulates	N/A	100		50	100

The specified maximum limits outlined above are mainly relevant to the construction phase of the proposed Project, during which these air pollutants are expected to be emitted.

#### 4.1.3 Noise Levels

Environmental Law No. 9 of 2009 details the maximum permissible noise levels in Article 44 of its modified ER No. 1095 of 2011, Article 42, and in Annex 7 of the ER, replaced by Decree No. 710 of 2012 of the law. Both the IFC and EU guidelines for noise level limits during the construction phase of the project and the noise level limits set by Egyptian legislation are outlined below (Table 4-3).

**Table 4-3: Maximum permissible noise levels in the different zones according to Annex (7) of the modified ERs of Law 4/1994 as well as international standards**

Maximum (Max.) Permissible Noise Levels During Construction			Max. Permissible Noise Level (dBA)		
Regulatory Instrument	Threshold Source	Type of Area	Day (07:00 – 22:00)	Night (22:00 – 07:00)	
National Legislation	Annex 7 of the ER replaced by Decree 710 of 2012 of Law No. 4 of 1994	Areas on roads where the roads width measures $\geq 12$ m, or industrial areas for light industry (i.e., an industry segment that produces goods meant for personal consumption) activities.	70	60	
International Guidelines/Standards	IFC Guidelines <sup>19</sup>	N/A	70	70	
	WHO <sup>20</sup>	Mixed commercial and industrial areas	Daytime	Evening-time	Night-time
			68	63	58

The specified maximum limits outlined above are mainly relevant to the construction phase of the proposed Project, as the project does not emit noise during operation. In cases of discrepancies between the national regulations and the international Maximum Limits, projects are required to adhere to the more stringent standards.

#### 4.1.4 Potable Water

Decree 458/2007, amended by Decree 182/2025, regarding the specifications and standards required for water to be considered potable and suitable for human use, establishes the safety standards and technical specifications for potable water intended for human consumption. The decree sets stringent permissible limits for inorganic substances, organic compounds, and heavy metals to protect water quality and public health. It also stipulates that the Central Laboratory for Public Health (CLPH) is responsible for conducting water sampling and laboratory analyses in accordance with the requirements of the decree.

Based on this decree, the liability and responsibility for water quality and safety primarily rest with the producer (the entity responsible for water production) and the service provider, extending all the way to the point of use.

- For a facility that uses water supplied by a producer, the producer and service provider are liable for ensuring that the water meets all physical, chemical, and biological standards. In addition, the Ministerial Decree No. 166 of 2000 issued by the Egyptian Ministry of Health and Population indicates the requirements for the cleaning and disinfecting of water tanks.

<sup>19</sup> Environmental, Health, and Safety General Guidelines, 2007

<sup>20</sup> World Health Organization recommendations and are commonly applied in EU Member States through national regulations and project-specific environmental assessments. The EU Environmental Noise Directive (2002/49/EC) does not prescribe numeric noise limits.



#### 4.1.5 Non-Hazardous Solid Waste Regulations

Chapter 4 of Egypt's Waste Management Law 202/2020 and its Executive Regulations (ERs) 722/2022 and 1113/2024 address the requirements for the solid waste management framework, including collection, transportation, storage, and disposal:

- Article 15: Waste generators must minimize waste, promote reuse, ensure recycling and safe disposal, and manage waste without harming public health or the environment.
- Article 16: Waste generators bear the cost of integrated, safe waste management.

Article 20: Open burning of waste is prohibited.

Article 36 of the executive regulation addresses construction waste management through contracting licensed contractors and proper storage of construction material/waste.

Additionally, Law 9/2009 and its executive regulations (Articles 39 and 41) address precautionary measures, ensuring proper waste handling and environmental protection.

*Non-hazardous waste management requirements apply throughout the project lifecycle, from construction through operation and decommissioning phases. However, waste generated in each phase would differ in terms of its source, nature, and quantities.*

#### 4.1.6 Hazardous Materials and Waste

Hazardous waste management in Egypt is governed by Law No. 202 of 2020 on Waste Management and its Executive Regulations (ERs) No. 722 of 2022 and No. 1113 of 2024. The legal framework establishes comprehensive obligations for the generation, handling, storage, transportation, and disposal of hazardous materials and waste.

Chapter Five of Law 202/2020, along with Articles 50 to 54 of ER No. 722/2022, sets forth the regulatory requirements for hazardous waste management. These provisions include:

- Mandatory classification and labelling of hazardous materials;
- Licensing and registration of all entities involved in hazardous waste handling, including transporters and disposal operators;
- Record-keeping obligations to track quantities, types, storage duration, and final disposal destinations; and
- Use of authorized disposal methods and facilities approved by the Waste Management Regulatory Authority (WMRA).

*Hazardous materials and waste management requirements apply throughout the lifecycle of the proposed project. However, larger quantities of hazardous waste are expected to be generated during the project's construction phase compared to its O&M phase. The only exception during the O&M phase is the anticipated end-of-life lithium batteries that have an expected lifetime of more than 15 years.*

#### 4.1.7 Registers

##### ○ Environmental Register

Article 22 of Law 4/1994, amended by Law No. 9 of 2009, and Article 17 of its modified executive regulations stipulate that all establishments are required to maintain an Environmental Register documenting the environmental performance of their operations.

This register must include data on emissions, discharges, waste generation, energy and water consumption, and any environmental incidents. Article 17 and Annex 3 of the ER 1741 of 2005 provide a detailed template for the required content. Moreover, any instances of non-compliance must be formally reported to the Egyptian Environmental Affairs Agency (EEAA).

#### ○ **Hazardous Materials & Waste Register**

In accordance with Article 56 of Waste Management Law No. 202 of 2020, Article 50 of its Executive Regulations (ER No. 722 of 2022) and Ministerial Decrees No. 151 and 152 concerning the Unified List of Hazardous Substances and Wastes, establishments that generate, store, or handle hazardous materials or hazardous waste must maintain a dedicated Hazardous Materials and Waste Register. This register must detail:

- The type and quantity of hazardous materials and hazardous waste.
- Dates of generation and transfer.
- Storage and transportation methods.
- Disposal and treatment methods.
- Names and licenses of the contracted waste management companies.
- Incident records such as spills, leaks, or non-compliance.

#### **4.1.8 Biodiversity Protection**

Article 28 of the Environmental Law No. 4 of 1994 is a crucial provision for wildlife protection. It explicitly prohibits the hunting, killing, or capturing of specific wild animals and plants, particularly those that are endangered or essential for maintaining the natural ecological balance.

This article aims to safeguard biodiversity by preventing the depletion of species at risk of extinction or those playing a critical role in their ecosystems.

The protection measures extend to habitats and ecosystems, ensuring the preservation of both flora and fauna that contribute to environmental stability. Additionally, this article empowers authorities to enforce these prohibitions and take necessary actions to protect wildlife from illegal activities.

Furthermore, Annex 4, as amended by ERs 1095 of 2011 of the Environmental Law No. 4 of 1994, lists the specific species of wild animals and plants protected under the law. These species are prohibited from being hunted, killed, or captured due to their ecological importance and the need for their conservation.

#### ▪ **First:**

Wild birds, animals, and other terrestrial or aquatic creatures, or any parts or derivatives thereof, are prohibited from being hunted, killed, traded, bred, possessed, transported, exported, or imported, whether alive or dead prohibition specifically includes:

- All wild birds, except those that are permitted under clause (1) of article 28 to be hunted in accordance with their designated seasons and within the allowed quantities.
- The Prohibited Animal Species (Mammals) under clause (1) of Article 28
- The Prohibited Animal Species (Amphibians and Reptiles) under clause (1) of Article 28:

Additionally, it is prohibited to kill or capture wild birds, animals, and aquatic creatures in areas where such actions would result in the destruction or alteration of their natural habitats. This includes areas of significant importance for resident and migratory wild birds, such as wetlands, natural lakes, the Nile River system, migration routes, and movement corridors of resident birds. The prohibition also applies to areas designated under the Ramsar Convention, to which the Arab Republic of Egypt is a party, as well as currently declared nature reserves and those that may be declared in the future by a decision from the Prime Minister under Law No. 102 of 1983.

▪ **Second:**

Flora is forbidden to be collected, imported, exported, cultivated, or commercialized. This includes wild plant species related to trade, specifically those listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), to which the Arab Republic of Egypt is a party, according to Article 28.

▪ **Third:**

Endangered Animal or Plant Species or Those Cultivated Outside Their Natural Habitats Without a License.

In addition, Law 53 of 1966 (the Law of Agriculture) is also concerned with biodiversity. Article 117 prohibits the hunting of birds and other wild animals useful to agriculture. It also bans the trading, killing, and destruction of their nests. Minister of Agriculture Decree 28 of 1967 (amended by Decree 1227 of 1988) specifies the species of birds and other wild animals under protection covered by Article 117 of Law 53/1966.

*While the Project Site does not fall within a designated protected area or sensitive habitat, it remains part of a wider natural desert ecosystem. Therefore, the precautionary principles and biodiversity safeguards set out in relevant national legislation and international standards continue to apply, in line with good environmental practice.*

#### **4.1.9 Cultural Heritage**

The Egyptian Antiquities Law (Law No. 117 of 1983, as amended by Law No. 3 of 2010, 61/2010, 91/2018, and 20/2020) serves as the cornerstone for safeguarding archaeological and historical sites. The Ministry of Tourism and Antiquities (MOTA) is the primary authority responsible for overseeing all archaeological activities.

This legislation establishes the legal framework for the preservation of archaeological and historical sites. According to Article 5 of the law, the MOTA is designated as the authority responsible for supervising all archaeological activities and sites within the country.

Furthermore, Article 23 assigns the MOTA the responsibility for the discovery and exploration of antiquities across Egyptian territory. It mandates that any person who discovers an unregistered archaeological artefact must notify the MOTA. Such artefacts are considered state property, and the MOTA is required to take necessary measures to preserve them. Within three months, the MOTA must:

- Remove the artefact if found on private property, or
- Initiate procedures to expropriate the land on which it was found, or

- Leave the artefact in place and register it in accordance with the provisions of the law.

*Although no registered or known antiquities or cultural heritage sites have been identified within the Project Site—as indicated in chapter 3 of this ESIA—the broader archaeological significance of Menya Governorate necessitates the implementation of chance finds procedures throughout all project phases, in accordance with applicable national legislation and international best practice.*

#### **4.1.10 Workplace and Employment Regulations**

The new Egyptian Labour Law 14/2025<sup>21</sup>, alongside Minister of Manpower and Immigration's Decisions 134/2003 and 211/2003, establish comprehensive guidelines in Egypt for occupational safety, health, and a secure work environment.

‘Based on the Ministerial Decree 134/2003, facilities with more than 50 workers should establish an occupational health and safety structure/department which is responsible for health and safety issues and will undertake all related responsibilities and should undertake daily inspections to detect hazards and risks.

Besides, Ministerial Decree 211/2003 of the Ministry of Manpower addresses the requirements to reduce the occupational health and safety risks during construction and operations (electrical hazards, working at heights, manual handling, physical and mechanical hazards, etc. In addition, the decree requires keeping medical surveillance records for the employees.

##### **○ Occupational Health and Safety**

The occupational health and safety requirements are addressed in Book four of the Labor Law 14/2025. The objective of this chapter is to reduce work-related accidents and health risks and protect workers’ safety and health in the workplace.

According to Article 246 of the labour law, facilities and their branches must provide occupational safety and health measures and secure a safe work environment in accordance with exposure standards and threshold limits. This includes protection from hazards such as noise, vibrations, harmful radiation, lighting intensity, etc.

According to Article 247 of the same law, facilities are required to take necessary safety precautions to prevent physical hazards, including mechanical, electrical, construction-related, and ergonomic risks; hazards from lifting and hauling equipment, transportation means, and excavations; and fall or collapse risks.

According to Article 1 of Ministerial Decree 211/2003, the facilities must implement safety limits, precautions, and protective measures to secure the work environment against recognized hazards, including physical and mechanical risks (e.g., moving machinery, equipment guards, tools), electrical hazards, working at heights and collapse risks, and environmental exposures such as heat, noise, vibration, illumination and radiation. The

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<sup>21</sup> The new labor law 14/2025 is entered into force by 1 September 2025, replacing the previous Law No. 12 of 2003. The updated executive decrees of the law are not issued yet.

decree also requires preventive controls for chemical and biological hazards, stipulates protective requirements for interaction with hazardous substances, and includes specifications for construction operations (e.g., ladders, scaffolds) to reduce the likelihood of accidents or health impairment. These measures collectively ensure that workplaces are managed to minimize exposure to occupational risks during both construction and routine operations.

Moreover, article 32 of the decree 211/2003 addressed protection against high voltage risks in electricity generation plants. It describes measures for occupational safety measures when handling and maintaining electric equipment, wires and cables.

On the other hand, according to articles 43 and 45 of Law 4/1994 and articles 44, 45, 46 and 47 of its executive regulations, the facility owner must provide the protective equipment and all necessary safety measures for the workers against noise, and gaseous emissions inside the workplace. In addition, it is the responsibility of the facility's owner to provide all closed and semi-closed places with efficient ventilation system.

#### ○ Noise in workplace

Law 4 /1994 (amended by Law 105/2015) sets the maximum permissible noise levels within the workplace (in dB) in Annex 7 of the Executive Regulation (amended by decrees 710/2012, 964/2015 and 2466/2024).

If noise level is more than 85 dB in workplaces with up to 8 working hours, the facility is obliged to reduce the exposure time by half with each increase in noise level by 3 dB with appropriate ear plugs.

Table 4-4 provides the maximum noise levels in the workplace, as indicated in Table 1 in Annex 7 of the ER 710/2012 of Law 4/1994.

**Table 4-4: Maximum Noise Levels within Workplace (dB (LAeq))**

Workplace Type	Exposure Period (Hours)	Noise Level Limit (dB LAeq)
Workshops and Factories (licensed since 2014)	8	85
Administrative Offices (e.g., offices housing computers, typewriters and similar equipment)	N/A	65
Workplaces wherein staff require routine cognitive focus (e.g., control rooms)	N/A	60
IFC General EHS Guidelines (2007) (Occupational Noise)	85 dB(A) over 8 hours – no employee should be exposed to >85 dB(A) (8 h TWA) without hearing protection.	
WHO Occupational Noise Guidance (2004) <sup>22</sup>	85 – 90 dB(A) and > 90 dB(A) exposure levels used for estimating occupational hearing impairment risk; no single limit is globally specified in the WHO workplace references.	

<sup>22</sup> Occupational noise, World Health Organization Protection of the Human Environment Geneva 2004, Environmental Burden of Disease Series, No. 9

### ○ **Employment organization**

The Egyptian Labour Law 14/2025 organizes employment terms, working conditions, and management in Book 2 and Book 3 of the Labour Law, as follows:

#### *Book 2 – Employment Organization*

- Definition and classification of employment contracts (fixed-term, unlimited-term)
- Conditions for employment and required contract formalities
- Work patterns including emerging/non-traditional forms (e.g., part-time, remote, job-sharing)
- Employer and employee registration obligations, data submission and record-keeping
- Equal opportunity, non-discrimination and prohibition of forced labour
- Employee file maintenance, electronic format recognition, retention periods
- Working hours, overtime arrangements, rest periods
- Leave entitlements (annual leave, maternity, paternity, casual)
- Health, safety, and welfare obligations of employer toward employees
- Provisions concerning persons with disabilities or “people of determination”

#### *Book 3 – Termination, Disputes & Special Employment Cases*

- Termination of employment contracts: notice periods, severance, end-of-service benefits
- Grounds for summary dismissal (gross misconduct) and procedural safeguards
- Resignation procedures and right of withdrawal
- Treatment of absence without justification (voluntary resignation concept)
- Recognition of work-arrangements in context of termination and rights
- Labour dispute resolution: specialized labour courts, timelines and processes
- Employment of foreign workers: permits, terms, regulations
- Special employment categories and protections (women, minors, workers with disabilities)
- Employer obligations in organizational changes (downsizing, restructuring)
- Transitional provisions and application of the law to existing contracts

On the other hand, according to Article 115 of Social Insurance Law No. 148 of 2019, and its ER 2437/2021, the employer is obligated to pay the social insurance contributions due for its employees in accordance with the provisions of the Law, including both the employer’s share and the portion deducted from the insured worker’s wages, and to register each employee with the social insurance system from the commencement of employment.

### ○ **Child Labour**

According to Articles 62, 63, 64, and 65 of the Labour Law 14/2024, Chapter 4 of Book 2: Rules for the Employment and Training of Children, it is prohibited to employ children before the age of 15. However, they may be trained once they reach the age of 14, provided that this does not prevent them from continuing their education. The employment or training of children must be in accordance with a decree issued by the competent minister in coordination with the National Council for Childhood and Motherhood.

It is also prohibited to employ or train children in jobs, professions, and industries that may endanger their physical or psychological health, safety, or morals. These jobs, professions, and industries, according to different age groups, will be issued by the decree of the



competent minister, in coordination with the National Council for Childhood and Motherhood. Until the updated decree is issued, Decree 215/2021 regarding the child employment and training system is implemented.

According to Article 66 of Labour Law 14/2025, It is the responsibility of the employer who employs one or more children to consider the following:

1. To post a copy of the provisions of this chapter in a visible place at the workplace.
2. To prepare a record indicating working hours and rest periods, approved by the relevant administrative authority (labour office).
3. To inform the relevant administrative authority of the names of the working children, the tasks assigned to them, and the names of the individuals responsible for monitoring their work.
4. To provide separate accommodation for children away from adults, in accordance with the regulations and provisions issued by the competent minister, and it is strictly prohibited for the child to stay overnight at the workplace.

#### ○ **Persons with Disabilities**

Egyptian Law No. 10 of 2018 amended by Law 156/2021 on the Rights of Persons with Disabilities aims to ensure the rights and inclusion of persons with disabilities in society. The law mandates non-discrimination, equal opportunities equal employment opportunities based on their qualifications, and accessibility in various aspects of life, including education, employment, and public services. Key provisions of the articles 21,22 and 23 from Law No. 10 of 2018, include:

- **Job Placement:** The Ministry of Manpower is responsible for creating a registry of job-seeking individuals with disabilities and assisting them in finding suitable employment.
- **Employer Quotas:** Employers with 20 or more employees must hire at least 5% of their workforce from people with disabilities.
- **Tax Incentives:** it includes a 50% increase in the personal exemption for persons with disabilities or their caregivers. Employers who hire beyond the 5% quota receive additional tax benefits.

In addition, Article 37 of Labour Law 14/2025 requires facilities to keep a special register of persons with disabilities and dwarfism and report on their employment and wages. The facility must also notify the authority with a statement that includes the total number of employees, the number of jobs occupied by people with disabilities and dwarfism, and the wages they receive, following a template and schedule set by the minister.

#### ○ **Equal opportunities**

Article 9 of the Egyptian Constitution stipulates that the country is committed to achieving equal opportunities for all citizens, without any form of discrimination.

Article 35 of Labour law 14/2025 states that it is prohibited to cluster wages based on cultural, religious, or gender.

Law 10/2018 related to the rights of people with disabilities is concerned with provision of equal rights to this group. It includes their rights to have a life insurance, social insurance,

freedom in choices, chances of work opportunities that do not surpass their physical disability limit.

#### ○ **Women's Workplace Safety and Night Shifts**

According to the Labour Law 14/2025:

Article 53: Applies all employment provisions to women without discrimination; mandates equal pay for equal value of work among men and women.

Article 59: Requires employers who employ one or more female workers to post the “Women’s Employment Regulations” in the workplace, which must address flexible working hours or remote work for women caring for children with disabilities or dwarfism.

In addition, Decree No. 44 of 2021 issued by Egypt’s Ministry of Manpower permits women, upon their request, to work night shifts in any establishment, provided that employers implement appropriate health, safety and transportation measures.

#### ○ **Protection from Harassment**

Article 254 of Labour Law 14/2025 stipulates that facilities and their branches shall be obligated to provide a safe and non-hostile work environment, free from harassment, bullying, and violence, and to ensure the availability of effective means for prevention against such behaviours.

Anti-harassment Law No. 141/2021: This law, which modifies the 58/1937 Penal Law, strengthens legal protections against sexual harassment. It provides comprehensive safeguards for women against various forms of harassment, including unwanted sexual advances, physical or verbal conduct, online and electronic harassment, stalking behaviours, workplace harassment, and public transportation harassment. It also imposes stricter penalties on perpetrators, reflecting a growing recognition of the seriousness of this issue in Egypt.

#### ○ **Grievance**

Article 103 of the Environmental law 4/1994

Grants every citizen and organization concerned with environmental protection the right to report any violations of the provisions of this law.

Article 85 of the Egyptian Constitution

All citizens have the right to address public authorities in writing and signed, but should not address it on behalf of groups, only as juridical persons.

#### ○ **Community Investment**

According to the Egyptian Investment Law 72/2017 indicated that towards achieving the goals of the sustainable development, investors may dedicate a percentage of their annual profits for social developments in one or more of the following fields:

- Environmental protection
- Areas of healthcare, social care, or cultural care;
- Support the technical education or the funding of research, studies in cooperation with any of the universities or scientific research institutions; and
- Training and scientific research.

Where investors have undertaken/implemented any community development investments, investors are required to submit to the General Authority for Investment and Free Zones an annual report supported by documents on community development activities.

- **Workers' Accommodation**

According to Article 79 of Labour Law 14/2025, the employer should assist in providing means of transportation, accommodation, and sustenance at remote work sites.

- **Foreign Workers**

According to Article 5 of Manpower Decree No. 146 of 2019, the number of foreign workers in any establishment in Egypt, including all its branches, may not exceed 10 % of the total number of Egyptian employees who are insured at that establishment. This quota is intended to ensure that foreign labour does not displace Egyptian workers in the labour market, and it may only be exceeded in exceptional cases approved by the Ministry's designated Exceptions Committee and subsequently endorsed by the competent minister.

## 4.2 Strategic National Initiatives

- ***Egypt National Climate Change Strategy (NCCS) 2050***

Egypt launched on 19/5/2022 the National Climate Change Strategy 2050. NCCS is a comprehensive roadmap designed to guide Egypt's efforts in addressing climate change. The strategy lays out five overarching goals, encompassing mitigation, adaptation, governance, financing, and scientific research. These goals are further divided into objectives and specific directions, each with corresponding performance indicators to track progress.

- ***Nationally Determined Contribution (NDC)***

After Egypt signed the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement on the 22nd of April 2016 and ratified it on the 29th of June 2017, the Intended Nationally Determined Contribution (INDC) was considered Egypt's first NDC.

Egypt's updated NDC to the UNFCCC. It outlines Egypt's commitments to reducing GHG emissions and adapting to the effects of climate change between 2020 and 2030.

The NDC highlights Egypt's national circumstances, including its vulnerability to climate change impacts, especially in the Nile Delta, and its ambitious economic development goals. It presents a series of mitigation actions, focused on energy, oil and gas, transport, industry, buildings and urban cities, waste management, and tourism, with projected emission reductions for each sector.

- ***Egypt's National Strategy for the Empowerment of Egyptian Women 2030:***

Launched in 2017, this comprehensive strategy aims to advance women's empowerment across political, economic, and social domains, aligning with national and international development goals. Key pillars include:

Political Empowerment: Increasing women's representation in leadership and decision-making positions.

Economic Empowerment: Expanding economic opportunities for women through improved employment prospects and support for female entrepreneurship.

Social Empowerment: Enhancing women's access to quality education, healthcare, and social services.

Protection and Response: Preventing and addressing violence against women through multi-stakeholder efforts.

### 4.3 International Conventions

Egypt is amongst the first countries to take an active interest in biodiversity conservation, natural resource preservation, and the protection of national natural and cultural heritage. The relevant international conventions are listed and summarized in this section.

#### 4.3.1 Biodiversity Conservation

- **Convention on Biological Diversity (CBD), 1992**

The CBD is a multilateral treaty that opened for signature on 5 June 1992 at the United Nations (UN) Conference on Environment and Development (the Rio "Earth Summit"). Egypt ratified the treaty on the 2nd of June 1994, and it entered into force on the 31st of August 1994. The CBD has three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from genetic resources. Its objective is to develop national strategies for the conservation and sustainable use of biological diversity, and it is often seen as the key document regarding sustainable development. Parties are required to create and enforce national strategies and action plans to conserve, protect and enhance biological diversity.

- **African Convention on the Conservation of Nature and Natural Resources, 1968 (revised in 2003)**

The convention recognizes the economic, social, cultural and environmental importance of natural resources including renewable and non-renewable resources, focusing on soil, water, flora and fauna. Egypt ratified the convention in 1968, and it entered into force in 1972. The Convention aims to promote and enhance environmental protection and encourage the sustainable use of natural resources. Parties are obligated to take effective measures to prevent land degradation and develop long-term integrated strategies for the conservation and sustainable management of land resources, including soil, vegetation and related hydrological processes. The Convention was revised in 2003, and in 2016, the Revised African Convention on the Conservation of Nature and Natural Resources, otherwise known as the Maputo Convention, came into force.

#### 4.3.2 Climate Change

- **Paris Agreement, 2016**

The Paris Agreement (also called the Paris Accords or Paris Climate Accords) is an international treaty on climate change that was signed in 2016. Egypt signed the agreement on the 22nd of April 2016 and ratified it on the 29th of June 2017. The treaty covers climate change mitigation, adaptation, and finance. The Paris Agreement has a long-term temperature goal of keeping the rise in global surface temperature to well below 2 °C above pre-industrial levels. The treaty also states that preferably the limit of the increase should only be 1.5 °C. The treaty aims to help

countries adapt to climate change effects and mobilize enough finance. Under the agreement, each country must determine, plan, and regularly report on its contributions. No mechanism forces a country to set specific emissions targets, but each target should go beyond previous targets.

○ **United Nations Framework Convention on Climate Change (UNFCCC), 1992**

The UNFCCC is the UN process for negotiating an agreement to limit dangerous climate change. Egypt ratified this convention on the 5th of December 1994, and it entered into force on the 5th of March 1995. It is an international treaty aiming to combat "dangerous human interference with the climate system" by limiting the increase in greenhouse gases in the atmosphere. The convention's main objective is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [i.e., human-caused] interference with the climate system". The treaty calls for continuing scientific research into the climate. This research supports meetings and negotiations to lead to agreements. The aim is to allow ecosystems to adapt to climate change. At the same time, it aims to ensure there are no threats to food production from climate change, whilst enabling economic development to proceed in a sustainable manner.

#### **4.3.3 Cultural Heritage**

○ **Convention Concerning the Protection of the World Cultural and Natural Heritage (1972)**

The General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO) meeting was held in Paris from 17 October to 21 November 1972, at its seventeenth session. The convention is also known as the World Heritage Convention. Egypt ratified the convention on 07/02/1974.

Article 1: For the purposes of this Convention, "culture heritage" refers to:

- **Monuments:** architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science;
- **Groups of buildings:** groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science; and
- **Sites:** works of man or the combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view.

Article 2: For the purposes of this Convention, "natural heritage" refers to:

- **Natural features** consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view;
- **Geological and physiographical formations** and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation; and
- **Natural sites** or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.

### Article 3

It is for each State Party to this Convention to identify and delineate the different properties situated on its territory mentioned in Articles 1 and 2 above.

#### ○ **Convention for the Safeguarding of the Intangible Cultural Heritage, 2003**

The Convention for the Safeguarding of the Intangible Cultural Heritage is a UNESCO treaty adopted by the UNESCO General Conference on 17 October 2003, which entered into force in 2006. Intangible cultural heritage is defined as the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artifacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. The purposes of the convention are to safeguard intangible cultural heritage, ensure respect for the intangible cultural heritage of the communities, groups and individuals concerned, to raise awareness at the local, national and international levels of the importance of the intangible cultural heritage, and to provide for international cooperation and assistance. Article 13 of the convention states that “to ensure the safeguarding, development and promotion of the intangible cultural heritage present in its territory, each State Party shall endeavor to adopt a general policy aimed at promoting the function of the intangible cultural heritage in society, and at integrating the safeguarding of such heritage into planning programs”.

#### **4.3.4 Work Environment**

The ILO conventions are international standards that complement national labour laws. The following international standards are crucial in creating a safe, fair, and non-discriminatory work environment that respects and protects the rights of all workers.

- **Freedom of Association and Protection of the Right to Organize Convention, 1948 (No. 87):**

This convention guarantees workers and employers the right to form and join organizations of their choosing without prior authorization.

- **Right to Organise and Collective Bargaining Convention, 1949 (No. 98):**

This convention provides protection against anti-union discrimination and promotes voluntary negotiations between employers and workers to determine wages and working conditions through collective bargaining.

- **Forced Labour Convention, 1930 (No. 29) and its 2014 Protocol:**

This convention aims to suppress all forms of forced or compulsory labour. The 2014 Protocol strengthens the measures to prevent forced labour and provides protection and remedies for victims.

- **Abolition of Forced Labour Convention, 1957 (No. 105):**

This convention calls for the immediate and complete abolition of forced or compulsory labour in all its forms, particularly for political coercion, economic development, labour discipline, or racial, social, national, or religious discrimination.



- **Minimum Age Convention, 1973 (No. 138):**

This convention sets the minimum age for admission to employment and work, ensuring that children are not exposed to work environments that can harm their health, safety, or morals.

- **Worst Forms of Child Labour Convention, 1999 (No. 182):**

This convention focuses on eliminating the worst forms of child labour, including slavery, forced labour, trafficking, prostitution, and any work that is likely to harm the health, safety, or morals of children.

- **Equal Remuneration Convention, 1951 (No. 100):**

This convention mandates equal remuneration for men and women workers for work of equal value, aiming to reduce gender pay gaps and promote economic justice.

- **Discrimination (Employment and Occupation) Convention, 1958 (No. 111):**

This convention seeks to eliminate discrimination in employment and occupation based on race, color, sex, religion, political opinion, national extraction, or social origin.

- **Occupational Safety and Health Convention, 1981 (No. 155):**

This convention aims to ensure that occupational safety and health measures are in place to protect workers from workplace hazards and promote safe working environments.

- **Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187):**

This convention provides a framework for continuously improving occupational safety and health systems to prevent workplace accidents and diseases, fostering a culture of prevention.

#### **4.3.5 Conventions on Human Rights**

Egypt has ratified many key UN human rights conventions, including the International Covenant on Civil and Political (ICCPR), International Covenant on Economic, Social and Cultural Rights (ICESCR), Egypt of the first Arab nations who ratified Egypt ratified the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) in 1981. In addition, Egypt ratified the UN Convention on the Rights of the Child (CRC) on July 6, 1990, becoming one of the first countries to do so, and has since submitted multiple State reports to the Committee on the Rights of the Child. Egypt has also ratified the UN Convention on the Rights of Disabled groups (CRPD) on April 14, 2008, followed by enacting its own comprehensive disability rights law (Law No. 10 of 2018) to align with the Convention's principles, including non-discrimination, equality, and enhanced provisions for employment and support.

## **4.4 International E&S Standards and Guidelines**

The following section summarises the Environmental and Social Requirements (ESRs) of the European Bank for Reconstruction and Development (EBRD), Performance Standards (PSs) of IFC, and The Equator Principles for projects seeking funding.

#### **4.4.1 Project Categorization**

Although the project has been categorized as Scoped B according to the national system, the project is to be categorized, according to lender requirements, as a Category A (High E&S risks) project, requiring a full-scale ESIA report including public consultation and stakeholder engagement.

#### ***EBRD Project Categorization***

The project is not included in the examples of Projects which could be considered as Category A projects listed in Annex 2 of the EBRD Environmental and Social Policy; however, based on the scale and greenfield nature of the Project and the potential for it to have significant new and additional environmental and/or social impacts the EBRD has categorized the Project as Category A.

#### ***IFC Project Categorization:***

Under the IFC Environmental and Social Sustainability Policy, IFC uses a risk-based categorization system (Category A, B, C, and FI) to determine the level of environmental and social assessment required. Category A is assigned to projects with potential significant adverse environmental and/or social impacts that are diverse, irreversible, or unprecedented, requiring a comprehensive Environmental and Social Impact Assessment (ESIA), robust public stakeholder engagement, and public consultation to present the project E&S documentation prior to appraisal and financing. IFC's categorization reflects the anticipated scale, complexity, and sensitivity of environmental and social risks associated with the project. Therefore, the project is categorized under Category A under IFC requirements.

#### **4.4.2 EBRD Environmental and Social Requirements (ESRs)**

Projects financed by the European Bank for Reconstruction and Development (EBRD) are expected to comply with good international practices relating to sustainable development. To support projects in achieving this, EBRD have defined ten Environmental and Social Requirements (ESRs) covering the key areas of environmental and social issues and impacts. The EBRD ESRs are set out in the EBRD's Environmental and Social Policy (EBRD, 2024) and described in this section, including whether or not the ESR is relevant to the proposed project.

#### **ESR1: Assessment and Management of Environmental and Social Risks and Impacts**

This Environmental and Social requirement establishes the importance of:

Clients must maintain an adaptive Environmental and Social Management System (ESMS) for identifying, assessing, mitigating, and monitoring risks, with a defined organizational structure for implementation. Conduct thorough assessments to identify direct and indirect risks, considering cumulative impacts, stakeholder engagement, and the needs of vulnerable groups. Regularly monitor and report environmental and social performance, ensure contractors comply with ESR and ESMS requirements, and manage core supply chain risks. Adopt an Environmental and Social Action Plan (ESAP) if upgrades are needed for compliance.

*This ESR applies to the proposed project throughout the project's construction, operation, maintenance, and decommissioning phases.*

**ESR2: Labour and Working Conditions**

Environmental and Social requirement emphasizes the relationship between economic growth and the well-being of a company on one hand, and establishing a relationship with the workers as a valuable asset that requires a healthy and safe work environment, as well as protection for basic rights of workers. It also recognizes the need for employment creation and income generation as an approach for economic growth. It pertains to issues around labour and working conditions, occupational health and safety, migrant labour, and so on. This ESR also addresses suppliers and contractors whilst emphasizing the need for a safe work environment to ensure the health and safety of workers. In this respect, companies must identify the roles, impacts, and risks associated with their supply chain concerning labour rights violations and other labour-related risks.

*ESR2 applies to the proposed project throughout the project's construction, operation, maintenance, and decommissioning phases.*

**ESR3: Resource Efficiency and Pollution Prevention and Control**

ESR3 focuses on ensuring that projects minimize their environmental impact by using resources efficiently and managing pollution.

. The ultimate aim of ESR3 is to reduce environmental harm, promote sustainability and a circular economy, and address climate change through careful planning and implementation throughout the project lifecycle. The ESR required adopting the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource use and pollution released from the project, avoid, minimise and manage project-related GHG emissions and avoid, minimise and manage the risks and impacts associated with hazardous substances and materials. ESR3 applies to all EBRD-financed projects where resource consumption or pollution generation is significant and where compliance with local and international environmental regulations is required; hence, it applies to all projects.

*ESR3 applies to all EBRD-financed projects, including the proposed project.*

**ESR4: Health, Safety, and Security**

ESR 4 emphasizes protecting project workers, affected communities, and consumers through robust risk management. Clients must assess and manage risks related to security services, adhering to human rights and legal requirements. Specific measures are mandated for occupational safety and health (OSH), community health and safety, prevention of gender-based violence and harassment (GBVH), and safe handling of hazardous materials.

ESR 4 addresses community exposure risks, such as equipment accidents, structural failures, hazardous material releases, disease exposure, and safety personnel deployment. The EBRD requires addressing GBVH, recognising its severe impact on women's health and well-being, and requires mitigating risks to ensure safe, inclusive working conditions.

*Attention must be given to occupational health and safety (OHS) risks affecting project workers during construction and operation*

*On the other hand, given the site remoteness, no direct health and safety risks to local communities are anticipated as a result of project site activities. However, transportation on roads passing through, or used by, communities, could expose communities to risks. Communities can also be impacted by the use of resources including water and food as well as demand for other utilities and facilities such as treatment plants and medical services. These aspects, including any possible community interactions, are further addressed in the impact assessment chapter of the ESIA, in the context of stakeholder engagement.*

*ESR4 applies to the proposed project*

#### **ESR5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement**

This ESR was designed to address and mitigate the social, economic, and cultural impacts of land acquisition and involuntary resettlement caused by projects. It seeks to ensure that affected people are treated fairly, with dignity, and in a way that improves or restores their livelihoods and living standards. It states that project designs must be developed with the aim of minimizing economic and physical displacement whilst balancing social, environmental, and financial costs and benefits.

*Provisions of ESR5 do not apply to the proposed PV project since the project activities will not involve any involuntary resettlement or land use changes. Associated facilities (OHTL route) might involve land acquisition and remuneration and will be addressed in separate specific ESIA to be developed by EETC.*

#### **ESR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources**

ESR6 aims to protect and conserve biodiversity by using a precautionary approach and to safeguard ecosystems. It mandates the application of the mitigation hierarchy to all projects, to achieve no net loss and preferably a net gain of biodiversity.

Projects are required to assess and manage potential impacts on biodiversity, habitats, and ecosystem services, considering factors such as habitat loss, invasive species, and pollution.

This ESR addresses project impacts on the livelihoods of communities, particularly Indigenous Peoples, and their access to biodiversity and natural resources. Furthermore, it covers supply chain risks related to land use conversion that could impact biodiversity and ecosystem services.

*This ESR is applicable to the proposed Project. While the Project Site is situated within a broader natural desert ecosystem, it is characterized by a homogeneous, arid environment devoid of vegetation and with low faunal diversity. Moreover, it is not located within a designated protected area or ecologically sensitive zone. The Environmental and Social Impact Assessment (ESIA) will describe these habitat characteristics and assess any potential impacts on local flora and fauna, where applicable, in accordance with national regulations and international biodiversity safeguards.*

#### **ESR7: Indigenous Peoples**

ESR 7 is dedicated to safeguarding the rights and well-being of Indigenous Peoples. It emphasizes respect for their dignity, rights, cultures, and livelihoods.

A key component is the requirement for meaningful consultation and, in specific cases, obtaining free, prior, and informed consent (FPIC) from affected Indigenous Peoples, especially when projects affect their customary lands, resources, or cultural heritage. This ESR also addresses the importance of fair compensation and benefit sharing and outlines requirements for ongoing engagement throughout the project lifecycle

*Provisions of this ESR do not apply to the proposed project since there are no communities in the Project Site, nor anywhere close to it. Moreover, indigenous communities as defined do not apply to population groups in Egypt.*

#### **ESR8: Cultural Heritage**

ESR8 aims to avoid or mitigate adverse impacts on cultural heritage arising from project activities. It requires a precautionary approach to management and sustainable use of cultural heritage, encompassing both tangible and intangible forms.

ESR 8 emphasizes the application of the mitigation hierarchy to preserve cultural heritage, which may include in situ conservation, relocation, or documentation. It promotes the equitable sharing of benefits from the use of cultural heritage in business activities and seeks to enhance awareness and appreciation of cultural heritage.

Projects are required to conduct assessments to identify potential impacts on cultural heritage and to implement a Cultural Heritage Management Plan (CHMP) with appropriate mitigation measures. The policy also addresses chancefind procedures and the need for consultation with relevant stakeholders, including local communities, custodians, and experts.

*The provisions of this ESR apply to the proposed project although there are no known cultural heritage, paleontological, natural heritage, or archaeological sites within or in close proximity to the Project Site. However, as the Project involves excavation and earth movement across a large area, a chance finds procedure must be established in case undocumented cultural heritage (e.g. archaeological sites or artifacts) is encountered during project activities.*

#### **ESR9: Financial Intermediaries**

This ESR stresses the responsibility of financial intermediaries (FIs) to apply EBRD's environmental and social standards to their investments. This includes ensuring that they manage the environmental, social, and governance (ESG) risks associated with the projects they fund, including those related to environmental impact, human rights, and labour conditions.

*The provisions of this ESR9 do not apply to the proposed project.*

#### **ESR 10: Information Disclosure and Stakeholder Engagement**

ESR 10 focuses on effective stakeholder engagement by building and maintaining constructive relationships with all relevant stakeholders throughout the project lifecycle.

ESR 10 emphasizes open and transparent communication to ensure stakeholders have access to timely, relevant, and understandable information, as well as opportunities for meaningful consultation.

A key component of ESR 10 is the establishment of accessible grievance mechanisms to address stakeholder concerns in a timely and appropriate manner. It requires a gender-responsive and inclusive engagement process, ensuring the participation of vulnerable and underrepresented groups.

It also stresses the importance of protecting stakeholder privacy and safety and preventing any form of retaliation against those who voice their opinions or concerns. Furthermore, ESR 10 requires ongoing reporting to stakeholders and the continuous adaptation of the engagement process to changing project contexts.

*Provisions of this ESR apply to the proposed project.*

#### **4.4.3 IFC E&S Performance Standards**

##### ***PS1: Assessment and Management of Environmental and Social Risks and Impacts***

This performance standard establishes the importance of:

- i. Integrated assessment to identify the social and environmental impacts, risks, and opportunities of projects.
- ii. Effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them.
- iii. The client's management of social and environmental performance throughout the life of the project.

*This PS is relevant to the proposed project. The current ESIA report is prepared satisfying PS 1.*

##### ***PS2: Labour and Working Conditions***

This performance standard emphasizes the relation between the economic growth and the well-being of a company in one side and establishing a relationship with the workers as a valuable asset that requires a healthy and safe work environment as well as protection for basic rights of workers. It also recognizes the need for employment creation and income generation as an approach for economic growth.

*This PS applies to the proposed project; more specifically related to the creation of job opportunities as well as ensuring the safe environment of the workplace.*

##### ***PS3: Resource Efficiency and Pollution Prevention***

This Performance Standard outlines a project-level approach to resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices. Its objectives include avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities and to promote more sustainable use of resources, including energy and water and reduce project-related GHG emissions. .

*This PS applies to the potential generation of emissions from different sources of the proposed project as well as resources management.*

##### ***PS4: Community Health, Safety, and Security***



This performance standard recognizes that the project activities and infrastructure can increase the potential for community exposure to risks and impacts arising from equipment accidents, structural failure, and releases of hazardous materials. Impacts may also arise from exposure to diseases and the use of safety and security personnel.

*This PS applies to the proposed project during the construction and operation phase of the project.*

**PS5: Land Acquisition and Involuntary Resettlement**

This performance standard recognizes that the project design minimizes economic and physical displacement, balancing social, environmental, and financial costs and benefits.

*This PS does not apply to the proposed project since the activities will not involve any involuntary resettlement. Associated facility (OHTL route) might involve land acquisition and remuneration and will be addressed in separate specific ESIA to be developed by EETC.*

**PS6: Biodiversity Conservation and Sustainable Natural Resource Management**

This performance standard addresses how projects can avoid or mitigate threats to biodiversity arising from their operations as well as sustainably manage renewable natural resources.

*This PS applies to the proposed project. Chapter 6 of this study discusses the mitigation measures needed for the biodiversity environment concerning the proposed project.*

**PS7: Indigenous Peoples**

This performance standard aims at preventing adverse impacts of the projects on communities of Indigenous peoples and to provide opportunities for development benefits.

*This PS does not apply to the proposed project since there are no indigenous communities in Egypt.*

**PS8: Cultural Heritage**

The objective of this performance standard is to protect the cultural heritage from the adverse impacts of the project activities and support its preservation.

*This PS does not apply to the proposed project as there are no recorded archaeological sites within the Project site. The archaeological sites near the proposed project location will be addressed in the ESIA.*

**4.4.4 Equator Principles**

**EP1: Review and Categorisation**

Projects are screened and categorized (A, B, or C) based on the magnitude of environmental and social risks and impacts, determining the level of assessment required.

**EP2: Environmental and Social Assessment**

An Environmental and Social Impact Assessment (ESIA) is required to identify, evaluate, and manage risks and impacts in accordance with international standards.

**EP3: Applicable Environmental and Social Standards**

Projects must comply with host country laws and, where applicable, the IFC Performance Standards and World Bank Group EHS Guidelines.

**EP4: Environmental and Social Management System and Equator Principles Action Plan**

Borrowers must develop and maintain an Environmental and Social Management System (ESMS) and, where necessary, an Action Plan to address identified gaps.

**EP5: Stakeholder Engagement**

Effective stakeholder engagement must be carried out, including meaningful consultation with affected communities throughout the project lifecycle.

**EP6: Grievance Mechanism**

A grievance mechanism must be established to allow affected communities to raise concerns and facilitate resolution.

**EP7: Independent Review**

For high-risk projects (Category A and some B), an independent environmental and social consultant reviews the ESIA and related documentation.

**EP8: Covenants**

Legal covenants are included in financing agreements requiring compliance with ESMPs, reporting, and applicable standards.

**EP9: Independent Monitoring and Reporting**

Independent monitoring may be required for high-risk projects to ensure ongoing compliance with environmental and social commitments.

**EP10: Reporting and Transparency**

Borrowers and lenders are required to publicly report on environmental and social performance and Equator Principles implementation.

**4.4.5 World Bank – EHS Guidelines**

The Environmental, Health, and Safety (EHS) Guidelines issued by the World Bank Group represent technical reference documents that define Good International Industry Practice (GIIP). They consist of the General EHS Guidelines, which cover overarching environmental, occupational health and safety, and community health issues, as well as industry-specific EHS guidelines applicable to various sectors. These guidelines are designed to inform the development and implementation of environmental and social management systems under World Bank-financed projects.

The EHS Guidelines provide performance measures that are generally achievable in new facilities through the application of current technology and good practice at a reasonable cost. The relevance and applicability of EHS provisions must be established based on the environmental and social assessment, taking into account local context, the assimilative capacity of the surrounding environment, regulatory frameworks, and project-specific characteristics.

The proposed project, located in a remote, hyper-arid desert environment with limited ecological sensitivity and significant solar exposure, the following aspects of the General EHS Guidelines and relevant sector-specific guidance are of particular relevance:

*Resource Efficiency and Pollution Prevention:*

- Efficient use of water resources, particularly in construction and operation, where water will be supplied for sanitation.
- Dust control measures (e.g., covering of stockpiles and speed reduction on unpaved roads).
- Proper waste management systems, including the segregation, containment, and licensed disposal of hazardous and non-hazardous waste. Special attention should be given to hazardous materials, including any batteries, fuel, or chemicals stored on-site.

*Occupational Health and Safety (OHS):*

- Protection of workers from extreme heat and sun exposure, including hydration stations, shaded rest areas, and awareness training on heat stress and dehydration.
- Implementation of a construction-phase safety management plan, including machinery safety, personal protective equipment (PPE).

*Community Health and Safety:*

- Although the project is located at a significant distance from populated areas, road safety measures must be in place for logistics operations involving the Western Desert Road and connecting unpaved access routes.

*Culture Heritage*

- A chance finds procedure must be integrated into the site management plan due to the presence of archaeological sites in Menya Governorate, even if none are identified on site

*Emergency Preparedness and Response:*

A site-specific Emergency Response Plan (ERP) should be developed to address potential incidents such as fire, fuel spills, or medical emergencies, considering the project's isolated location and limited external emergency access.

*Noise and Visual Impact Management:*

While community exposure is limited, construction and transport-related noise and any visual disturbance should be monitored and managed, especially near shared access routes.

*Climate Change and Energy Efficiency:*

- Integration of energy-efficient technologies and infrastructure, aligned with broader climate adaptation goals.
- Design resilience measures should be considered to address potential impacts of extreme weather (e.g., high wind or heat stress), which are occasionally experienced in the region.

#### **4.4.6 IFC and EBRD Guidelines for Workers' Accommodation**

In relation to projects funded by the European Bank for Reconstruction and Development (EBRD) or International Finance Corporation (IFC), workers' accommodation requirements are

summarized in the following section<sup>23</sup>. The section looks at the principles and standards applicable to the location and construction of workers' accommodation, including the transport systems provided, the general living facilities, rooms/dormitories facilities, sanitary facilities, canteen and cooking facilities, food safety, medical facilities and leisure/social facilities.

- **Location and construction:** located to avoid flooding and other natural hazards, Safe, healthy, and close to the workplace; comply with national/local regulations.
- **General living facilities:** Adequate materials, ventilation and/or air conditioning, lighting, and drainage to prevent health hazards.
- **Water:** Provision of free potable water.
- **Wastewater and solid waste:** Regular collection and disposal of solid waste, maintain hygiene, adequate discharge systems of wastewater, and pest extermination, vector control and disinfection.
- **Room/dormitory standards:** Minimum space per person, triple deck bunks are prohibited, storage facility, privacy, gender separation, and separate sleeping/cooking areas.
- **Sanitary facilities:** Adequate toilets, showers, handwashing facilities; clean, private, non-shared between genders (except family units).
- **Canteen, cooking, laundry:** Safe, hygienic, and well-equipped; separate from sleeping areas; laundry for work and personal clothes.
- **Food and nutrition:** Standards for safe and nutritious meals.
- **Medical facilities:** First aid, and access to health care; on-site health management plans.
- **Leisure and social facilities:** Recreational, exercise, religious spaces; telecommunication access.

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<sup>23</sup> Workers' accommodation: processes and standards, public guidance note by IFC and the EBRD, August 2009

## 5. Analysis of Alternatives

The analysis of alternatives involves evaluating various project options during the conceptual and pre-feasibility design phases. Emphasis is placed on both the environmental and social implications, ensuring that the selected option is technically and economically viable, environmentally sound, and complies with Egyptian laws, regulations and international requirements.

### 5.1 No Project Alternative

The 'no project' alternative means that the 1,000 MW solar plant project will not be developed. If "no-project" alternative is selected, the project area would remain unchanged, retaining its current characteristics or allocated for other renewable energy project.

However, the benefits of the project would also not be realized. The project aims to meet part of the continuously increasing energy requirements in Egypt. Additionally, it contributes to sustainable development and reduces greenhouse gas emissions, particularly CO<sub>2</sub>, which would have been generated if the same amount of energy were produced from fossil fuel-fired power plants. It also aids in conserving resources such as oil and gas reserves. In regions with high solar power potential, like Upper Egypt, utilizing solar energy is one of the best alternatives to satisfy Egypt's growing energy demand. The project is expected to generate local employment and procurement opportunities during the construction and operation phases and commit to other social responsibilities.

*Therefore, the "no project" alternative is not considered a suitable alternative for this project.*

### 5.2 Alternative Site Location

The Project Site is located within the West Nile Concession area, situated in the western part of Menya Governorate, west of the Nile River, approximately 55 km west of Menya city. The site lies within a remote and uninhabited part of the governorate. This land is part of the NREA concession already designated for photovoltaic (PV) projects.

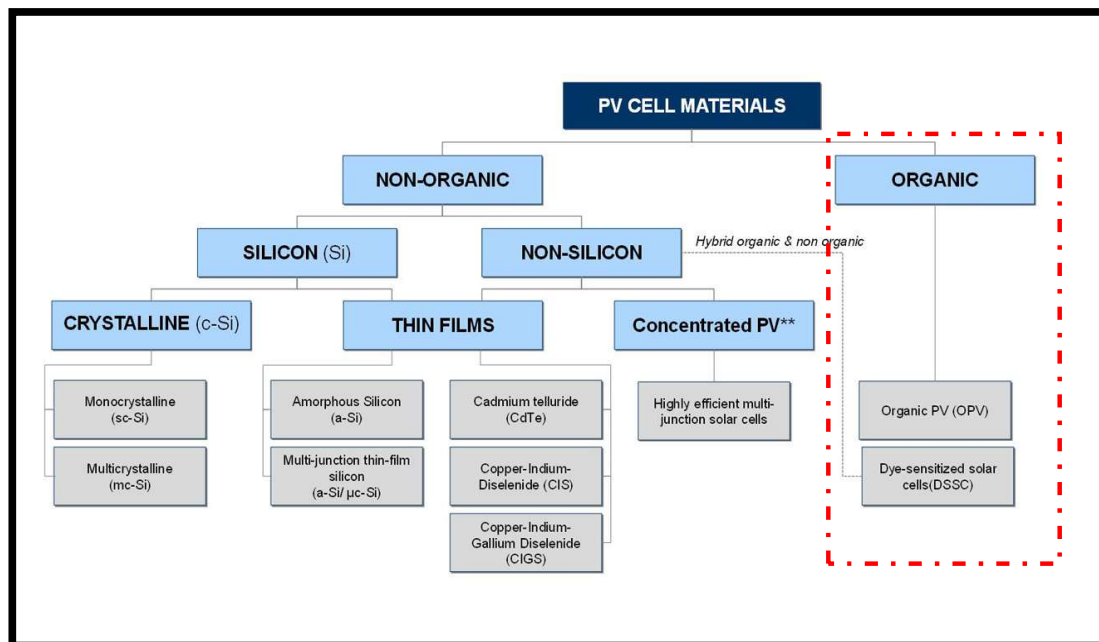
*Therefore, the alternative site location option is not considered, and the selected site is suitable for establishing the project.*

### 5.3 Alternative PV Types

Types of PV modules can be classified by the following 3 types:

- Mono and Poly Crystalline
- Silicon Thin-Film
- Compound Thin-Film

General classification of the types of PV module is shown in Figure 5-1 Materials marked with red dotted lines means that these are new emerging technologies, modules that are under research and development stage.

Figure 5-1: Types of PV modules<sup>24</sup>

Upon comparison of the three types of photovoltaic modules in terms of cost, efficiency, temperature characteristics, lifetime, environmental considerations, and the effect of shade, the Mono Crystalline bifacial type is selected for the proposed project.

Table 5-1 below shows the comparison between various PV panel options.

Table 5-1: Evaluation Result for each Photovoltaic Module<sup>25</sup>

PV Module	Silicon crystallized		Silicon Thin film		Compound thin film	
	Mono Crystalline	Poly Crystalline	Amorphous Silicon	MLTF	Cd-Te	CIS
Cost	High	Low	Middle	Low	Low	Low
Efficiency	Excellent	High	Low	Middle	Middle	Middle
Temperature Characteristic	Middle	Middle	Excellent	Excellent	Good	Good
Life time	>25 years	>25 years	15-20 years	>25 years	>25 years	>25 years
Environmental consideration	Safe	Safe	Safe	Safe	Includes hazardous substance Cd	Can include a small amount of Cd
Land/per MW	4-5 acres (16187 – 20234 m <sup>2</sup> /MW)		7.5-9 acres (30351 - 36421 m <sup>2</sup> /MW)			

Based on the above, Mono Crystalline bifacial type is selected for the proposed project.

<sup>24</sup> Source: [http://sovoxglobal.com/cell\\_classification.html](http://sovoxglobal.com/cell_classification.html)

<sup>25</sup> Developed based on: <http://www.sunsinesolution.com/faq.aspx>,  
<http://www.slideshare.net/gouravkumar220/solar-panel-technology-ppt>, -  
<http://www.geni.org/globalenergy/research/review-and-comparison-of-solar-technologies/Review-and-Comparison-of-Different-Solar-Technologies.ppt>.



## 5.4 Alternative Tracking Systems

Photovoltaic power systems are also classified according to their configurations: (1) Fixed PV systems, normally oriented to the south at northern latitudes and vice versa at southern latitudes; (2) PV tracking systems, which follow the sun's path in the sky (Figure 5-2).

Sun tracking systems are more efficient than fixed-tilt systems as they can capture a higher amount of incident solar irradiance, thereby increasing the annual electrical output. However, they require a larger area compared to fixed systems and consume a fraction of the generated electric power to track the sun. PV trackers can be further classified based on the number of their axes: single-axis tracking systems and double-axis tracking systems.

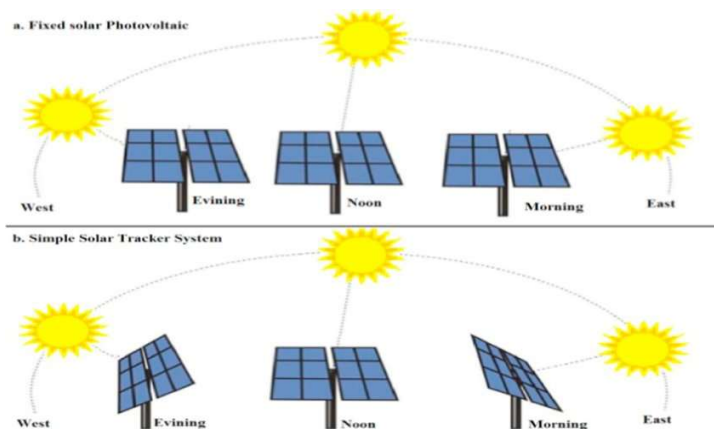


Figure 5-2: Fixed angle solar panel (a) and solar panels with a tracking system (b)

Source: Nadia et al. (2018) <sup>26</sup>

Compared to a fixed mount, a single-axis tracker increases annual output by approximately 15% to 25%<sup>27</sup> As shown in Figure 5-3

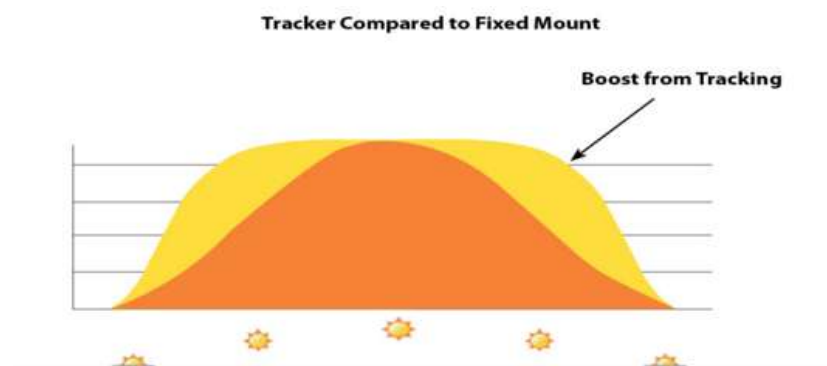


Figure 5-3: Daily power production, fixed tilt versus tracking

Source: First Solar <https://www.firstsolar.com/>

<sup>26</sup> Nadia, A. R., Isa, N. A. M., & Desa, M. K. M. (2018). Advances in solar photovoltaic tracking systems: A review. Renewable and sustainable energy reviews, 82, 2548-2569.

<sup>27</sup> Design of a Solar Tracker System for PV Power Plants, Tudorache, T, Kreindler, L. Acta Polytechnica Hungarica, Vol. 7, No. 1, 2010

Solar tracking systems can be mainly divided into two main groups based on the techniques that control the photovoltaic module. These two main groups are active and passive tracking systems. Active tracking systems use electric motors (DC or AC) or hydraulic systems. to direct the panel toward the sun. Passive tracking systems use a low-boiling-point compressed gas fluid that originates from solar heat, as shown in Figure 5-4 and Figure 5-5.

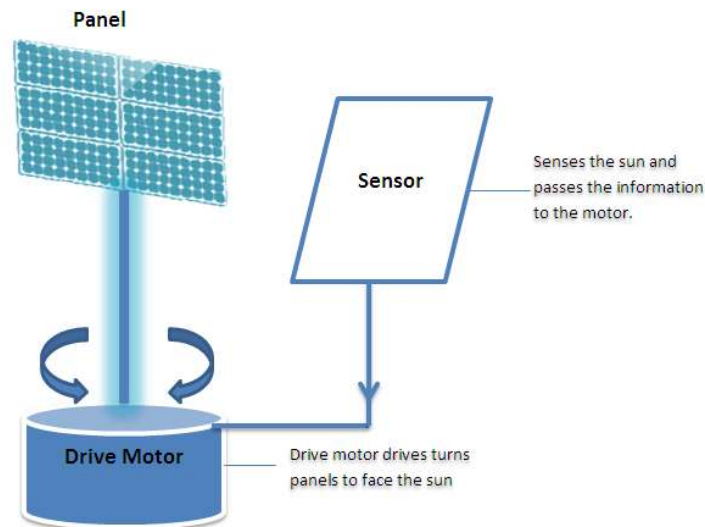


Figure 5-4: Active solar tracking system.  
Source: Solarmango<sup>28</sup>

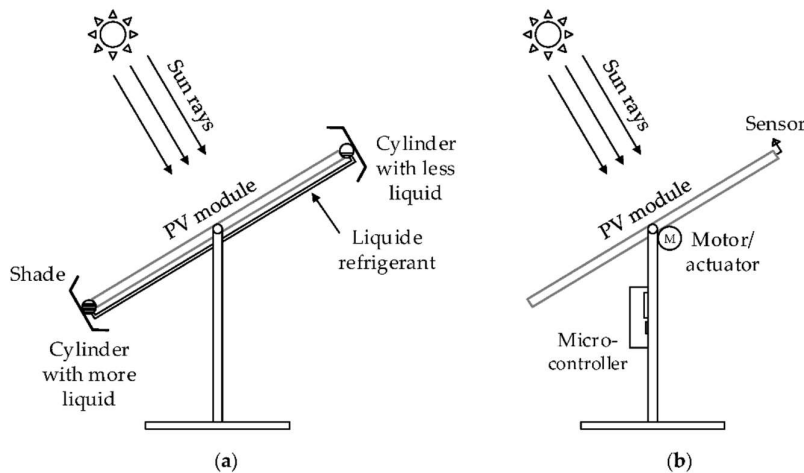


Figure 5-5: (a) passive tracking system and (b) active tracking system<sup>29</sup>.  
Source: Seme, et al., (2020)<sup>30</sup>

The following table provides a comparison between passive and active solar tracking systems.

<sup>28</sup> <https://www.solarmango.com/scp/solar-tracker-tracking-the-sun-for-maximum-power/>

<sup>29</sup> Passive solar trackers utilize thermal expansion of fluids to induce movement; it is simple but less precise. Active trackers use motors and control systems to optimize panel orientation, significantly improving energy capture. <https://www.mdpi.com/1996-1073/18/10/2553>

<sup>30</sup> Seme, S., Štumberger, B., Hadžiselimović, M., & Sredenšek, K. (2020). Solar photovoltaic tracking systems for electricity generation: A review. *Energies*, 13(16), 4224.

Feature	Passive Solar Tracking Systems	Active Solar Tracking Systems
<b>Tracking Mechanism</b>	Side-to-side tracking without motors, gears, or controllers	Motorized tracking (Single-axis or Dual-axis). It allows for the precise positioning of the solar panels, optimizing energy capture throughout the day.
<b>Installation</b>	Relatively easy installation	Generally, a more complex installation
<b>Power Requirements</b>	No external power required	Require external power (typically electricity)
<b>Maintenance</b>	Low maintenance costs	<ul style="list-style-type: none"> <li>- Higher maintenance requirements (especially for dual-axis)</li> <li>- It is provided by integrated monitoring systems that allow for remote monitoring, diagnostics, and maintenance scheduling. This can reduce the downtime for maintenance</li> </ul>
<b>Weather Dependency</b>	Can be significantly impacted by weather conditions	Less susceptible to weather variations
<b>Performance</b>	It can be less efficient in adverse weather and may require additional support mechanisms in harsh conditions.	Generally, more efficient, especially dual-axis
<b>Cost</b>	Lower initial cost	Higher initial cost. It generally offers a better cost-benefit ratio over its lifetime. The increased energy production can offset the higher initial investment.
<b>Precision</b>	Less precise orientation	More precise orientation
<b>Driving Mechanism</b>	No motors	Single-axis: One motor, Dual-axis: Two motors
<b>Movement</b>	Side-to-side movement	Single-axis: Horizontal or vertical movement, Dual-axis: Two axes of movement

In summary, the selection of an active single-axis tracking system likely reflects a balance of factors, including higher energy yield, cost-effectiveness, versatility, improved performance, precision, ease of maintenance, and suitability for the specific project requirements.

*Based on the above, the single-axis solar tracking system (1P dual-row configuration) has been selected for the project.*

## 5.5 Alternative module cleaning

At present, there are multiple cleaning options available to clean PV modules.

- (1) Non-Automated Cleaning (manual cleaning) involves mostly manual labor, using brushes or cloths to clean small-scale PV modules, such as those on residential or commercial systems.
- (2) Semi-Automated Cleaning uses both automation and manual effort. It includes:
  - Robotic Cleaning Systems: Robots clean PV modules but need to be manually moved between rows.
  - Vehicle-Driven Cleaning Systems: A cleaning mechanism, typically a brush, is attached to a vehicle and driven along rows, with an operator controlling pressure to prevent damage to panels. These systems require a larger land area for vehicle maneuvering. Non-Automated Cleaning and Semi-Automated Cleaning are shown in Figure 5-6.
- (3) Fully Automated Cleaning uses Automatic Robotic Cleaning Systems (ARCS) to efficiently clean PV modules with minimal human intervention. Robots are permanently installed on each row and move along panel edges, cleaning in both directions. They dock at stations located at the ends or within rows and move between arrays using bridges. ARCS can operate day or night, preferably at sunset for better moisture-based cleaning, and can be controlled remotely.



Figure 5-6: PV Modules cleaning options

Methods have been investigated for module cleaning, namely:

- Dry cleaning: Wiping modules with dry cloths
- Wet cleaning: Wiping modules with a wet cloth
- Washing: Washing with high-pressure water

### **Wet vs. Dry Cleaning**

Wet Cleaning involves water and relevant chemicals in removing sediments from the solar panel and is more feasible for regions that have abundant water reserves and experience heavy rainfalls. Dry Cleaning is a solution that does not involve water; rather uses motorized brushes or pressurized air to clean the panels. Various reports and studies completed recently in desert-like environments recommend Dry Cleaning as the best cleaning option for such arid climatic zones.

Table 5-2 below presents a comparison between the different types of cleaning methods. For module cleaning, the company intends to deploy automatic robotic dry-cleaning systems based on rotating brushes/cloths carried by a tractor equipped with automatic steering. In consideration of redundancy and flexibility, two tractors, including a rotating brush, shall be deployed. Only in case of significant performance drop due to extraordinary soiling caused, for instance, by sandstorms, additional cleaning cycles shall be considered.

*The selected option for PV Module Cleaning is the automatic robotic dry-cleaning systems, as it is more reliable than labour based cleaning and saves scarce water in a desert environment.*

Table 5-2: Evaluation of the ways of module cleaning

Items	Wipe with a dry cloth	Wipe with a wet cloth	Washing	Robotic Cleaning
<b>Tools and resources</b>	Rotating brush/cloth carried by tractor; fuel	Rotating brush/cloth carried by tractor, water, and fuel	Water truck; water; fuel	Cleaning machine, power
<b>Number of workers</b>	2 workers, one for each tractor per shift; two shifts per day (Fully manual cleaning would require 15 to 30 workers per shift, working in two shifts per day, for similar cleaning.)		1 x Driver also functioning as Team Supervisor and first Water Operator 1 x second Water Operator 2 x Washer 2 x Squeegee Dryer 2 x Clothes Dryer	Each cleaning robot can clean up to 6,000 m <sup>2</sup> with one battery load; depending on the design of the plant/length of the table rows, min. 70 robots need to be deployed for daily cleaning; 2 workers per shift are required for moving robots
<b>Water volume</b>	None	approx 0.4 – 0.6 ltr per module; in total 85 – 126 m <sup>3</sup> per cleaning cycle	approx 0.75 – 1.0 Ltr per module	None (Except in case of heavy humidity, soiling, or sandstorms, wet cleaning can be implemented. Such intervention is expected to take place two times per year, with an estimated amount of water of about 5,400 m <sup>3</sup> per clean.
<b>Working effort</b>	Easy	Easy	Easy	Easy
<b>Damage to the glass surface</b>	Scratch from dust on the surface might cause glass scratching	Stuck dust on the glass might remain and cannot be removed	No damage to the glass	No damage to the glass
<b>Waste</b>	Waste clothes	Waste clothes, wastewater for washing clothes	Potential wastewater generation	No wastewater
<b>Conclusion</b>	Does not need any water, but longer maintenance time, may cause damage to the surface, and produce significant waste quantities.	Does not need much water, but longer maintenance time; dust might be stuck hard on the panels.	High resource consumption and potential generation of wastewater	Continuous cleaning is required to avoid a significant accumulation of soil stuck hard on panels



## 5.6 Battery Energy Storage System (BESS) Alternatives

- *Lithium Solid State Containerized Batteries*

A Solid-State Battery consists of multiple battery cells assembled to form modules. Each cell contains a positive electrode, a negative electrode, and an electrolyte, which is mostly solid but can contain a small amount of liquid/polymer. The solid-state batteries that are being considered are Lithium-ion systems, as shown in Figure 5-7 below.

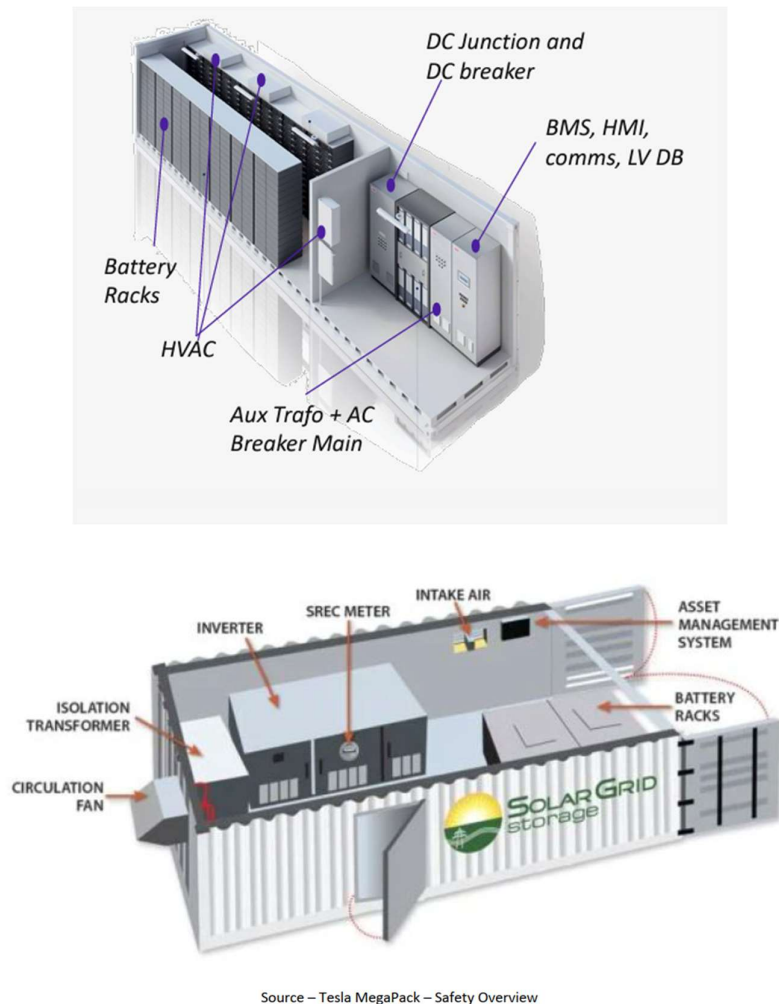


Figure 5-7: BESS systems

The possibility of thermal runaway potentially resulting from improper operation, such as increased battery temperature, overcharging, or discharging. Li-Ion battery technologies have different chemistries, among the most promising ones are: lithium-ion titanate (LTO), lithium iron phosphate (LiFePO<sub>4</sub>), and lithium nickel manganese cobalt (NCM).

**Lithium Iron Phosphate Batteries:** This type has the safest chemistry among Li-ion technologies, and has a relatively low cost. It also has high power density and can deliver all power under 100% of depth of discharge (DoD). In contrast, this type of battery presents low energy density, which ends up limiting its area of application.

**Lithium Nickel Manganese Cobalt Batteries (NCM):** They represent the most common type used in grid-scale power systems. These batteries present balanced characteristics in terms of power, energy, life cycles and costs.

**Lithium-Ion Titanate Batteries (LTO):** They have large life cycles, which can reach up to 20.000 cycles. They also have high power densities, and compared to previous Li-Ion batteries, they have the fastest charging process. However, it has a much lower energy density and higher costs.

- *Vanadium redox flow battery installations (VRFB)*

Redox Flow Batteries, typically Vanadium chemistry based (VRFB) are energy storage systems supplied either as containerized units or as a fixed installation. Redox flow batteries can be installed in containers where the individual quantities of electrolyte involved would be smaller but still significant. Because this technology has a low energy density, requiring a larger area for the electrolyte tanks, has not been selected for this project.

*The key disadvantage is the possibility of spills of corrosive electrolytes.*

- *Molten Metal Battery Energy Storage Systems*

Molten Metal batteries, typically the AMBRI Technology, are energy storage systems supplied as containerized units. The liquid metal battery is comprised of a liquid calcium alloy anode, a molten salt electrolyte, and a cathode comprised of solid particles of antimony.

*The key disadvantage is that they have to be heated to the melt temperature of the metals used to keep them constantly hot. This results in constant consumption of energy even when not being used to provide power.*

- *Sodium-ion (Na-ion) batteries*

In this type of battery, the positive electrode is usually made of molten sulfur (S) and the negative of molten sodium (Na). These electrodes are separated by a solid ceramic, called sodium beta alumina, which also serves as the electrolyte. The chemical reactions occur at high temperatures, between about 300 °C and 400 °C, in order to keep the electrodes in a molten state, which implies a heating system for the battery.

*Based on the above, the project will use solid-state lithium-ion battery modules for their cathodes.*

## 5.7 Water Sources Alternative

Other than bottled drinking water, water supply is required during construction activities and during operational activities for occasional panel cleaning as well as for sanitary purposes. Connection to a public water network is not an option given the considerable distance. Accordingly, options considered for water supply are trucking from the nearest cities/villages and abstraction from groundwater wells.

As per section 2, the total water supply is expected to be about 500 m<sup>3</sup>/day during peak construction for human and construction activities. The O&M consumption on site is expected

to be limited to 150 - 200 m<sup>3</sup>/month, as the method used for regular cleaning of PV modules will be dry cleaning, except in case of heavy humidity soiling or sandstorms, wet cleaning can be implemented. Such intervention is expected to take place two times per year, with an estimated amount of water of about 5,400 m<sup>3</sup> per clean. Drinking water for workers will be bottled water and will be provided separately.

#### **5.7.1 Groundwater abstraction**

The depth of the aquifer underlying the Project Site ranges between 120-140 m. The aquifer is productive and is expected to provide the quantity of water required even at peak construction demand. This is to be confirmed by a hydrogeological study required for well permitting by the Ministry of Irrigation and Water Resources.

The management of wells, potential well clogging, and the disposal of the liquid waste (brine and/or backwash of demineralization column) constitute the main operational issues facing the option of the Project establishing its own groundwater wells

Accordingly, an alternative might be to procure water from the neighbouring agricultural projects.. Yet, the legality of this option is questionable.

*In this respect, constructing water wells is not a preferred option for the project.*

#### **5.7.2 Water trucking and pipeline supply**

The required water will be trucked and stored in tanks distributed across the site for different uses. The volume of water required daily during peak construction will require a large fleet of trucks.

*This option is a preferred option for water supply.*

### **5.8 Wastewater Management alternatives**

#### **5.8.1 On-site wastewater treatment**

The option of construction of an on-site domestic wastewater treatment will be too expensive for a short-term construction phase, and for smaller quantities on the long-term operation phase.

*This option will not be considered for wastewater management*

#### **5.8.2 Use of grey water and Off-site wastewater disposal**

This option entails utilization of grey water generated during construction activities to be used on site for dust suppression. In addition, periodic trucking of black wastewater to the authorized water treatment plants.

*This option is a preferred option*

### **5.9 Alternative accommodation**

A number of alternatives to workers' accommodation can be considered. These include traditional on-site worker camps, accommodation in the closest villages or in farther larger urban areas in Menya. These alternatives allow project managers to balance cost, logistics, worker welfare, and the temporary nature of construction projects. Table 5-3 below provides description of the different accommodation alternatives.

**Table 5-3: E&S impacts of options for worker accommodation during construction**

Aspect	On site camp	In closest settlements (smaller)	In Towns (larger but more distant)
Investment	High for a temporary need	Expect substantial improvements to housing units will be needed	Mild improvements to housing units, as needed
Land use	Uptake within project site	None	None
Worker Transportation	Minimal	Daily transport for each shift	Daily transport for each shift
Worker influx	No direct interface with communities	High Social Impact on community	Lower Social Impact as towns already have a more mixed population  It could be high in vicinity of rented buildings for single male workers
Impact on rents	None	Potential introduction of rent option to community	Lower impacts the larger the town
Food Supply	Traffic, cost and adequate storage	Could put pressure on host community resources	Impact is lower the larger the host town
Water (for human use)	Traffic and cost	Less. Can put pressure on small host community resources	Much lower impact the larger the host community
Wastewater	Traffic and cost	Less. If the host community is connected to sewer network, increment is not expected to be substantial	Less quantity to be transported  If the host community is connected to sewer network, increment is expected to be insignificant
Solid Waste	Traffic and cost	Less municipal waste to be transported	Less municipal waste to be transported
Medical facilities	Needed	Needed	Needed

Based on the above, a mix between onsite camps and off site in larger urban centers will be selected.

## 6. Assessment of Environmental and Social Impacts and Mitigation Measures

### 6.1 Methodology

An environmental assessment was carried out to cover potential risks and impacts of the project on the environment as well as risks/impacts of the environment on the project.

The assessment was carried out in five main steps, as follows:

1. Delineation of the Area of Influence;
2. Identification and classification of risks and impacts into irrelevant (scoped out), positive and negative;
3. Assessment of negative risks and impacts in terms of their significance;
4. Identifying and proposing suitable mitigation measures for minimizing the effects of negative impacts; and
5. Detailing residual risks and impacts.

The main cumulative impacts have been also assessed using the same methodology utilized to assess potential negative impacts.

#### 6.1.1 Delineation of the Area of Influence

A project's Area of Influence (Aol) is defined as the geographical area likely to be affected by the project, including its activities, associated facilities, and supporting infrastructure. The Aol accounts for both direct and indirect impacts of the project. Direct impacts are typically those that arise from planned activities and occur within or adjacent to the project site. Indirect impacts, however, result from unplanned but predictable project activities and developments. Consequently, the Aol must encompass areas affected by these indirect impacts, which may occur in the future or at locations beyond the immediate project site.

The area of influence (Aol) includes regions likely to be affected by the project and its directly managed activities and facilities. It also encompasses areas impacted by unplanned but predictable developments caused by the project, which may occur later or at different locations. Additionally, it covers areas where the project indirectly affects biodiversity or ecosystem services that are crucial to the livelihoods of local communities. The identified project E&S aspects within the project's direct AOI are described in the tables below. Impacts within the potential indirect area of influence, if any, would be addressed in the impact assessment section.

#### 6.1.2 Identification and Classification of Impacts

Interaction between the different activities and the environmental receptors, identified through the baseline information, was specified. As such interactions could result in negative or positive impacts, the different types of impacts were identified.

Based on the analysis of the baseline environmental and social conditions and the nature of the receiving environment, some aspects were found to be irrelevant to the specific activities

of this particular project. These are "scoped out risks and impacts". Those that were considered relevant were "scoped-in risks and impacts"

Scoped in risks and impacts were subject to a process of impact evaluation, based on the analysis of the proposed project components and activities, to determine the magnitude of the related aspects, in relation to the importance of the receptors. Accordingly, the significance of the different impacts was assessed. The evaluation process took into account the information collected in the field, available in the literature, and/or based on the professional judgment of the consulting team, as well as concerns and opinions expressed during stakeholder consultation.

### 6.1.3 Assessment of Negative risks and Impacts

Impacts are the result of the interaction of an aspect of the project with a receptor. If the aspect and receptor are connected by a pathway, the impact is relevant and is scoped in, irrespective of its significance. This provides the skeleton of "impact assessment", where each scoped-in impact would be described and its significance assessed before and after implementing the design integrated measures and/or applying mitigation, management and monitoring practices (i.e. residual risks/impacts).

#### Procedure to Assigning SIGNIFICANCE

Risk and Impact assessment is the assignment of **SIGNIFICANCE** to each risk/impact. The **SIGNIFICANCE** of potential negative impacts is assessed, considering the **MAGNITUDE** of an **ASPECT** in combination with the sensitivity of the **RECEPTOR** (according to its sensitivity and value), in the absence of quantified standards), exposed to this aspect through a defined **PATH**.

#### A) Assessing the MAGNITUDE

The magnitude of an aspect is determined according to the following criteria:

- The temporal scale or duration of the aspect;
- The *spatial scale* or geographic extent of the aspect; and
- The **intensity scale** of the aspect.

1. The temporal scale defines the aspect at various time scales, as an indication of the overall duration of the aspect.

Category	Description
Short term	Less than 5 years. Aspects will be of short duration
Medium term	Between 5 and 20 years
Long term	Between 20 and 40 years (a generation) and from a human perspective essentially permanent
Permanent	Over 40 years and resulting in a permanent and lasting change that will always be there

2. The *spatial scale* (geographic extent) defines the physical extent of the aspect.

Category	Description
Localized	At localized scale and a few hundred meters in extent
Study area	The project area and its immediate surroundings
District	District level (e.g. Markaz or equivalent)
Regional	Provincial level (e.g. Governorate or equivalent)
National	Country wide – Egypt
Global	Global scale

3. The **intensity scale** is used in order to scientifically evaluate the size of an aspect would be on a particular affected system or a particular affected party. It is a methodology that attempts to remove, as much as possible, value judgments from the assessment, although it mainly relies on the professional judgment of the specialist.

Category	Description
Very severe	Usually an irreversible change to the affected system(s) or party(ies) which cannot be mitigated. For example, the change to topography resulting from a quarry. However, professional judgment is also required in order to categorize an impact as “very severe”.
Severe	Impacts that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these. For example, the clearing of vegetation which is fairly common elsewhere, as the area could be rehabilitated.
Moderate	Impacts that could be mitigated. For example, constructing a narrow road through vegetation with a low conservation value.
Slight	Mitigation is either integrated in the project design or is very easy, cheap, less time consuming or not necessary. For example, the temporary change in the water table of an irrigation canal, which is adapted to fluctuating water levels.
No effect	The system(s) or party(ies) is not negatively affected by the proposed development. For example, construction activities will be of no effect on the overall geological context of the area.

In addition, other parameters that might be considered to assess the intensity of an aspect include its frequency, duration (i.e. the period of time during which the aspect persists)<sup>31</sup>, probability of occurrence and the degree of certainty or confidence with which the intensity of an aspect has been predicted<sup>32</sup>. Accordingly, assessing the intensity of an aspect is still subjective and is influenced by the expert’s experience, estimation and professional orientation.

The MAGNITUDE scale is an attempt to evaluate the importance of an aspect taking into account the temporal, spatial and intensity scales.

Temporal scale + spatial scale + intensity scale = Magnitude of aspect:

- Large
- Medium

<sup>31</sup> The duration meant here differs from the temporal scale. For example, an oil spill is a long term impact as it can happen throughout the project lifetime but it usually has a short duration when it occurs.

<sup>32</sup> The degree of certainty can be categorized into definite, probable, possible and unsure. To define a specific impact as definite, substantial supportive data are usually required.



- Small
- Negligible

Assigning numerical values can assist in assessing the MAGNITUDE of an aspect; however, this type of assessment is not always realistic and should be better taken as a guide to assist professional judgment.

For some aspects, especially noise, air and water pollution, the intensity can be assessed directly against numerical criteria and standards<sup>33</sup>. If exceeding, further mitigation must be incorporated by the Project to reduce the magnitude of the impact (and the significance of its effect).

For other aspects, nominal levels of magnitude (small, medium, large) may be adopted based on widely recognized factors such as: the nature of a change; its duration and reversibility, size or intensity and, for unplanned events, likelihood of occurrence.

Some activities will result in changes to the environment that may be immeasurable or undetectable or within the range of normal natural variation. Such changes will be assessed as having no impact or to be of negligible magnitude and will not lead to significant effects.

#### **B) Assessing the SIGNIFICANCE**

In evaluating significance, the ESIA process is seeking to inform regulators and stakeholders about the effects of the project in a way that helps them make decisions on whether to approve it and allows them to develop suitable conditions to attach to an approval. The evaluation of significance should ideally demonstrate legal compliance at least (e.g. compliance with quantified standards, avoidance of effects on legally protected resources).

In the absence of quantified standards, significance can be evaluated through considering the magnitude of a risk/impact in combination with the sensitivity / value (collectively called "importance") of the receptor or resource that is affected.

#### **Terminology used to describe the Receptor / Resource**

The terms sensitivity, and value of a receptor and/or resource are explained through the following definitions.

Receptor (or resource) sensitivity is the degree to which a particular receptor is more or less susceptible to a given risk/impact. Examples: cold-blooded animals are more sensitive to temperature variations than warm-blooded animals. Hospitals, schools, daycare facilities, elderly housing and convalescent facilities are sensitive receptors as their occupants are more susceptible to the adverse effects of exposure to pollutants.

Receptor (or resource) value takes into consideration its quality and its importance as represented, for example, by its conservation status, its cultural importance and/or its economic value.

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<sup>33</sup> Environmental measurements are usually not available since it is assumed that the project has not started yet; however, these can be sometimes available from previous similar projects, from utilities and machinery technical specifications, from simulation activities (such as mathematical modeling), if the project is an extension of an existing project, or if, for any reason, the project has already started and measurements can be carried out.

The appropriate use of the terms “receptor” and “resource” is less confusing than those used to describe its “importance”. For example, ambient air is generally considered as a receptor. A groundwater aquifer is also a receptor, but the term “resource” would better apply if groundwater is used for irrigation or as a source of potable water.

#### **Method for Determining the Resource / Receptor Importance**

Receptor importance (sensitivity / value) is determined based on the following parameters, which are equally weighted and are each assigned a rating of 1, 2 or 3.

- **Physical Receptor/Feature**

Presence (to the identified stressor); ranges from:

<b>3</b>	Presence of feature of any type which has national or international value (e.g. state protected monument); to
<b>2</b>	Feature with local or regional value sensitive to disturbance; to
<b>1</b>	Feature which is none of the above.

Resilience<sup>34</sup> (to the identified stressor); ranges from:

<b>1</b>	Feature/receptor is unaffected or marginally affected or highly resilient to change; to
<b>2</b>	Undergoes moderate but sustained change which stabilizes under constant presence of impact source with physical integrity maintained; to
<b>3</b>	Potential for substantial damage or loss of physical integrity.

- **Soil, Groundwater and Surface Water**

Presence; ranges from:

<b>3</b>	Receptor/resource is highly valued, either environmentally (e.g. a lake categorized as Important Bird Area) or socio-economically (e.g. used extensively for agriculture or used as a public water supply); to
<b>2</b>	Receptor/resource has moderate environmental and/or socio-economic value (e.g. moderate/occasional use for agriculture purposes); to
<b>1</b>	Receptor/resource has limited or no value.

Resilience(to the identified stressor); ranges from:

<b>1</b>	No or low levels of expected contamination (well below accepted standards) and/or receptor/resource is unaffected or marginally affected or highly resilient to change; to
<b>2</b>	Moderate levels of expected contamination and/or receptor/resource is vulnerable to physical disturbance; to
<b>3</b>	High levels of expected contamination and/or receptor/resource is highly sensitive to physical disturbance.

- **Biological/Ecological Receptors/Features**

Presence; ranges from:

<b>3</b>	Routine, regular or reliably predictable presence of any species/feature which is of conservation concern (unique and/or critical feature such as protected area, critical habitat and key biodiversity area; and/or threatened, protected and endemic species) or not threatened but largely confined to the Project Area; to
<b>2</b>	Not threatened at the national level but regionally rare and/or sensitive to changes and/or disturbance and/or of social importance; to
<b>1</b>	A species/feature which is none of the above.

Resilience (to the identified stressor); ranges from:

<b>1</b>	Species or community / feature unaffected or marginally affected; to
<b>2</b>	Species/feature undergoing moderate but sustainable change which stabilizes under constant presence of impact source, with ecological functionality maintained; to
<b>3</b>	Substantial loss of ecological functionality (e.g. loss of species in key groups, substantially lower abundance and diversity, habitat loss/modification affecting ecological processes).

- **Human Receptors**

Presence; ranges from:

<b>3</b>	People being permanently present (e.g. residential property) in the geographical area of anticipated impact; to
<b>2</b>	People being present some of the time (e.g. commercial property); to
<b>1</b>	People being uncommon in the geographical area of anticipated impact.

Resilience (to the identified stressor); ranges from:

<b>1</b>	People being at least risk to change or disturbance (i.e. ambient conditions such as air quality and/or noise are known or expected to be well below applicable legislation and/or international guidance); to
<b>2</b>	People being at risk to change or disturbance (i.e. ambient conditions such as air quality and/or noise are known or expected to be below adopted standards); to
<b>3</b>	Most groups at risk (i.e. ambient conditions such as air quality and/or noise are known or expected to be at or above adopted standards).

As for the magnitude, numerical values can be used as a support to assess the importance of receptor/resource, but professional judgment might be needed to complement/modify the result. The importance (sensitivity / value) of a receptor or resource could sometimes be hardly quantifiable (e.g. if we are not able to evaluate if air emissions and/or noise intensity will be below or above regulatory standards) but it is not usually difficult to evaluate based

on professional judgment, without using numerical values. For example, from an ecological perspective, the ecological value of an industrial zone is Low, while that of a protected area is High. On the other hand, the value of a natural area of no particular conservation concern may be deemed as “Medium”, as long as it does not include features or species of particular importance. Moreover, given the High importance of human receptors, if a community is exposed to noise/emissions of unknown or unquantifiable intensities/loads, the worst-case scenario would be adopted.

### SIGNIFICANCE SCALE

Magnitude and significance tend to be related, but do not necessarily directly correlate. Magnitude can be measured, in terms of how much an area is affected by the development and how badly, but significance is a more subjective measurement. While a proposed development may have a large impact in terms of magnitude, the effects it causes may not actually significantly affect the environment as a whole. On the other hand, for a given impact magnitude, different receptors (either directly or indirectly) may be deemed of greater importance and as such the significance of the impact is greater than the impact magnitude alone.

The following table assesses the significance of a potential impact by combining the stressor’s magnitude with the sensitivity / value of the receptor or resource that is affected.

Magnitude of Aspect	Sensitivity / Vulnerability / Value of Resource / Receptor		
	Low	Medium	High
Negligible	INSIGNIFICANT	INSIGNIFICANT	INSIGNIFICANT
Small	INSIGNIFICANT	MINOR	MODERATE
Medium	MINOR	MODERATE	MAJOR
Large	MODERATE	MAJOR	EXTREME

Impacts/effects of more than minor significance may warrant re-examination to see if an impact magnitude can be reduced further. Different mitigation options may be examined and the reasons for selecting one and rejecting others explained. Some impacts/effects that cannot be adequately mitigated may need to be addressed through the consideration of offsets<sup>35</sup> or compensations. A cautious judgment is undertaken before assessing the significance of an impact as “Extreme”, which should comply with the definition provided in the table below. Otherwise, the impact is categorized as “Major”.

Adoption of mitigation measures can decrease the magnitude of the risk/impact but not the sensitivity and/or value of the resource and/or receptor.

<sup>35</sup> Offsets are a set of actions with on-the-ground “*measurable conservation outcomes*” that can balance significant residual environmental and/or social losses caused by the project *only after appropriate avoidance, minimization and restoration measures have been applied*, with equivalent or higher environmental and/or social gains in terms of characteristics and size of expected gains. The decision to undertake an environmental and/or social offset therefore would never be a substitute for the implementation of good management practices that prevent significant impacts.

### Impact significance definitions

SIGNIFICANCE	Definition
<b>EXTREME</b>	<b>Highly significant.</b> Impacts with an “ <b>Extreme</b> ” significance are known to permanently disrupt the function and value of the resource/receptor, and have broader systemic consequences (e.g. ecosystem or social well-being). These impacts are very difficult or impossible to mitigate and might require the implementation of offset and/or compensation measures, contributing to national and/or regional-level conservation goals rather than solely site-level impact mitigation.
<b>MAJOR</b>	<b>Significant.</b> Impacts with a “ <b>Major</b> ” significance are likely to disrupt the function and value of the resource/receptor and may have broader systemic consequences (e.g. ecosystem or social well-being). These impacts are a priority for mitigation in order to avoid or reduce the significance of the impact.
<b>MODERATE</b>	<b>Significant.</b> Impacts with a “ <b>Moderate</b> ” significance are likely to be noticeable and result in lasting changes to baseline conditions, which may cause hardship to or degradation of the resource or receptor, although the overall function and value of the resource or receptor is not disrupted. These impacts are a priority for mitigation in order to avoid or reduce the significance of the impact.
<b>MINOR</b>	<b>Detectable but not significant.</b> Impacts with a “ <b>Minor</b> ” significance are expected to be noticeable changes to baseline conditions, beyond natural variation, but are not expected to cause hardship, degradation, or impair the function and value of the resource or receptor. However, these impacts warrant the attention of decision-makers, and should be avoided or mitigated where practicable.
<b>INSIGNIFICANT</b>	<b>Not Significant.</b> Any impacts are expected to be hardly distinguishable from the baseline or within the natural level of variation. These impacts do not require mitigation and are not a concern of the decision-making process.

#### 6.1.4 Mitigation Measures

The mitigation of impacts follows a hierarchy of actions, referred to as the “Mitigation Hierarchy”, which comprises the following sequential steps:

- **Avoidance:** actions taken to fully prevent impacts, such as relocating a project or changing its spatial layout to prevent impacts in specific locations;
- **Minimization:** actions taken to reduce the duration, intensity, and/or extent of impacts that cannot be completely avoided;
- **Restoration:** actions taken to assist in the recovery of a feature that has been degraded, damaged, or destroyed; and
- **Offset:** measurable outcomes resulting from actions designed to compensate for significant residual adverse impacts arising from project development and persisting after appropriate avoidance, minimization, and restoration measures have been taken. These could be applied in both biodiversity conservation (e.g., restore and protect areas degraded by impacts unrelated to the planned development or avert the loss of biodiversity from impacts unrelated to the planned development) and pollution loads (e.g., by investing in pollution abatement in an adjacent industrial facility emitting pollutants in the same air shed).

Mitigation measures are either incorporated as integral part of the project design or through management and monitoring measures. By implementing mitigation measures, the residual impacts, which are those potentially, remaining after implementing the mitigation measures, should be minimal and acceptable.

Based on the impact identification and evaluation process, mitigation measures are proposed for significant impacts, while minor impacts are usually integrated within the management plans of the project. As much as possible, the avoidance and prevention of impacts is favoured over minimization, restoration, or offset.

#### **6.1.5 Residual Impacts**

Residual impacts have been evaluated, and their significance is stated in this chapter after the implementation of relevant mitigation measures.

#### **6.1.6 Impacts and risks Identification**

Interaction between the different activities and the environmental and social receptors, identified through the baseline information, was carried out. Such interactions may result in negative or positive impacts. The different types of risk and impacts were identified.

#### **6.1.7 Scoped Out Impacts**

Based on the analysis of the baseline environmental and social conditions and the nature of the receiving environment, some aspects were found to be irrelevant to the specific activities of this particular project. These are identified as "scoped out impacts".

Based on the results of the scoping exercise, it was indicated that the following topics can be scoped out of the ESIA for both the construction and O&M phases:

##### ***Impacts on "surface water quality" and "aquatic life"***

As the project is located in a desert region with no water bodies or surface canals within its boundaries, there are no surface water sources in the vicinity of the project. The nearest surface water body to the Project Site is the River Nile, which is located at substantial distances about (60 km) away from the Project Site.

Therefore, impacts on surface water can be scoped out.

##### ***Impact on groundwater***

In the West Menya Region, groundwater is sourced from the Nubian Sandstone Aquifer, with aquifer depths ranging from 120 to 140 meters, and static water levels between 45 and 74 meters, depending on location. The project will not utilise groundwater for its activities.

Therefore, impacts related to groundwater are scoped out.

##### ***Critical Habitats (CHs) and Ecological Sensitivities***

The Project Site is entirely barren and composed of a bare gravely sandy soil in a hyper-arid desert ecoregion, completely devoid of vegetation. Consequently, it provides no opportunities for the flourishing of any permanent vegetation and is inhospitable for any faunal species to permanently inhabit the site. Moreover, this type of habitat dominates the Western Desert. Therefore, none of the EBRD ESR6/IFC PS6/OS6 CH criteria are met, and no CHs have been identified within an Ecologically Appropriate Area of Analysis (EAAA). Based on the undertaken CH screening exercises described in section 3.2.8 above, it was indicated that the EAAA does not qualify as CH as none of the criteria/thresholds apply to the

biodiversity and/or features of the area. Therefore, no additional assessment of CHs is required.

### ***Intangible Cultural Heritage***

Based on UNESCOs List of Intangible Cultural Heritage (ICH) in Egypt, none of the identified ICH elements are practiced within the Project Site. However, some elements may be practiced within Menya governorate, examples including local artistic and historical traditions such as local handicrafts and folkloric performances and Cultural Festivities, where the governorate hosts major Christian and Islamic festivals that are key to its intangible heritage, particularly around the monasteries of Gabal El-Tayr and the religious sites in Al-Bahnasa areas at about 65 and 75 km from the project site respectively. Within this context, no impacts on such culture heritage are expected for the following reasons:

- A substantial part of the workers will be local hires
- Most of the non-local workers will be accommodated in a workers camp , with no major interaction with the community
- The workers to be housed within large urban centers normally receiving out of town persons for various periods of time and their number will be significantly small relative to the size of these communities.
- The whole construction period, during which the demand for labour will be substantial, is limited in time

### ***Ecosystem Services***

No kind of human activities or uses take at the site. Thus, no benefits are derived from the bare ground covering the entirety of the Project Site and the localities in close proximity to it.

### ***Impact on Land Acquisition***

The site is entirely located on state-owned land within the New and Renewable Energy Authority (NREA) concession. No physical or economic displacement is anticipated. Based on the site visit results no known claims or usage patterns exist. However, land acquisition may be relevant to the associated OHTL.

Therefore, impacts related to land acquisition are scoped out for the PV and BESS project.

### ***Impact of the Environment on the Project (Contextual Risks)***

#### ***Flash Floods***

The Project Site is located in a relatively flat, hyper-arid area with no wadis or natural drainage channels that can result in flash floods. There are no wadi paths within the Project Site, or close to it. Rainfall is also scarce and negligible. However, during rainfall events, water may be accumulated in certain locations on site acting like a sheet flow with no defined streams. Yet, given that the whole site will be subject to levelling and grading activities during the construction activities, such potential water ponding will be taken into consideration in the design activities.

Given the relatively leveled terrain of the Project Site, its lack of wadis, flood streams, and hyper-aridity of the area, flash flooding events are not expected to occur at the Project Site.

Therefore, the potential impact of flash floods on the Project Site is considered irrelevant and is scoped out.



**Ambient Air Quality during operation**

Operational air emissions are negligible since the operation of the PV projects do not generated air emissions.

**Noise levels**

Noise generation at the Project Site during operation phase is expected to be minimal, primarily resulting from routine maintenance activities. The majority of the noise will be localized to the work area.

**Traffic**

Impacts of traffic will be irrelevant during operation. Vehicle movements are limited to occasional maintenance visits. No regular transportation of materials, workforce, or equipment is required, and therefore, traffic volumes remain negligible.

**Cultural Heritage during operation phase**

No cultural heritage/archaeological sites nearby. As mentioned in the baseline chapter, the nearest archaeological site in West Menya is the ancient city of *Oxyrhynchus* (Al-Bahnasa), located approximately 71 km northeast of the project area.

**Workers Influx during operation**

The PV project requires only a limited number of workers for routine monitoring and maintenance. Since the workforce does not increase significantly and no community interaction is introduced, there is no potential for demographic or social pressures typically associated with worker influx during the operation phase.

**6.1.8 Positive Impacts****Environmental Impacts:**

1. The project provides the national energy security, by providing a natural resource for energy consumption>
2. A solar energy project producing 1000 MWac of electricity annually in Egypt is projected to result in an approximate reduction of 0.55 million metric tons of carbon dioxide emissions each year when compared to generating the same amount of electricity using a natural gas power plant. (Natural Gas Emission Factor (kg CO<sub>2</sub>/kWh) is 0.55, (*Abdallah and El-Shennawy, 2020*).<sup>36</sup>.
3. The solar plant will not produce air pollutants like nitrogen oxides, sulfur oxides, and particulate matter during operation, unlike fossil fuel power plants.
4. Solar photovoltaic power generation does not require water compared to traditional thermal power plants, helping conserve water resources in this desert area.

The inclusion of BESS allows for better integration of renewable energy into the grid, potentially reducing the need for fossil fuel-based peaking power plants.

All positive environmental impacts are long term, as they materialize over the whole operation phase. However, each has its specific intensity. They are also not confined to the project site, area or region but are at the national level.

The 1000 MW plant generates 6000 MWh/day DC<sup>37</sup>. As the efficiency of conversion to AC does exceed 80%, this translated to 5000 MWh/day AC. This is assumed to displace power generated from fossil fuel plants in Egypt, the dominant fuel in Egypt being natural gas.

1. The project enhances national energy security, by generating much needed electricity without consuming natural gas, a depletable natural resource.

The specific consumption of natural gas per KWh varies from 0.15 to 0.3 m<sup>3</sup>/KWh. Even if the lowest figure is used, a substantial volume of 750,000 m<sup>3</sup> (or 26.5 Million cubic feet) is saved per day. This represents around 0.75% of the natural gas production in Egypt (fluctuating around 3.5 billion cubic feet/day). As Egyptian consumption is not currently totally met by domestic production, these savings are translated to less import needs. This aspect is considered moderate, but the significance of the impact is high given the chronic balance of trade deficit.

2. This fuel savings is also reflected in a reduction of Green House Gases emissions.

According to official information of the Egyptian Electricity Holding Company (EEHC report 2024/2025), the emissions of thermal power plants amount to 0.38 Kg CO<sub>2</sub> e/KWh. Accordingly, the avoided emissions would amount to 1,900 tons CO<sub>2</sub>e/day and 700,000 tons CO<sub>2</sub>/year. This represents around 0.25 % of Egypt's annual emissions (estimated to be around 291,6 million tons in 2024). The magnitude of this aspect is therefore considered moderate, and the significance of the impact is medium given the small contribution of Egypt to Green House Gases on a global scale.

3. The solar plant will not produce air pollutants like nitrogen oxides, sulfur oxides, and particulate matter during operation, unlike fossil fuel power plants.

The major pollutant emitted from natural gas power plants is Nitrogen oxides which vary from 10 to 50g/MWh, depending on the technology. A combined cycle plant, burning less fuel per unit of energy generated would be on the lower side. Assuming the average figure would make the emissions avoided amount to 150 kg of Nitrogen Oxides/day. As these local pollutants will not be avoided from a defined plant in a specific site, this aspect is considered minor and so is the significance of the impact on the receiving environment.

4. Solar photovoltaic power generation does not require water compared to thermal power plants

Most of the water consumed in thermal power plants is through evaporation in cooling systems. This water amounts to 1.4 m<sup>3</sup>/MWh in natural gas powered plants. Accordingly, the water saved would amount to 7000 m<sup>3</sup>/day. This is equivalent to water needed for the daily consumption of 30,000 to 35,000 people. This is a small percentage of the present Egyptian population (0.03%), but the magnitude of this aspect is still considered moderate given the scarcity of renewable water in Egypt.

<sup>37</sup> Following a rule of thumb, that over the 24 hours of a day, the energy generated is equivalent to generation of full capacity for 6 hours

5. Finally, the inclusion of BESS allows for better integration of renewable energy into the grid, potentially reducing the need for fossil fuel-based peaking power plants.

***Socioeconomic Impacts:***

These impacts occur both in the construction and the operation phases

**During the construction phase**

1. The project is likely to provide around 5000 direct jobs during the peak construction phase. This aspect is in the short term. An additional benefit will be to train the workforce for similar potential projects with the initiation of development of the NREA concession. Accordingly, although the aspect is on the short term, its impact could extend to building the capacity of the workforce. The impact of this capacity building is therefore considered major.
2. Indirectly, it could support more than 500 jobs in the supply chain and related services. These jobs will still be in the short term but are more concentrated in the project region. The aspect is considered small given the small number of jobs.
3. Increased economic activity in neighboring local municipalities of Menya governorate and will likely boost local businesses and services.  
This is still a short-term aspect, and the demand for goods and services for the project workforce, and other services like transportation will be high during the construction period. It will also be more concentrated in the project region. The aspect is therefore of a moderate magnitude.
4. Once operational, it may provide about 100 permanent jobs for maintenance and operation.  
These are mostly jobs with higher qualifications, which would be for the long term. Training on these jobs prior to the operation phase will improve the impact on the local population. This training could be organized in cooperation with the local universities and technical schools.
5. The proposed project would also coordinate with the Menya Governorate and/or City Council to initiate Corporate Social Responsibility (CSR) initiatives that are aligned with community priorities and the strategic development plans to support effective implementation.
6. It is not possible to assess the impact of this voluntary activity since its scope is not yet known. However, it is expected that the concerned parties would agree on activities with high impact/need. One of these activities could be the training on operation jobs mentioned above.

## 6.2 Assessment of Potential Negative Risks and Impacts

### 6.2.1 Potential Impacts during Construction Phase

#### A. Potential Impact on the Physical Environment

##### • *Potential Impacts on Air Quality:*

During the construction phase, dust will be generated from activities such as excavation, soil leveling, road works and truckloads. Additionally, exhaust emissions from construction vehicles and machinery, as well as fuel combustion in construction power generators, will contribute to air pollution. These emissions are likely to include nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), sulfur oxides (SO<sub>2</sub>), hydrocarbons (HC), and total suspended particulates (TSP).

The construction activities will be carried out within the PV project footprint, making the aspect *localised*. Over the total short-term duration of the construction phase, the intensity of the aspect of the air quality is expected to be moderate; thus, the magnitude of the aspect is considered MEDIUM.

As ambient air with good quality is essential for humans and all forms of life, thus it is a valuable resource. The air quality in the area project is naturally affected by ambient dust and existing conditions due to the site's open desert setting (no other emission sources). However, the local air environment has a relatively high capacity to tolerate minor, short-term increases in dust or air emissions. Thus, the sensitivity of ambient air is considered low

Therefore, the overall significance of the impact is assessed as **MINOR**.

#### Mitigation Measures

To address these potential impacts, mitigation measures would be implemented as the project management will ensure that the construction contractors carry out the necessary measures to minimize impacts and include them in the contractors' agreements.

The following mitigation measures are usually used to minimize the impacts of construction activities on the air quality:

- Implement policies/procedures to reduce idling times for vehicles and machinery
- Maintaining machinery and vehicles in good working conditions to minimize fugitive emissions and exhaust;
- Limit on site speed and implement dust suppression measures to prevent dust emissions;
- Emissions from power generator stacks will comply with Law 4/1994 and its relevant executive regulations.

#### Residual Impacts

The above mitigation measures are expected to be efficient in minimizing the potential impacts. Therefore, the residual impacts of construction activities of the proposed project on workplace air quality are deemed **INSIGNIFICANT**.

### • **Potential Impacts on Ambient Noise**

During the construction phase, the predominant sources of noise will be the operation of heavy equipment, power generators, vehicle movement, and ramming for foundations. Increased traffic noise from the transportation of materials and workers will also contribute to the overall noise levels.

Table 6-1 shows typical noise levels, in decibels, expected at various distances from construction machinery.

**Table 6-1: Average Noise Levels from Construction Equipment**

Equipment Type	Distance from Noise Source (dBA)		
	10m	50m	100m
Ramming Machines <sup>38</sup>	100	88	80
Bulldozer	74	60	54
Generator	76	62	56
Backhoe	79	65	59

Such aspects will be *localized* and the duration is short term and the intensity of noise is moderate; thus, the magnitude of the aspect is considered MEDIUM.

The project site is located in a remote, uninhabited area with no industrial or other noise-generating activities; therefore, the construction activities will be the only source of noise. As there are no sensitive human or ecological receptors present, the sensitivity is considered low.

Therefore, the overall of the impact is assessed as **MINOR**.

### Mitigation Measures

The following mitigation measures will be included in the contracts of the construction contractors:

- Ensuring regular maintenance of construction equipment and machinery to minimize noise emissions.
- Use low-noise machinery and equipment where possible.
- Schedule high-noise activities to avoid simultaneous operations that could amplify noise levels.

### Residual Impacts

The above mitigation measures are expected to efficiently minimize the potential impacts. Therefore, the residual impacts of construction activities of the proposed project on the ambient and workplace noise are deemed **INSIGNIFICANT**.

### • **Potential Impacts on Soil**

Potential impacts on soil during the construction phase generally result from domestic wastewater management, construction waste management, accidental spills or leaks of fuels, oils, and other chemicals from construction equipment that can contaminate the soil.

In general, the construction activities are unlikely to result in soil contamination that will need future decontamination and clean-up activities

<sup>38</sup> <https://iqip.com/products/pile-driving-equipment/noise-reduction-system/>

The generation of wastewater and waste is *localised*, and short-term. risks of the construction phase on soil are thus considered of **SMALL** magnitude and the sensitivity of the receptor is **MODERATE**. Therefore, the overall significance of the impact is **MINOR**.

#### Mitigation Measures

Despite the risks of the construction phase on the soil are limited, mitigation measures are recommended to manage the potential impacts.

- Conduct maintenance of vehicles, trucks, and construction equipment off-site to reduce on-site effluents and spills.
- Collect and dispose of spillages from tank filling or generator operation through licensed/authorized waste contractors.
- Develop and implement spill management plan.
- Maintain good housekeeping practices to ensure a clean and organized construction site.
- Collect and transport wastewater by authorized contractors to ensure proper disposal and prevent contamination.

#### **Non-Hazardous Solid Waste**

- Collect waste at designated collection points and store it in appropriate containers following regulations.
- Use licensed contractors for the collection and disposal of non-hazardous waste.

#### **Hazardous Waste**

- o Establish marked and physically separated storage areas for hazardous waste.
- o Use licensed contractors for the collection and disposal of hazardous waste.

#### Residual Impacts

By implementing the above mitigation measures, the residual impacts of the construction activities on the soil will be **INSIGNIFICANT**.

### **B. Risks and Impacts on the Biological Environment**

The project site is located within the Middle Limestone Plateau which is an extremely arid part of the Western Desert and practically rainless. Vegetation cover is generally absent with the exception of few scattered desert shrubs. This is a common feature of the Western Desert which, except for its coastal part, is almost devoid of vegetation and plant communities are restricted to oases and areas where water can accumulate such as small basins filled with fine sediments in the otherwise barren gravel desert (these areas are absent in the project area, which has a sandy soil).

Results of the field survey indicated that the project site is characterized by bare ground, and no flora was observed within the project site. This is reflected on the presence of fauna, which has usually a scattered distribution and mainly includes species adapted to these harsh conditions.

Moreover, no CHs have been identified within an EAAA covering a large area of around 143 km<sup>2</sup>. This area is wide enough to determine the presence of critical habitat for each species with regular occurrence in the Project's Aol or ecosystems (including those extending outside the boundaries of the project's Aol) covered by Criteria 1-4.

Moreover, the project is entirely located in a natural habitat. In such cases, IFC PS6 requires that a project does not significantly convert or degrade natural habitat, unless the following are demonstrated:

- *“No other viable alternatives within the region exist for development of the project on modified habitat.*
- *Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation; and*
- *Any conversion or degradation is mitigated according to the mitigation hierarchy”.*

IFC PS6 also defines what is meant by conversion or degradation as follows: *“the elimination or severe diminution of the integrity of a habitat caused by a major and/or long-term change in land or water use; or (ii) a modification that substantially minimizes the habitat’s ability to maintain viable populations of its native species.”*

Accordingly, it should be noted that that:

- There are no viable alternatives for development of the project on modified habitat, as the modified habitats are highly valuable agricultural lands;
- Consultation with relevant stakeholders has been carried out; and
- The project area does not include any community that could be affected by the project.

In addition, one of the main objectives is to adopt the mitigation hierarchy in the design and implementation of projects with the aim of achieving “no net loss”, and where appropriate, a “net gain” of biodiversity. Net gains are additional conservation outcomes that can be achieved for the biodiversity values for which a critical habitat was designated. Therefore, the concept of “net gain” does not apply to the present project area, where no CH has been identified.

“No net loss” is defined by EBRD ESR6 as “the point at which project-related biodiversity losses are balanced by gains resulting from measures taken to avoid and minimize these impacts, to undertake on-site restoration and finally to offset **significant** residual impacts, if any, on an appropriate geographic scale”.

In this respect, potential risks and impacts have been properly addressed, and suitable mitigation measures have been developed. All residual impacts are deemed minor or insignificant as shown in the following sections, and do not require the implementation of offsets, also given that no CHs have been identified. Accordingly, the “no net loss” concept has been properly addressed.

On the other hand, as indicated in chapter 3 above, a number of species have been identified as PBFs. Although the EAAA cannot be considered to “support” these species, there is a remote possibility of their occurrence the area (at least as vagrants) and are herein considered PBFs using a precautionary approach.

- ***Habitat loss, modification, and fragmentation***

During the installation of PV panels and construction of utilities, the soil nature and topographic structure of the area will change leading to a modification of the desert habitat



from natural to modified due to constructions and potential soil levelling activities. Moreover, the presence of a fenced site might have a barrier effect on local faunal species, affecting their displacement from one place to another.

The risk is deemed permanent and irreversible (unless the project is terminated and the site is restored), involves the *study area*, and is considered **moderate** given the extension of study area, which is relatively small when compared to the vastity of the Western Desert, which covers two thirds of surface of Egypt. The magnitude is considered MEDIUM. Given the Low value of the receptor (a barren desert habitat with limited biodiversity), this risk is deemed **MINOR**.

#### Mitigation Measures

Mitigation measures will focus on avoiding the degradation of offsite habitats:

- Ensure proper housekeeping onsite and offsite to avoid the degradation of surrounding areas;
- Avoid offsite areas with vegetation cover to prevent further degradation of surrounding areas;
- Ensure proper speed limits onsite and offsite; and
- Provide awareness to the workers on the negative impacts of affecting flora and disturbing wild fauna.

To reduce the risks of habitat fragmentation, implement a wildlife friendly fence with the following characteristics:

- The fence should be highly visible to running and flying fauna.
- The lowest wires should provide some distance (about 30 cm) at different intervals to allow wildlife species to crawl under them without injury.

#### Residual risks

As habitat loss and modification are permanent, their residual risks will remain **MINOR**. On the other hand, by implementing a wildlife friendly fence, risks on biodiversity due to habitat fragmentation can be reduced to **INSIGNIFICANT**.

#### • ***Disturbance to wildlife***

During the construction phase, air emissions, noise and vibrations, light emissions, as well as a relatively large human presence, may affect local wildlife which is reported to include some threatened species and potential PBFs at the wider area level, and possibly within the EAAA. These stressors may drive fauna away from the site, whose area is, however, considered to be very limited. Heavy machinery may lead to soil compaction and destroy dens and burrows (if any), thus affecting fossorial species. Increased traffic may slightly increment animal road-kills. On the other hand, migratory avifauna is not expected to be affected as there is no correlation between the airspace utilized by avifauna and the terrestrial area of the site, which does not provide any resources in terms of resting and feeding areas (as confirmed by the site's Sensitivity Index being of  $\leq 0.001$ ).

Given the nature of the site, the overall risks are **moderate** in intensity, of short term and at the *study area* level. Their magnitude is considered MEDIUM. Receptors are considered of Medium value (due to the potential presence of some threatened species) but of Low

vulnerability to these impacts as they are not confined to project site and/or its Aol and, therefore, will be unaffected or marginally affected. Accordingly, the overall significance of these impacts is deemed **MINOR**.

#### Mitigation Measures

Will mainly include the following:

- Develop, implement and update a solid waste, hazardous waste and wastewater management plan to include waste collection, storage, transport and disposal in an environmentally sustainable manner to avoid attraction of vermin and the potential consumption of waste from desert species;
- Provide awareness to the workers on the negative impacts of disturbing wild fauna;
- Ensure proper housekeeping practice;
- Avoid high intensity light directed outside the site that may disturb fauna;
- Ensure speed control and the prohibition of off-track driving; and
- Ensure the proper maintenance of construction equipment and any other equipment with high noise and vibration potential.

#### Residual Impacts

With the proper implementation of the mitigation and management measures the residual impacts will be **INSIGNIFICANT**.

#### • ***Attraction of pests and propagation of invasive species***

Solid waste and sewage wastewater mismanagement may result in the presence of water and the growth of marginal vegetation, which may in turn attracts pests (such as insects and rodents) and alien species to the area (such as flora, feral dogs and cats). Pests may be disease vectors while feral dogs and cats may compete with native fauna for food resources.

The development will require considerable amounts of water during the construction phase, resulting in significant quantities of sewage and wastewater. Therefore, if mismanaged, the potential presence of water and the growth of marginal vegetation in a desert environment might also attracts several birds, including species typical to the mesic habitats of the Nile Valley. However, even if alien seeds are inadvertently introduced to the area, the lack of water due to proper managed of water and wastewater will not result in growth of such species.

If properly managed, this risk is **slight** in intensity, of short term and at the *study area* level. The magnitude is considered **SMALL** as this is not a continuous and persistent impact and with a low probability of occurrence. Given the Low ecological value of the site, this impact is deemed **INSIGNIFICANT**.

#### Mitigation Measures

Mitigation measures will mainly include the following:

- Develop, implement and update a solid waste, hazardous waste and wastewater management plan to include waste collection, storage, transport and disposal in an environmentally sustainable manner to avoid attraction of vermin and the potential consumption of waste from desert species;
- Ensure that food storage areas are inaccessible to animals;
- Ensure proper housekeeping practices; and

- Provide awareness to the workers on the negative impacts of improper solid waste and wastewater disposal.
- Engaging a licensed pest control contractor

#### Residual risks and Impacts

With the proper implementation of mitigation measures, the residual impact will remain **INSIGNIFICANT**.

### **C. Impacts on Socio-Economic Environment**

#### • **Impact on Community Water Resources**

During the construction phase, the site will require approximately 500 m<sup>3</sup>/day of water for various purposes, including drinking water for workers and sanitation at the workers' camp. Water trucks will transport water for construction activities. According to the meeting with the Eng. Hassan Yehia, the Chairman of Menya Water and Wastewater company, the nearby water treatment plants may not be able to meet the project water demand. However, he indicated that the capacity of the water plants to meet the project needs.<sup>39</sup> In this context, to avoid potential impacts on the communities water resources, prior coordination between the project and the water company is to be established to plan the sources of water from the different water plants. In addition, the wastewater treatment plants in Menia and Abou Qurqas have also the capacity to receive the project's wastewater.

The impact is slight, *regional*, and short-term. Impacts of the construction phase on the social environment are thus considered of **SMALL** magnitude, and the sensitivity of the receptors is Medium.

Therefore, the overall significance of the impact is assessed as **Moderate**.

#### Mitigation measures:

- Proper planning and coordination with Menya water and wastewater company for planning project water supply.
- Develop site specific water management and efficiency plan.

#### Residual Impacts

By implementing the above mitigation measures, the residual impacts of the construction activities on the social environment will be **Minor**.

#### • **Worker Influx**

The influx of workers can strain local resources such as water, food, and housing, potentially leading to shortages and increased prices for local communities. Workers' influx may result in raising apartment rents in the communities closest to the project which are relatively limited in size. This, however, does not apply to larger urban centers at commuting distance, such as

<sup>39</sup> The total water design capacities of the water treatment plants in Menya and Abo Qurqas are 313,240 and 106,320 m<sup>3</sup>/day respectively. The Markaz of Menya has a total of 15 water treatment plants. Their capabilities vary from 2000 to over 100,000 m<sup>3</sup>/day of which 5 have capacities of more than 20,000 m<sup>3</sup>/day. On the other hand, Markaz Abo Qurqas has only 2 treatment plants of capacities of 4,320 and 102,000 m<sup>3</sup> /day. The capacity of WWTPs in Menia and Abou Qurqas are 40,000 m<sup>3</sup>/day each

Menya city, especially since the non-local worker influx will not be significant, as these will be small relative to the size of these communities,

Additionally, the increased number of workers can result in higher volumes of waste, including solid waste and sewage, which can impact local sanitation and health. The arrival of a large workforce including speculative job seekers can also disrupt local communities, leading to potential conflicts and increased pressure on local services.

The hiring policy entails maximizing utilization of local employment. Contractors will be encouraged to continuously increase the percentage of local workers, while higher qualifications, potentially not available locally, will be sought from outside the surrounding communities. content.

This approach and arrangements concerning worker influx makes the disruption of social norms highly unlikely and the limited size of non-local workers interacting with the communities would not be in a position to challenge the local context, culture and norms and traditions in Upper Egypt. Accordingly, GBV and SH, should they take place, would be individual occurrences, and not trends created by the project.

During the stakeholders scoping meetings it was indicated that workers accommodation within the closest villages is not a preferred option mainly because housing in the villages are mostly family homes and do not offer renting for strangers from outside the village. In this respect, accommodation would be recommended to take place within Menya of Abo Qurkas urban areas where renting is available and that these centers normally receive out-of-town people for various periods of time.

In addition, the number of non-local workers will be significantly smaller than the population in these urban centers.

At the ESIA stage the specific numbers of work workers to be accommodated within Menya urban centers have not yet been determined. Nevertheless, the EPC Contractors will be required to prepare labour management and accommodation plans to be implemented for the construction phase of the project. The plans will include in depth demonstrations around population sizes, availability of accommodation, service capacity, and expected numbers of non-local workers. In addition, workers a code of conduct will be developed that takes into account the appropriate behaviour of workers at all times, religious customs and practices, traditional cultures and social norms of the region. In addition, it will include specific requirements regarding social issues, including violence, exploitation, sexual abuse and harassment.

In this context, the impact during construction is **MINOR**, and short-term. Impacts are thus considered of **SMALL** magnitude.

Therefore, the overall significance of the impact is assessed as **MINOR**.

#### Mitigation measures

- Prioritize hiring local workers not only to increase benefits to local communities, but also to reduce the number of incoming workers and minimize social disruption.
- Prohibit "hiring at the door" to control speculative job seekers. Job advertisement and applications receipt will be through the governorate labour office.
- Provide adequate on-site accommodation facilities for workers to prevent overburdening local infrastructure.
- Implement comprehensive waste management plans to handle increased waste generation, including recycling and proper disposal methods.
- Ensure that women and youth have opportunities for business such as supplier of construction of materials.

#### Residual impacts

By implementing the above mitigation measures, the residual impacts of the construction activities on the social environment will be **INSIGNIFICANT**.

#### • **Site Security**

For security measures, the project company will assign an annually contracted security company to provide security services for the site premises. The security company will provide security guards on site, exchanging shifts. The presence of guards may have a negative impact on the community, neighbouring operators and on the construction workers if not properly trained, equipped and monitored. Untrained or poorly supervised guards may engage in inappropriate or aggressive behaviour, misuse their authority, or mishandle conflicts, which can lead to tensions, or mistrust among community members and workers. In addition, potential risks that may arise from neighbouring operators such as physical damage trespassing and safety hazards.

#### Mitigation measures

The security personnel will be adequately trained, have appropriate conduct toward workers and community and to act within the applicable law. Furthermore, a grievance mechanism will be developed to allow the potentially affected community to express concerns about the security arrangements and acts of security personnel. Mitigation measures for potential risks from neighbouring activities could include installing [perimeter fencing](#), using CCTV, thermal cameras for poor visibility, and ensuring regular security patrols.

#### Residual impacts

By implementing the above mitigation measures, the residual impacts are deemed to be **INSIGNIFICANT**.

#### **D. Impacts on infrastructure**

##### • **Impacts on land use**

Large scale PV facilities can raise concerns about land uptake. Concerning the proposed project, it will be located in a desert and unoccupied land, which is allocated by NREA for solar energy power generation. No land ownership claims, or other types of land uses existed at the project site. This was confirmed during stakeholders' meetings with local government representatives and nearby land uses and no risks are perceived with regard to potential land ownership.

Accordingly, this impact is deemed **INSIGNIFICANT**.

- **Culture Heritage**

**Tangible Cultural Heritage**

According to the Supreme Council of Antiquities' Archaeological Atlas, the Egyptian Archeological Map (2022) and the UNESCO World Heritage List of Egypt no known or registered archaeological or cultural heritage sites exist within or near the Project Site. As described in section 3 the nearest archaeological sites in West Menya are located approximately 71 km and 67 km from the Project Site.

In addition, the strategic assessment conducted for the NREA concession indicated the absence of any tangible cultural heritage features within the concession area. The data of the strategic assessment was based on interviews with local governments, academics and NGOs. Moreover, the presidential decree allocating the concession area for NREA was issued based on the non-objection granted by all potentially concerned governmental entities including the Egyptian Ministry of Tourism and Antiquities. The non-objection letters is annexed to the project usufruct agreement.

Based on the above, there are no indications that the project site was inhabited or otherwise utilized in historical times. Moreover, a study<sup>40</sup>, using high resolution satellite imagery and multi-spectral band analysis to detect abandoned desert trails, has touched on the project region. It identified a few such trails, the closest of which is at a few kilometers of the project site.

In this respect, the potential risk on tangible cultural heritage sites is **INSIGNIFICANT**.

However, Menya Governorate is archaeologically rich and the site has not been subject to detailed surveys. This might be seen to indicate a high likelihood of so far undiscovered buried sites.

In context, chance find procedures are to be developed to indicate the actions to be taken in case of any unlikely finds during excavations.

Mitigation Measures

- Develop and implement Chance Find Procedure indicating the actions to be taken in case of any significant findings during site leveling and construction activities.

Residual Impacts

By applying the Chance Find Procedure the residual impacts of construction activities on cultural heritage are deemed to be **INSIGNIFICANT**.

**Intangible Cultural heritage**

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<sup>40</sup> ROADS FROM BAHARIYA TO FAIYUM: A STUDY IN REMOTELY SENSED DATA, ROADS FROM BAHARIYA TO FAIYUM: A STUDY IN REMOTELY SENSED DATA Valentina Gasperini and Hannah Pethen, Ägypten und Levante/Egypt and the Levant 28, 2018, 181–197 - Österreichische Akademie der Wissenschaften, Wien

Based on UNESCO's List of Intangible Cultural Heritage (ICH) in Egypt, none of the identified ICH elements are practiced within the Project Site. However, some elements may be practiced within Menya governorate, examples including local artistic and historical traditions such as local handicrafts and folkloric performances and Cultural Festivities, where the governorate hosts major Christian and Islamic festivals that are key to its intangible heritage, particularly around the monasteries of Gabal El-Tayr and the religious sites in Al-Bahnasa areas at about 65 and 75 km from the project site respectively. Within this context, no impacts on such culture heritage are expected for the following reasons:

- A substantial part of the workers will be local hires
- Most of the non-local workers will be accommodated in a workers camp, with no major interaction with the community
- The workers to be housed within large urban centers normally receiving out of town persons for various periods of time and their number will be significantly small relative to the size of these communities.

The whole construction period, during which the demand for labour will be substantial, is limited in time

### **E. Traffic**

The construction of the project will necessitate the transportation of construction machinery, equipment, and project components (e.g., PV modules, trackers, inverters, BESS units, ...)

The intensity of this transportation will vary throughout the construction phase and will peak in certain periods. This is especially true for imported components, which transportation will be related to the arrival of shipments to the import port (expected to be the port of Ain Sokhna).

The PV modules and BESS units represent a major part of imported material. Over two Thousand trucks will transport containers from the port to the site<sup>41</sup>. These will come in multiple shipments and not all at once, but each shipment will have to be transported out of the port promptly.

For imported materials, road access to the project site spans ~275 km from Ain Sokhna Port via Hurghada–Ismailia Road, Ras Ghareb–El Menya Road. Crossing the Nile would be from the Samalout axis or the Malawi axis, north and south of Menya respectively, as the bridges in Menya are not adequate for substantial loads. These axes link smoothly to the Western Desert Road. All these roads are of adequate width and specifications to host this additional traffic.

From the Western Desert Road, the site is accessed through an unpaved road (south of the site) which only current user is El-Reef El-Masry agricultural reclamation project. During the site visit, it was noted the traffic on this road is extremely light. It is, however, expected that traffic would be heavier during specific periods (e.g. in the harvest season of specific crops). In this respect, the construction phase transportation plan should be coordinated with the El-Reef El-Masry. It should be noted that this specific road is not used by the Canal Sugar development, in which sugar beet is the only crop planted in a very large area. Moreover, as

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<sup>41</sup> This is a preliminary estimate with each transporting two twenty feet containers of one 40 feet container



Canal Sugar has its own sugar factory, transportation in the harvest season is mainly on internal roads.

Other construction materials are supplied, eg. cement and steel, are acquired from different places and delivery could be scheduled for short term storage on site.

Some transportation would take place on a daily basis, including the transportation of workers, bulk water and wastewater. In addition, minor transportation of bottled water and food items for the construction camp will take place on a daily basis.

The number of workers commuting daily for Menya is not settled yet but is assumed to be about one fifth to one quarter of the labour force, i.e. +/- 1,100 worker. Many types of vehicles could be used from a passenger car to a 50 person bus. Assuming an average of 30 person per vehicle, this will amount to 36 vehicles of different sizes, but not all will be in the same shift. If on two shifts, each shift will have 15 to 29 vehicle. This volume of traffic can easily be accommodated on the main roads. On the other hand, the item access road will need to be widened, at the entrance of the site to accommodate loading and off-loading vehicles without blocking the road.

Bulk water, for construction and sanitary needs will be trucked daily. A daily need of ~ 500m<sup>3</sup> could be transported in around 20 vehicles. As opposed to the transportation of workers, these could be distributed throughout the day, avoiding the traffic at the beginning and end of work shifts. The volume of wastewater to be transported to Wastewater treatment plants would not exceed 320 m<sup>3</sup> and could follow the same schedule avoiding peak times. The wastewater to be transported would be much less if adequately treated grey water is used on site and along the access road for dust suppression.

The increased demand of transportation anticipated to be *regional* and of short-term during the construction phase, its intensity would be moderate, expect during major transportation campaigns of imported components. Due to the medium sensitivity of the receptor, in this case the roads, the overall significance of the impact is assessed as **MODERATE** but could be **HIGH** for imported components.

#### Mitigation Measures

A Traffic Management Plan (TMP) and associated procedures will be developed and implemented, including those of contractors and subcontractors. This plan will outline specific routes, schedules, and safety protocols for project-related transportation. The requirements will supplement national regulatory specifications, as well as project or business unit specifications and insurance requirements, ensuring a safe and efficient management of traffic impacts during the project.

As the transportation of workers, water and wastewater will be from and to inhabited areas, the transportation schedule will be coordinated with the traffic department to avoid rush hours. The shift schedule on site will be adapted to these constraints.

In addition, the timing of transportation of imported material would be coordinated with El-Reef El-Masry, currently the major user of the road ensuring access to the project site, to avoid periods of expected high traffic.

#### Residual impacts

With implementation of the traffic policy and management procedures, the residual impacts are deemed to be **MINOR**.

### **F. Workplace health and safety**

#### • **Occupational environment**

Safety hazards are potential during construction due to;

- Accidents involving heavy machinery such as excavators, and pile drivers and physical injuries during the ramming activities.
- Electrocution or electrical fires from improper handling of electrical equipment and installations.
- Exposure to hazardous chemicals such as fuels, solvents, and cleaning agents.
- Injuries from lifting, carrying, or moving heavy materials.
- Fires from flammable materials, electrical faults, or hot work activities.
- Heat exhaustion or heat stroke from working in high temperatures.

These aspects are short-term, *localized*, and of **moderate** intensity, and considering the medium sensitivity of the receptors involved. Accordingly, the overall significance of the risks is **MODERATE**.

To effectively manage and mitigate OHS risks during the construction phase, EPC Contractors shall develop, implement, and maintain a comprehensive OHS Management Plan.

The OHS Management Plan shall include a detailed OHS Risk Assessment covering all construction activities, clearly defined mitigation and control measures, incident reporting and investigation procedures, and emergency preparedness and response plans addressing medical emergencies, fire incidents, electrical hazards, and extreme weather conditions. As part of the implementation of the OHS Management Plan:

- The excavation sites will be surrounded with warning signs to prohibit access to these places;
- Contractors will ensure that construction workers will be continuously supervised, through the continuous presence of on-site supervisor(s)
- Ensure proper training for operators, regular maintenance of equipment, and implementation of safety protocols.
- Use of personal protective equipment (PPE), proper storage and labelling of chemicals, and training on handling hazardous materials.
- Provide hearing protection, implement noise control measures, and schedule regular breaks for workers.
- Provide training on proper lifting techniques, and the use of mechanical aids, and encourage team lifting for heavy loads.
- Implement fire prevention measures, maintain fire extinguishers on-site, and conduct fire safety training.
- Provide adequate hydration, schedule work during cooler parts of the day, and allow for

- regular breaks in shaded areas.
- Restrict vehicles speed so that they do not exceed the safety limit inside the site premises (15-20 km/h)
- All equipment will be inspected before the start of the job to ensure the safety of the workers.

#### Residual risks

The above mitigation measures are expected to be efficient in minimizing the potential impacts. Therefore, the residual impacts of the construction activities of the proposed project on the health and safety of workers are deemed to be **MINOR**.

#### **G. Contribution to Climate Change**

Greenhouse gas (GHG) emissions from onsite equipment usage have not been fully investigated. A study<sup>42</sup> estimated the GHG emissions from onsite equipment usage for different activities according to equipment productivity related to site conditions of good, fair, and poor within expected ranges of such emissions. For the major activities that produced most of the GHG emissions from onsite equipment, the value was estimated to be in the range of 256.52 to 376.70 tCO<sub>2</sub>eq, with 282.17 tCO<sub>2</sub>eq for fair site conditions.

In addition, photovoltaic (PV) systems, or solar panels, offer a significantly cleaner energy source compared to traditional fossil fuel plants. While the life cycle assessment (LCA) carbon footprint of PV systems can vary between 14 and 73 grams of CO<sub>2</sub> equivalent per kilowatt-hour of electricity generated, it's still substantially lower than the 742 grams emitted by fuel-based power generation.<sup>43</sup> This low environmental impact can be further reduced by employing innovative materials and manufacturing processes, potentially decreasing the carbon footprint by an additional order of magnitude<sup>44</sup>.

As per the EBRD Environmental and Social Policy (October 2024), projects meeting either of the following criteria will quantify their GHG emissions using the EBRD Protocol for Assessment of Greenhouse Gas Emissions:

- Projects with (or expected to have) gross annual emissions exceeding 20,000 tonnes of CO<sub>2</sub>-equivalent.
- Projects anticipated to cause a net change in emissions (positive or negative) of more than 20,000 tonnes of CO<sub>2</sub>-equivalent annual post-investment.

The projects that have or are expected to have gross emissions exceeding 20,000 tonnes of CO<sub>2</sub>-equivalent annually need to quantify and report these emissions using the EBRD Protocol for Assessment of Greenhouse Gas Emissions.

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<sup>42</sup> Greenhouse Gas Emissions from Onsite Equipment Usage in Road Construction, August 2012 [Journal of Construction Engineering and Management](https://www.researchgate.net/publication/273432700_Greenhouse_Gas_Emissions_from_Onsite_Equipment_Usage_in_Road_Construction) 138(8):982-990, [https://www.researchgate.net/publication/273432700\\_Greenhouse\\_Gas\\_Emissions\\_from\\_Onsite\\_Equipment\\_Usage\\_in\\_Road\\_Construction](https://www.researchgate.net/publication/273432700_Greenhouse_Gas_Emissions_from_Onsite_Equipment_Usage_in_Road_Construction)

<sup>43</sup> Tawalbeh, M., Al-Othman, A., Kafiah, F., Abdelsalam, E., Almomani, F., & Alkasrawi, M. (2021). Environmental impacts of solar photovoltaic systems: A critical review of recent progress and future outlook. *Science of The Total Environment*, 759, 143528. <https://doi.org/10.1016/j.scitotenv.2020.143528>  
<https://www.sciencedirect.com/science/article/abs/pii/S0048969720370595>

<sup>44</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0048969720370595>

The proposed project's emissions during construction phase are relatively short term and expected to be much below this threshold.

Table 6-2 shows the impact assessment matrix for the construction phase.

Table 6-2: The Impact Assessment Matrix for the Construction Phase

Impacts/Risks		Without Mitigation					Level of Residual Impacts after Mitigation	
		Temporal scale	Spatial Scale	Intensity Scale	Magnitude	Sensitivity / Value of Resource / Receptor	Level of Impact before Mitigation	
Construction Phase (00 months)								
Air Quality		Short term	Localized	Moderate	MEDIUM	Low	MINOR	INSIGNIFICANT
Ambient Noise		Short term	Localized	Moderate	MEDIUM	Low	MINOR	INSIGNIFICANT
Soil		Short term	Localized	Moderate	SMALL	Medium	MINOR	INSIGNIFICANT
Biological Environment	Habitat loss, modification, and fragmentation	Permanent	Study area	Moderate	MEDIUM	Low	MINOR	INSIGNIFICANT
	Disturbance to wildlife	Short term	Study area	Moderate	MEDIUM	Medium	MODERATE	MINOR
	Attraction of pests and propagation of invasive species	Short term	Study area	Slight	SMALL	Low	INSIGNIFICANT	INSIGNIFICANT
Social Environment	Impact on community Water resources	Short term	Regional	Slight	MEDIUM	Medium	INSIGNIFICANT	INSIGNIFICANT
	Worker Influx	Short term	District	Slight	SMALL	Medium	MINOR	INSIGNIFICANT
	Site Security	Short term	Localized	Slight	SMALL	Medium	MINOR	INSIGNIFICANT
	Land use	Short term	Localized	Moderate	SMALL	Low	INSIGNIFICANT	INSIGNIFICANT
	Cultural heritage	Short term	Localized	Moderate	SMALL	Low	INSIGNIFICANT	INSIGNIFICANT
Infrastructure	Traffic	Short term	Regional	Moderate	MEDIUM	Medium	MODERATE	MINOR
Occupational Health and Safety		Short term	Localized	Moderate	MEDIUM	Medium	MODERATE	MINOR

## 6.2.2 Potential Impacts during Operation Phase

### A. Potential Impact on the Physical Environment

- **Potential Impacts on Ambient Air Quality**

Potential impacts on local air quality from the Project include emissions from the use of backup generators during power outages or maintenance activities, and potential emissions of SF6, if utilized for insulation of the switchgear. SF6, a GHG, is the most used insulation material in medium and high voltage systems.

In this respect, SF6 containing equipment is designed to avoid emitting any of this gas into the atmosphere mainly during maintenance and servicing, and de-commissioning. However, although small amounts of SF6 may escape to the atmosphere these could be controlled through cost-effective operational improvements and equipment upgrades. No GHG will result in case of using air insulation systems.

These impacts are short term, and *localized*, with a small air quality impact, the magnitude of the impact is considered SMALL. As the proposed project will be carried out within the western desert, the sensitivity of the receptors is **Low**.

Based on the above, the overall SIGNIFICANCE of the impact is considered **MINOR**.

#### Mitigation Measures

The company will ensure the following

- Optimize the operation of backup generators to reduce usage and emissions.
- Carry out maintenance and annual stack emission measurements for the emergency generators
- If SF6 is used as insulator instead of air insulation, the mitigation measures will include leak detection and repair, use proper chambers vacuums during filling the SF6 into the GIS, and employee education/training.

#### Residual Impacts

The above mitigation measures are expected to efficiently minimize the potential impacts. Therefore, the residual impacts of the operation activities of the proposed project on the health and safety of workers are deemed to be **INSIGNIFICANT**

- **Potential Impacts on ambient Noise & Vibration**

Potential impacts on ambient noise from the Project include the following;

- Operation of Transformers and other operational components of battery energy storage systems.
- Use of backup generators during power outages.

Table 6-3 below shows the expected noise levels from different Instrumentation in the workplace



Table 6-3: Expected noise levels from different Instrumentation in the workplace

Noise source	Noise level (dB(A))	Location
Invertors	75dB	Inside the inverter room
Transformer	64dB	Outside transformer room

*\*At 10m from the source*

These impacts are localized and slight. The magnitude of the impact is considered SMALL. Since the proposed project will be conducted on vacant land in the Western Desert, the sensitivity of the receptors is medium-low.

Based on this assessment, the overall significance of the impact is considered **MINOR**

#### Mitigation Measures

- Potential noise-generating machines and equipment are designed to meet statutory regulations concerning noise.
- Workers at noise generating machinery and equipment will be provided with suitable personal protective equipment (PPEs).

#### Residual Impacts

Residual noise during operational activities is unlikely to have an impact on the public. Furthermore, the impact of noise on the workplace will be **INSIGNIFICANT** when implementing the above mitigations measures and health and safety procedures.

#### • ***Glint and Glare***

Solar photovoltaic (PV) modules are specifically designed to maximize light absorption and convert sunlight into electricity, making reflection fundamentally contrary to their intended function. Modern PV panels typically reflect no more than 2% of incoming sunlight, owing to their dark-coloured, anti-reflective glass surfaces. Although the panel glass is smooth and can, under rare conditions, produce a brief mirror-like reflection similar to that of calm water, such occurrences are highly limited and short-lived, especially in systems equipped with solar tracking mechanisms that continuously adjust panel orientation throughout the day to optimize solar exposure.

The two potential receptors on the ground are the users of the access road (Ain road) and the agricultural areas, both south of the project site. Based on the site visit, it was noted that the road is sparsely used, but traffic could increase in the future.

There are no permanent workers or buildings within the agricultural areas, yet the road users might be exposed to potential light reflection from the PV panels.

In this respect, the EPC will be required to perform a glare risk assessment to identify the potential glare risks on the road users south the project site.

### **B. Potential Risks and Impact on Biodiversity**

#### • ***Disturbance to wildlife (excluding avifauna)***

There will be no air emissions, noise and vibrations arising from machinery during operation, while the human presence will be limited to about 100 workers. Moreover, during this phase,

the potential occurrence of fauna onsite will be further reduced due to its modified and fragmented status. On the other hand, the presence of waste left by onsite personnel might attract opportunistic species. PBFs presence onsite is not expected.

These risks are **slight** in intensity, of long term and at the *study area* level. Their magnitude is considered MEDIUM. Given the Low vulnerability of the receptors, these risks are deemed **MINOR**.

#### Mitigation Measures

Mitigation measures will mainly include the following:

- Develop, implement and update a solid waste, hazardous waste and wastewater management plan to include waste collection, storage, transport and disposal in an environmentally sustainable manner to avoid the growth of marginal vegetation, attraction of vermin and opportunistic species and the potential consumption of waste from desert species;
- Provide awareness to the workers on the negative impacts of disturbing any wild fauna;
- Ensure proper housekeeping practice;
- Ensure that food storage areas are inaccessible to animals;
- Avoid high intensity light that may disturb offsite fauna;
- Ensure speed control and the prohibition of off-track driving;
- Ensure the proper maintenance of equipment and any other equipment with high noise and vibration potential;
- Ensure that the generators are properly insulated to avoid noise emissions; and
- Ensure that workers do not disturb native fauna potentially encountered.

#### Residual Impacts

With the proper implementation of the mitigation and management measures the impacts on biodiversity are deemed to be **INSIGNIFICANT**.

#### • ***Risks and Impacts on Avifauna***

Although the wider area has witnessed some changes, the Project Site and its Area of Influence (Aoi) is still an undeveloped desert habitat, similar to how it was at the time of the Ecode Strategic Assessment survey. The Project Site is totally devoid of vegetation with no suitable habitats for migratory birds to land or rest.

In addition, a regional assessment using MSBT indicated that the West Menya Region sensitivity is classified as “potential, score: 0.000”, indicating that the region has the least sensitivity to soaring migratory birds. The same assessment using MSBT was carried out at the Project Site level (in or around the Project Site within a 5 km diameter buffer). The results were the same as those of the regional assessment and indicated that 13 migratory bird species may occur in or around the Project Site within a 5 km diameter buffer (i.e. almost the same results of the Ecode survey).

Moreover, an assessment using AVISTEP was also carried out, and the results indicate that the project falls in a green (low risk) zone.

### **Lake effect**

The smooth and uniform appearance of PV solar plants similar to a sheet of water, as they reflect light like a lake or a pond, are said to attract birds. This might be particularly relevant in a desert environment where the "lake effect" would be most intense. While there is no strong evidence of solar PV facilities having a "lake effect" impact on birds, this potential impact is herein considered, using the precautionary approach.

The potential lake effect for PV panels with tracking system is very low as this will happen only during a short portion of the day. Yet, there has been no sufficient evidence that PV is reflective surface to be mistaken by lake surfaces to attract birds<sup>45</sup>. Moreover, PV cells will have a double-sided anti-reflection film and aluminum frame for higher visibility to birds.

### **Collision risk**

#### ***PV panels***

According to a regional assessment using the Migratory Soaring Birds Tool (MSBT), the West Menya Region sensitivity is classified as "potential, score: 0.000", indicating that the region has the least sensitivity to soaring migratory birds. Typically, for a single-axis horizontal tracking system the height can range up to approximately 2.8 meters above ground level; and O&M building structures shall not exceed 5 meters in height.

Moreover, it is not expected to have birds roosting and perching on the photovoltaic panels. In addition, there is no relationship between the airspace utilized by avifauna and the terrestrial area of the site, which lacks features potentially attracting avifauna to rest or forage. Accordingly, avifauna will avoid flying over or landing in the area due to its harsh conditions, except under rare and specific circumstances.

#### ***Mitigation measures***

Measures to reduce the risk of collision include:

- Periodic carcass recording would take place to assess the effectiveness of the proposed mitigation measures.
- Implement good housekeeping and waste/wastewater management to avoid the presence of water and the growth of marginal vegetation that would make the site "attractive" to birds.

#### ***Residual impacts***

With the implementation of the mitigation measures, the residual impacts will be **MINOR**.

### **Electrocution risk**

The project substation located within the project footprint and thus might pose an electrocution risk for avifauna where the transmission line grid connects to the substation. Even if the risk is not high, the consequence of a single fatality is high, particularly on threatened birds (such as the Egyptian Vulture).

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<sup>45</sup> Guidelines to minimize the impact on birds of Solar Facilities and Associated Infrastructure in South Africa. Smit, Hanneline A., BirdLife South Africa, 2012

The risks and impacts of long term and at the *study area* level and precautionarily considered **moderate** in intensity despite their low probability of occurrence. Their magnitude is considered MEDIUM. Given the potential occurrence of some threatened species, receptors are considered of **High** value, yet given their small number the exposure to risk is low.. Accordingly, potential impacts on avifauna are deemed of **MODERATE** significance.

#### Mitigation Measures

To reduce the risks of electrocution, anti-perching devices will be implemented, as follows:

- Using insulators that prevent birds from landing on them and forcing birds to perch on crossarms only.
- Cover the crossarms of pylons with insulating materials such as PVC strips to ensure that birds are not earthed when perched; feasibility of this method will depend on pylon design.

#### Residual Impacts

With the proper implementation of the mitigation measures, impacts on avifauna are expected to be **MINOR to INSIGNIFICANT**.

### **C. Impacts on Socio-Economic Environment**

#### • **Water Resources**

During the operation phase, water will mainly be required for sanitary purposes, since dry-cleaning method will be used for regular cleaning of PV modules. In addition, there will be only 100 workers present during the operation; the daily water demand and wastewater generation will be limited.

Accordingly, the impact of water consumption is localized, and long-term. The severity is slight and the Impacts of the operation phase on the social environment are thus considered of **SMALL** magnitude, and the sensitivity of the receptors is Medium.

Therefore, the overall significance of the impact is assessed as **INSIGNIFICANT**.

#### Mitigation measures:

Given the limited water consumption and wastewater generation, the wastewater produced during the operation phase will be collected by a contractor licensed by a competent authority and discharged to designated/approved treatment plants. No mitigation measures have been suggested for water consumption.

#### • **Waste generation**

##### **Non-Hazardous Solid Waste**

- Collect waste at designated collection points and store it in appropriate containers following regulations.
- Use licensed contractors for the collection and disposal of non-hazardous waste.

#### • **Hazardous Waste**

- Establish marked and physically separated storage areas for hazardous waste.
- Use licensed contractors for the collection and disposal of hazardous waste.
- Waste lithium batteries at their end of life (and damaged PV modules) will be returned to the suppliers or sent to competent and authorized facilities conducting sustainable

recycling strategies. The most sustainable option is selected upon approach of batteries' end of life, i.e. in 19 years, when li-ion recycling technologies are matured, developed, and economically viable.

- **Site Security**

For security measures, the project will assign an annually contracted security company to provide security services for the site premises. The security company will provide security guards on site, exchanging shifts. The presence of guards may have a negative impact on the community if not properly trained, equipped and monitored.

#### Mitigation measures

The security personnel will be adequately trained, have appropriate conduct toward workers and community and to act within the applicable law. Furthermore, a grievance mechanism will be developed to allow the potentially affected community to express concerns about the security arrangements and acts of security personnel.

#### Residual impacts

By implementing the above mitigation measures, the residual impacts will be **INSIGNIFICANT**

### **D. Occupational Health and Safety**

Impacts on workplace during operation are relevant when considering replacement of modules, converters, transformers etc. However, the probability of replacement of these units is considered as minor due to their expected lifetime.

These aspects are considered long-term (throughout the project's operation) the severity is **slight**. Thus, the magnitude of impacts is deemed SMALL. Therefore, the significance of impacts on occupational health and safety (sensitivity of the receptor is Low) is deemed **INSIGNIFICANT**.

#### Mitigation measures

comprehensive OHS Management Plan, which include a formal OHS Risk Assessment covering all operational activities, defined mitigation and control measures for identified risks, incident reporting and investigation procedures, and emergency preparedness and response plans.

In addition, the following measures shall be implemented:

- A health and safety policy will be applied;
- Abide by all national occupational health and safety regulations; Labour Law 14/2025 and
- Provision of suitable PPE.

#### Residual impacts

By implementing the above mitigation measures, the residual impacts on the workers during the operation phase are expected to be **INSIGNIFICANT**.

Table 6-4 shows the impact assessment matrix for the operation phase

Table 6-5: The Impact Assessment Matrix for the Operation Phase

Impacts/Risks		Without Mitigation					Level of Residual Impacts after Mitigation	
		Temporal scale	Spatial Scale	Severity	Magnitude	Sensitivity / Value of Resource / Receptor		Level of Impact Before Mitigation
Operation Phase								
Air Quality		<u>Long-term</u>	localized	Slight	MEDIUM	Low	MINOR	INSIGNIFICAT
Ambient Noise and Vibration		<u>Long-term</u>	localized	Slight	SMALL	Medium-Low	MINOR-INSIGNIFICANT	INSIGNIFICAT
Biological Environment	Disturbance to wildlife (excluding avifauna)	<u>Long-term</u>	Study area	Slight	MEDIUM	Low	MINOR	INSIGNIFICAT
	Risks & Impacts on Avifauna	<u>Long-term</u>	Study area	Slight	MEDIUM	Medium	MODERATE	MINOR
	Electrocution Risks	<u>Long-term</u>	Study area	Moderate	MEDIUM	High	MODERATE	MINOR- INSIGNIFICANT
Social Environment	Water resource	<u>Long-term</u>	localized	Slight	SMALL	Medium	MINOR	NO RESIDUAL IMPACT
	Waste generation	<u>Long-term</u>	localized	Slight	SMALL	Low	INSIGNIFICAT	INSIGNIFICAT
	Site Security	<u>Long-term</u>	localized	Slight	SMALL	Low	INSIGNIFICAT	INSIGNIFICAT
Occupational Health and Safety		<u>Long-term</u>	localized	Slight	SMALL	Low	INSIGNIFICAT	INSIGNIFICAT

### 6.3 Impacts of Associated facilities

The construction, operation, and maintenance of OHTL fall under the exclusive responsibility of the Egyptian Electricity Transmission Company (EETC). Therefore, a separate ESIA for the OHTL is required to be prepared by EETC and submitted to the Egyptian Environmental Affairs Agency (EEAA) for review and approval. The final route alignment and tower distribution will be confirmed during the detailed design phase. Typically, towers are spaced between 400 and 600 meters apart, depending on terrain and technical constraints.

**Annex 1** provides a high-level assessment of the potential E&S impacts and risks related to the OHTL. The construction, operation, and maintenance of OHTL fall under the exclusive responsibility of the Egyptian Electricity Transmission Company (EETC). In this respect, a separate ESIA for the OHTL is to be prepared by EETC and submitted to the the Egyptian Environmental Affairs Agency (EEAA) for approval.

### 6.4 Impact of the Environment on the project

- **Potential Impact of Dust Storms**

The Western Desert is naturally exposed to frequent dust and sandstorm events, particularly during spring (Khamasin) and autumn (Shamal winds). Additionally, sand rising events in this region typically occur under sustained wind speeds exceeding 25–30 km/h, which are frequent during March to May and October to November and may be associated with Khamasin winds – a regional meteorological phenomenon characterized by strong, dry, and dusty winds originating from the south or southwest. These events may lead to:

- Reduced visibility and hazardous working conditions;
- Increased dust and particulate matter concentrations during high-intensity events;
- Surface erosion and the formation of mobile sand sheets and small dunes;
- Mechanical wear and abrasion of equipment and exposed infrastructure;
- Dust deposition on solar panels which in turn can lower PV efficiency and increase cleaning frequency.

These aspects are long-term, and regional, with a moderate intensity, thus the magnitude of the aspect is medium. Sensitivity of the receptors the project and workers of the aspect is considered MEDIUM

Based on the above, the overall significance of the impact is considered **MODERATE**.

#### Mitigation measures

Periodic module cleaning and maintenance will minimize the impact of deposited dust.

#### Residual impact

By implementing the above mitigation measures, the residual impacts on the project are deemed to be **MINOR**.

- **Contextual Risks: Impact of Climate Change**

The project's location in Menya Governorate, characterized by extreme temperatures, variable rainfall, necessitates careful consideration of climate change impacts.



**Potential Impact of Extreme Heat**

Climate change projections, as indicated in Egypt's Second National Communication to the UNFCCC, indicate a potential increase in the frequency and intensity of extreme heat events. This could pose challenges to both the construction and operation phases of the project. During the construction phase, Extreme heat can lead to the following.

- Heat stress for workers, reducing productivity and increasing the risk of heat-related illnesses.
- Adverse effects on the operation of machinery.
- During the Operation Phase, high temperatures can reduce the efficiency of solar panels and the battery energy storage system. As a result of these reduced efficiencies, there may be an increased need for cooling systems to maintain optimal operating conditions for both the solar panels and the battery energy storage system. This increased cooling requirement means higher energy consumption to power the cooling systems and can result in increased maintenance and potential wear and tear on equipment.

**Mitigation Measures****A. Construction Phase:**

- Implement heat stress management plans, including providing shaded rest areas, frequent water breaks, and adjusting work schedules to avoid peak heat hours.
- Provide training to workers on recognizing and preventing heat-related illnesses.
- Utilize appropriate construction materials and techniques that are resistant to high temperatures.

**B. Operation Phase**

- Employ cooling technologies for BESS to maintain optimal operating temperatures.
- Utilize advanced monitoring systems to track temperature and performance data, enabling proactive maintenance and adjustments.
- Develop contingency plans for extreme heat events, including potential temporary shutdowns or reduced operations.

**Residual Impacts**

With the implementation of these mitigation measures, the residual impacts of extreme heat are expected to be minimal. However, ongoing monitoring and adaptive management will be essential to ensure the project's resilience to the changing climate.

## **6.5 Cumulative Impacts**

The EBRD ESR 1 emphasizes identifying and characterizing, to the extent appropriate, cumulative risks and impacts of the project in combination with risks and impacts from other relevant past, present and reasonably foreseeable developments as well as unplanned but predictable activities enabled by the project that may occur later on.

According to the IFC "Good Practice Handbook Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets", examples of cumulative impacts may include:

- Incremental contribution of gaseous emissions to an airshed;
- Reduction of water flows in a watershed due to multiple withdrawals; increases in sediment loads to a watershed;
- Interference with migratory routes or wildlife movement; or
- More traffic congestion and accidents due to increases in vehicular traffic on community roadways; and
- Influx of workers.

In this context, it is important to point out that PV projects generally do not pose environmental adverse impacts during operation activities, and the potential impacts during construction are localized and short term and their residual impacts are insignificant. Potential cumulative impacts as result of interaction with existing and foreseeable future construction activities within the project area would largely depend on the time frame within which the different neighbouring projects are expected to be constructed.

Potential cumulative impacts may include:

The proposed project is the first project to be constructed within NREA concession in West Menya and its construction activities are unlikely to overlap with other future PV projects in the area. In addition, no current development plans exist.

## 7. Environmental and Social Management Plan

### 7.1 Summary of Risks and Impacts, and Mitigation Measures

This ESMP has been developed in accordance with national laws and international standards for the proposed PV Plant and BESS project.

The project's ESMP consists of a set of mitigation and monitoring measures that will be considered during the construction, operation phases and decommissioning to ensure the sound environmental and social performance of the project. The plan also includes the actions needed to be taken to implement these measures.

Decommissioning considerations are integrated into the overall environmental and social management framework, ensuring that potential impacts are minimized throughout the project lifecycle, from initial construction to final site restoration.

The purpose of the project's ESMP is to:

- Ensure continuing compliance with the relevant legislation and laws;
- Outline the ways in which the potential impacts identified in this ESIA report will be managed;
- Provide assurance to regulators and other stakeholders that the local requirements with respect to environmental and social performance are being met;
- Ensure that appropriate monitoring is undertaken, including the establishment of a monitoring plan; and
- Provide a framework for the compliance auditing programs that ensures the efficient environmental and social performance of the Project.

In general, the project's ESMP consists of the following components:

- **Summary of Impacts and Mitigation Measures** as identified in Chapter (6) of the ESIA.
- **Environmental and Social Management Plans** to ensure environmental protection and maintain efficient environmental and social performance and compliance with the relevant legislations, laws and international E&S standards.
- **Environmental Monitoring Plan** during project implementation to provide information of the key environmental aspects of the project.
- **Emergency Response Plan** is prepared as a guiding document by which project supervisors and staff identify hazards and act appropriately in response to emergency events.

Table 7-1 below summarizes the social and environmental aspects, mitigation measures, and residual impacts as assessed for the different project phases.

Table 7-1: Summary of the social and Environmental Aspects, Mitigation Measures, and Residual risks and Impacts

Environmental and social Aspects	Expected Impacts	Mitigation Measures Summary	Residual Impacts
<b>Construction Phase</b>			
<b>Air Quality</b>			
<ul style="list-style-type: none"> <li>Air emissions</li> </ul>	MINOR	<ul style="list-style-type: none"> <li>Implementing policies to reduce idling times for vehicles and machinery;</li> <li>Maintaining machinery and vehicles in good working conditions to minimize fugitive emissions and exhaust;</li> <li>Speed restriction on site to minimize dust emissions;</li> <li>Ensuring workers with awareness of safe driving and maintain good practices in machinery usage; and,</li> <li>Conducting periodic measurements for stacks of generators to ensure their compliance with Law 4/1994</li> </ul>	INSIGNIFICANT
<b>Ambient Noise</b>			
<ul style="list-style-type: none"> <li>Equipment and machinery</li> <li>Vehicle Movement</li> <li>Power Generators</li> </ul>	MINOR	<ul style="list-style-type: none"> <li>Ensuring regular maintenance of construction equipment and machinery to minimize noise emissions;</li> <li>Use low-noise machinery and equipment, where possible;</li> <li>Schedule high-noise activities to avoid simultaneous operations that could amplify noise levels;</li> <li>Provide hearing protection equipment to workers exposed to high noise levels.</li> </ul>	INSIGNIFICANT
<b>Impacts on Soil</b>			
<ul style="list-style-type: none"> <li>Domestic wastewater tanks, material and waste storage, and accidental spills and leakages</li> </ul>	MINOR	<ul style="list-style-type: none"> <li>Conduct maintenance of vehicles, trucks, and construction equipment off-site to reduce on-site emissions and spills;</li> <li>Collect and dispose of spillages from tank filling or generator operation as hazardous waste;</li> <li>Develop and implement spill management plan.</li> <li>Maintain good housekeeping practices to ensure a clean and organized construction site:</li> <li>Collect and transport wastewater by authorized contractors to ensure proper disposal and prevent contamination; and</li> <li>Maintain good housekeeping practices to ensure a clean and organized construction site.</li> </ul>	INSIGNIFICANT

Environmental and social Aspects	Expected Impacts	Mitigation Measures Summary	Residual Impacts
		<ul style="list-style-type: none"> <li>• Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids</li> <li>• Collect and transport wastewater by authorized contractors to ensure proper disposal and prevent contamination.</li> <li>• <b>Non-Hazardous Solid Waste:</b> <ul style="list-style-type: none"> <li>○ Collect waste at designated collection points and store it in appropriate containers following regulations; and</li> <li>○ Use licensed contractors for collection and disposal of non-hazardous waste.</li> </ul> </li> <li>• <b>Hazardous Waste:</b> <ul style="list-style-type: none"> <li>○ Establish marked and physically separated bunded storage areas for hazardous waste; and</li> <li>○ Use licensed contractors for the collection and disposal of hazardous waste.</li> </ul> </li> </ul>	
<b>Impacts on the Biological Environment</b>			
<ul style="list-style-type: none"> <li>• Habitat loss, modification, and fragmentation</li> </ul>	MINOR	<ul style="list-style-type: none"> <li>• Ensure proper housekeeping onsite and offsite;</li> <li>• Ensure proper speed limits onsite and offsite; and</li> <li>• Provide awareness to the workers.</li> <li>• A visible fence to fauna and avifauna , and</li> <li>• The lowest wires should provide some distance at different intervals to allow wildlife species to crawl under them without injury.</li> </ul>	MINOR TO INSIGNIFICANT
<ul style="list-style-type: none"> <li>• Disturbance to wildlife</li> </ul>	MINOR	<ul style="list-style-type: none"> <li>• implement and update waste and wastewater management plans;</li> <li>• Provide awareness to the workers;</li> <li>• Ensure proper housekeeping practice;</li> <li>• Ensure speed control and the prohibition of off-track driving; and</li> <li>• Ensure the proper maintenance of construction equipment.</li> </ul>	INSIGNIFICANT
<ul style="list-style-type: none"> <li>• Attraction of pests and propagation of invasive species</li> </ul>	INSIGNIFICANT	<ul style="list-style-type: none"> <li>• Develop, implement and update a solid waste, hazardous waste and wastewater management plan to include waste collection, storage, transport and disposal in an environmentally sustainable manner to avoid attraction of vermin and the potential consumption of waste from desert species;</li> <li>• Ensure that food storage areas are inaccessible to animals;</li> <li>• Ensure proper housekeeping practices; and</li> <li>• Provide awareness to the workers on the negative impacts of improper solid waste and wastewater disposal.</li> <li>• Engaging a licensed pest control contractor</li> </ul>	INSIGNIFICANT

Environmental and social Aspects	Expected Impacts	Mitigation Measures Summary	Residual Impacts
<b>Impacts on the Social Environment</b>			
• Water Resources	MODERATE	<ul style="list-style-type: none"> <li>Coordination with the water and wastewater company</li> <li>Develop site specific water efficiency and management plan</li> </ul>	MINOR
• Worker Influx	MINOR	<ul style="list-style-type: none"> <li>Prioritize hiring local workers to reduce the number of incoming workers and minimize social disruption;</li> <li>Prohibit "hiring at the door" to control speculative job seekers. Job advertisement and applications receipt will be through the governorate labour office.</li> <li>Provide adequate on-site accommodation facilities for workers to prevent overburdening local infrastructure.</li> <li>Implement comprehensive waste management plans to handle increased waste generation, including recycling and proper disposal methods.</li> <li>Ensure that women and youth have opportunities for business such as supplier of construction of materials.</li> </ul>	INSIGNIFICANT
• Site Security	MINOR	<ul style="list-style-type: none"> <li>The security personnel will be adequately trained, have appropriate conduct toward workers and the community, and to act within the applicable law. Furthermore, a grievance mechanism will be developed to allow the potentially affected community to express concerns about the security arrangements and acts of security personnel</li> </ul>	INSIGNIFICANT
<b>Infrastructure</b>			
• Land use	INSIGNIFICANT	<ul style="list-style-type: none"> <li>No land ownership claims or other types of land uses exist at the project site. This was confirmed during stakeholders' meetings with local government representatives and nearby land uses and no risks are perceived in this regard</li> </ul>	INSIGNIFICANT
• Impact on Cultural Heritage	INSIGNIFICANT	<ul style="list-style-type: none"> <li>Develop and implement the Chance Find Procedure, indicating the actions to be taken in case of any significant findings during site leveling and construction activities</li> </ul>	INSIGNIFICANT
• Traffic	MODERATE	<ul style="list-style-type: none"> <li>Traffic Management Plan (TMP) and associated procedures will be developed and implemented, including those of contractors and subcontractors. This plan will outline specific routes, schedules, and safety protocols for project-related transportation. The requirements will supplement national regulatory specifications, as well as project or business unit specifications and insurance requirements, ensuring a safe and efficient management of traffic impacts during the project</li> </ul>	MINOR

Environmental and social Aspects	Expected Impacts	Mitigation Measures Summary	Residual Impacts
<b>Occupational Health and Safety</b>			
<ul style="list-style-type: none"> <li>Impacts on workforce health and safety</li> </ul>	MODERATE	<ul style="list-style-type: none"> <li>The excavation sites will be surrounded with warning signs to prohibit access to these places;</li> <li>Contractors will ensure that construction workers will be continuously supervised through the continuous presence of on-site supervisor(s) for close inspection and management of the construction activities;</li> <li>Ensure proper training for operators, regular maintenance of equipment, and implementation of safety protocols.</li> <li>Use of personal protective equipment (PPE), proper storage and labelling of chemicals, and training on handling hazardous materials.</li> <li>Provide hearing protection, implement noise control measures, and schedule regular breaks for workers.</li> <li>Provide training on proper lifting techniques, and the use of mechanical aids.</li> <li>Implement fire prevention measures, maintain fire extinguishers on-site, and conduct fire safety training.</li> <li>Provide adequate hydration, schedule work during cooler parts of the day, and allow for regular breaks in shaded areas.</li> <li>Restrict vehicles speed so that they do not exceed the safety limit inside the site premises (15-20 km/h)</li> <li>All equipment will be inspected before the start of the job to ensure the safety of the workers;</li> </ul>	MINOR
<b>Operation Phase</b>			
<b>Air Quality</b>			
<ul style="list-style-type: none"> <li>Emissions from emergency generator</li> <li>potential emissions of SF6, if utilized for insulation of the switchgear</li> </ul>	MINOR	<ul style="list-style-type: none"> <li>Optimize the operation of backup generators to reduce usage and emissions.</li> <li>Conduct annual stack emission measurements for the emergency generators</li> <li>If SF6 is used as insulator instead of air insulation, the mitigation measures will include leak detection and repair, use proper chambers vacuums during filling the SF6 into the GIS, and employee education/training.</li> </ul>	INSIGNIFICANT



Environmental and social Aspects	Expected Impacts	Mitigation Measures Summary	Residual Impacts
<b>Ambient Noise &amp; Vibration</b>			
<ul style="list-style-type: none"> <li>Operation of Transformers, and other operational components of battery energy storage systems.</li> <li>Use of backup generators during power outages</li> </ul>	MINOR	<ul style="list-style-type: none"> <li>Potential noise generating machines and equipment are designed to meet statutory regulations concerning noise.</li> <li>Workers at noise generating machinery and equipment will be provided with suitable personal protective equipment (PPEs).</li> </ul>	INSIGNIFICANT
<b>Impact on the Biological Environment</b>			
<ul style="list-style-type: none"> <li>Disturbance to wildlife (excluding avifauna)</li> </ul>	MINOR	<ul style="list-style-type: none"> <li>Develop, implement and update a solid waste, hazardous waste and wastewater management plan ;</li> <li>Provide awareness to the workers on the negative impacts of disturbing any wild fauna;</li> <li>Ensure proper housekeeping practice;</li> <li>Ensure that food storage areas are inaccessible to animals;</li> <li>Avoid high intensity light that may disturb offsite fauna;</li> <li>Ensure speed control and the prohibition of off-track driving;</li> <li>Ensure the proper maintenance of equipment and any other equipment with high noise and vibration potential;</li> <li>Ensure that the generators are properly insulated to avoid noise emissions; and</li> <li>Ensure that workers do not disturb native fauna potentially encountered.</li> </ul>	INSIGNIFICANT
<ul style="list-style-type: none"> <li>Risks and Impacts on Avifauna</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Periodic carcass recording would take place to assess the effectiveness of the proposed mitigation measures.</li> <li>Implement good housekeeping and waste/wastewater management to avoid the presence of water and the growth of marginal vegetation that would make the site "attractive" to birds.</li> </ul>	MINOR
<ul style="list-style-type: none"> <li>Electrocution</li> </ul>	MODERATE	<ul style="list-style-type: none"> <li>Using insulators that prevent birds from landing on them and forcing birds to perch on crossarms only.</li> <li>Cover the crossarms of pylons with insulating materials such as PVC strips to ensure that birds are not earthed when perched; feasibility of this method will depend on pylon design.</li> </ul>	<ul style="list-style-type: none"> <li>MINOR to INSIGNIFICANT</li> </ul>

Environmental and social Aspects	Expected Impacts	Mitigation Measures Summary	Residual Impacts
<b>Impact on the Social Environment</b>			
<ul style="list-style-type: none"> <li>Water Resources</li> </ul>	MINOR	<ul style="list-style-type: none"> <li>Given the limited water consumption and wastewater generation, the wastewater produced during the operation phase will be collected by a contractor licensed by a competent authority and discharged to designated/approved treatment plants. No mitigation measures have been suggested for water consumption</li> </ul>	INSIGNIFICANT
<ul style="list-style-type: none"> <li>Waste generation</li> </ul>	MINOR	<ul style="list-style-type: none"> <li>Establish marked and physically separated storage areas for hazardous and non-hazardous waste.</li> <li>Use licensed contractors for the collection and disposal.</li> <li>Waste lithium batteries at their end of life (and damaged PV modules) will be returned to the suppliers or sent to competent and authorized facilities conducting sustainable recycling strategies.</li> </ul>	INSIGNIFICANT
<ul style="list-style-type: none"> <li>Presence and conduct of contracted security personnel and their interaction with workers and the surrounding community.</li> </ul>	INSIGNIFICANT	<ul style="list-style-type: none"> <li>The security personnel will be adequately trained, have appropriate conduct toward workers and community and to act within the applicable law. Furthermore, a grievance mechanism will be developed to allow the potentially affected community to express concerns about the security arrangements and acts of security personnel.</li> </ul>	INSIGNIFICANT
<b>Impacts on Occupational Health and Safety</b>			
<ul style="list-style-type: none"> <li>Impacts on the workplace</li> </ul>	INSIGNIFICANT	<ul style="list-style-type: none"> <li>A health and safety policy will be applied</li> <li>Abide by all national occupational health and safety regulations, Law 14/2025</li> <li>Provision of suitable PPE</li> </ul>	INSIGNIFICANT

## 7.2 Environmental and Social Organisational Arrangements

### 7.2.1 Establishment of HSSE Department

The guidelines require appointing roles and responsibilities of the Health, Safety, Security, and Environment (HSSE) department. In this context, the company will assign at least five HSSE dedicated personnel for HSE issues.

The social aspects, including workers influx, water resources and wastewater management, and waste management, will be under the responsibility of the contractor (supervised by the Nefer company) during the construction phase and operation phase.

The Nefer company will establish an organisational capacity and competency to manage E&S impacts and risks through its Environmental and Social Management System (ESMS), which will be aligned with international standards and EBRD/IFC requirements.

Project-specific construction E&S management plans will be developed and implemented. The EPC contractor and subcontractors will be contractually required to prepare and implement detailed E&S plans consistent with Nefer company requirements. Compliance will be monitored through regular reporting, inspections, audits, and corrective action processes.

### 7.2.2 Staff Responsibilities

The HSSE personnel will be responsible for daily safety work (walks-over) at the site, for inspecting safety, housekeeping, personal protection, controlling unsafe practices/conditions, updating the environmental register, and assessing the environmental performance of the facility. When construction and operation work pose a high risk that threatens the workers' safety and health, the HS officer has the right to end the activity in order to prevent a potential hazard. The HSEE and the Labor Compliance Officer (LCO) will also be responsible for follow-up on compliance with labour issues as part of their role regarding contractors' monitoring and management.

- **Site Manager/HSSE personnel**
  - Responsible for the implementation of the HSE management system and to provide necessary resources for implementation of the system;
  - Responsible for the implementation of correction plans.
  - Reports on HSSE matters to company management and is part of the annual management review process
  - Inclusion of HSSE / E&S requirements in contractor contracts
- **HSSE Team**
  - Implementation of the HSE management system.
  - Ensures that contractors and subcontractors adhere to the HSE management system
  - Provides training, help, and support for workers and ensures that contractors and subcontractors provide similar training to their workers;
  - Provides the necessary support and determines any deficiency and disparity in the HSE procedures;
  - Attends weekly and/or monthly HSE meetings;
  - Updates and manages correction plans.

- Audits the implementation of the contractor's HSE plan;
  - Analyses reports and corrects potential HSE issues;
  - Organizes and completes all relevant HSE introductory training and awareness for workers;
  - Reports any accident/incident on site and investigates the reason of accident/incident;
  - Records and updates HS statistics, and submits monthly reports;
  - Prevents and corrects potential safety risk behaviour;
  - Update the environmental register;
  - Resolves all environmental issues on site; and
  - Plans and supervises all environmental monitoring aspects and proposes potential corrective actions.
  - Responsible for attending to and closing worker grievances
- **Community Liaison Officer**
    - Maintaining dialogue with the communities and relevant stakeholders as per the stakeholder engagement plan
    - Responsible for attending to community grievances
    - Identification of local communities for the sourcing of labour and contractors

### 7.3 Institutional Arrangements

#### 7.3.1 Risk assessment and hazard identification

The EPC Contractor and the Subcontractors performing construction work shall carry out risk assessments prior to the commencement and during the construction works.

The risk assessments shall form part of the HS plan to be implemented on the site and shall include at least:

1. The identification of the risks and hazards to which workers may be exposed;
2. The analysis and evaluation of the risks and hazards identified;
3. A documented plan of safe work procedure to mitigate, reduce, or control the risks and hazards that have been identified;
4. A monitoring plan;

Hazards shall be eliminated when possible and can be minimized through awareness training, engineering controls, the use of personal protective equipment, and/or monitoring devices.

Workers shall be familiar with the risk assessment, use the existing controls and preventive measures while performing the tasks, and provide input to their supervisors to ensure that the risk assessment procedures reflect all hazards identified.

A pre-task risk assessment must be completed prior to the start of any job/task by those involved in the task.

### 7.3.2 HSE Policy

Nefer company will develop comprehensive HSSE policies and procedures in accordance with the international requirements and national regulations, as available. The construction contractors will be required to abide by these policies and procedures and develop project-specific HSE management plans. The policies and procedures rely on the pollution reduction approach to protect the environment and community, as well as provide a safe and healthy work environment.

In this context, the outline of the HSSE policy requirements is summarized as follows:

- Ensuring the provision of appropriate institutional capacity with clearly defined roles and responsibilities for managing HS issues.
- Ensuring that all HS personnel are properly trained and competent to fulfill their respective duties.
- Ensuring the availability of adequate resources and continuous support from top management.
- Communicating HS policy to all employees and other relevant stakeholders.
- Ensuring the provision of safe working conditions for all employees.
- Evaluating HS risks and taking appropriate action to minimize potential risks.
- Setting up objectives with the aim of reducing and eliminating HS related incidents.
- Ensuring that all labor rights stipulated in Egyptian laws, as well as the ILO requirements and the international PSs, are fulfilled for all employees. This, in addition to implementing a grievance mechanism for all workers.
- Ensuring the continuous monitoring and assessment of HS performance, both internally and through third-party external audits/monitoring.

Nefer company will require from the main construction contractors and the subcontractors the appointment of:

- A HS Officer
- An Environmental Control Officer,
- Risk Assessor
- Details and specifications of responsibility for all appointments shall be defined in the HS plan, and described in a suitable organizational chart.
- The company requires that contractors and subcontractors implement a system of reporting, including workers attendance records, vehicles records, minutes of meetings, audit reports and incident reporting.

### 7.3.3 Human Resources (HR) Policy

HR policies and procedures will be developed in line with national and international laws/legislation and best practices.

Under these policies, the company provides employees with information regarding their rights under national labour and employment law, including their rights related to wages and benefits. This policy will be clear and understandable to all employees. Accordingly, an HR policy will cover the following topics:

- Hiring policy
- Entitlement to and payment of wages; permissible wage deductions;
- Overtime payments; hours of work and any legal maximums;

- Entitlement to leave for holidays, vacation, illness, injury, and maternity and other reasons;
- Entitlement to benefits;
- The employees' right to form and join workers' organizations of their choosing without any interference or employment consequences and to bargain collectively with the employer;
- Disciplinary and termination procedures and rights;
- Conditions of work;
- Occupational safety, hygiene and emergency preparedness;
- Promotion requirements and procedures;
- Vocational training opportunities;
- Child labor and equal opportunity.
- Discrimination or favouritism due to race, ethnicity, nationality, gender, age, gender, disability, national origin, religious conviction or cultural belief
- Promoting inclusivity and cultural differences
- Develop workers code of conduct
- Human rights
- Zero Tolerance for GBV and SH policy

With respect to contracted workers, the company will ensure that the third parties who engage these workers abide by the project's HSSE management requirements through a contractor management plan. This is to be included in the contractor's scope of work (contract). This is to include ensuring proper transportation, housing and accommodation conditions for workers during construction and/or operation, as relevant <sup>46</sup> as well as ensure proper consideration of human rights including prohibition of child and forced labour, the right of protection in the event of unjustified dismissal, freedom of assembly and association, rights of collective bargaining and social security.

In this context, Nefer company policies and procedures will ensure management and monitoring the performance of third-party performance.

## 7.4 EMPs

Within its commitment to ensure environmental protection and maintain efficient environmental performance as well as social integrity, Nefer company will develop various environmental and social management plans addressing the different E&S aspects and impacts of the project during its construction, operation and decommissioning phases.

Decommissioning considerations are integrated into the overall E&S management framework, ensuring that potential impacts are minimized throughout the project lifecycle, from initial construction to final site restoration.

These E&S dimensions will be incorporated throughout the project phases. In this regard, the ESMPs to be developed will address:

<sup>46</sup> Workers' accommodation: processes and standards A guidance note by IFC and the EBRD, 2009 and ILO Housing Standards  
[https://normlex.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100\\_ILO\\_CODE:R115](https://normlex.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:R115)

#### 7.4.1 EMPs During the Construction Phase

The main objectives of the Construction Environmental and Social Management Plan (CESMP) are to:

- Address environmental, cultural and social issues identified as part of the present ESIA study and any additional issues considered to be important;
- Minimize the residual environmental impacts of construction activities;
- Prepare an achievable environmental management plan for implementation;
- Detail management and monitoring tasks to be completed;
- State the timing for implementation of each task;
- Provide details of reporting requirements;
- Identify roles and responsibilities for ensuring that relevant tasks are completed;
- Provide contingency plans that can be followed in an event of non-compliance or complaint; and
- Detail registers and standards reporting forms for documenting complaints, non-compliances, unplanned exceedances and discharges etc.

For each plan the following structure will be followed:

- Scope and objective of the ESMP
- Compliance Requirements and regulatory requirements
- Roles and Responsibilities,
- Communication, training and awareness
- Record Keeping,
- Monitoring,
- Reporting.

- **OHS Management Plan**

A comprehensive OHS Management Plan will be developed and implemented for the construction phase by the EPC Contractor, based on detailed task-specific risk assessments. This plan will be separate from, but aligned with, the Construction Environmental and Social Management Plan (CESMP), which focuses on broader environmental and social mitigation measures.

The OHS Management Plan will provide a structured framework to ensure the health and safety of all workers and will address, inter alia:

- Identification, assessment, and control of construction-related occupational health and safety risks;
- Definition and enforcement of OHS requirements applicable to contractors and subcontractors;
- Workforce health and safety arrangements, including training, supervision, and provision of appropriate PPE;
- Safe management of activities undertaken in close proximity to workers, including the storage, handling, and use of hazardous substances and materials; and
- Emergency preparedness and response procedures for construction-related incidents.

All contractors and subcontractors will be informed of, and required to comply with, the provisions of the OHS Management Plan. The Project HSE Manager will be responsible for overseeing contractor compliance, monitoring OHS performance, and ensuring that

construction activities are conducted in a safe and environmentally sound manner. Contractors will also be required to regularly report on OHS performance as part of the periodic construction progress reporting process, enabling continuous monitoring and improvement throughout the construction phase.

- **Transportation Management Plan**

Nefer company will develop an transportation policy and procedures to ensure the safety and security of all employees, contractors, and stakeholders while promoting sustainable and responsible driving practices. A project-specific transportation plan will be developed, including the following key components:

- Driver Requirements
- Requirements for vehicles and their use
- Maintenance program
- Local road transportation safety Requirements and additional Nefer company safety requirements
- Driving time and rest period

- **Noise Management**

- Compliance with the requirements of Law 4/1994 regarding the exposure period to different levels of noise, whether continuous or intermittent;
- Ensuring regular maintenance of construction equipment and machinery to minimize noise emissions.
- Schedule high-noise activities to avoid simultaneous operations that could amplify noise levels.
- Maximize the distance between noisy equipment and sensitive receptors;
- Workers shall be provided with adequate PPE (earplugs), and ensuring that workers are always wearing PPE while working near equipment that emit high noise levels.

- **Solid waste management**

Domestic solid waste generated from the construction labour camp will be collected, properly stored according to the national regulations, and finally disposed of by a licensed waste contractor.

Construction waste will be collected in a separate onsite location and periodically disposed of off-site by the contractor. Demolition and construction waste will be safely transported to officially designated sites. Recyclable wastes will be reused by the contractor at other construction sites.

Solid waste management will be conducted in accordance with the requirements of laws 4/1994 and 202/2020.

- **Hazardous waste management**

The following briefs the management plan concerning hazardous waste (HW) of the proposed project.



#### HW generation

Different hazardous wastes will be generated from the construction activities. The type of generated hazardous waste is mentioned in Chapter 2.

#### HW segregation and on-site storage

HW will be separated from other types of non-hazardous waste. Proper identification of hazardous waste forms a basis for waste segregation. It is therefore essential that all personnel are familiar with waste identification.

HW will be stored in the designated storage area providing secondary containment where necessary, which would be provided with suitable fire extinguishers and other safety equipment. Furthermore, each HW type will have color-coding and will be labelled with the container's content and the required precaution instructions.

#### HW disposal

The HW will be transported to a WMRA/EEAA licensed facility, such as El Nassreya HW landfill in Alexandria, via a certified contractor. On the other hand, spent oils will be disposed of through specialized contractors approved for the collection of oils, to send them for recycling to Petrotrade Company.

#### HW register

A HW register will be established, including information about the types and amounts of the generated waste and methods of its disposal.

#### • **Water and wastewater management**

A project-specific water and wastewater management plans will be developed. The emergency response plan is to include responses to potential acute leakage scenarios. Wastewater will be collected in an isolated internal sewage system and will be periodically collected by an authorized contractor for disposal. The wastewater will be collected in wastewater tanks and transported to the nearest wastewater plant.

#### • **Emergency Management Plan**

The contractors will have a written Emergency Response Plan to respond to and mitigate any incident to minimize its impact on employees, community, and environment. Employees will be trained on the implementation of the plan and on response activities that could be required in the event of an emergency.

Nefer company will ensure that the contractors have developed preparedness program to respond to and mitigate any emergency situation to minimize the impact on employees, community, and environment according to national laws and the international EHS guidelines.

The contractor will be committed to the following:

- A knowledgeable, highly trained, and motivated employee group;
- A safety and accident record;
- Preparation and training for emergency response and mitigation measures; and
- Awareness among the workforce through education and training.

In addition, the written emergency plan will be prepared to address the following phases:

- Preparedness: the activities that are communicated for rescuing and minimizing damage.
- Response: the actions necessary to minimize loss of life and property damage and provide emergency assistance.
- Recovery: short- and long-term activities which restore the construction activities and help return it to its normal state.
- Mitigation: the activities that eliminate or reduce the probability of disaster.

- **Biodiversity Management**

The Project will ensure that the contractors are aware of the importance of the biological environment and their compliance with the law and international regulations, and conventions. Contractors and subcontractors should be aware of species that are prohibited from being hunted, captured, or killed. In case of the presence of vagrant animals, Annex 4 of the ERs of law 4/1994, amended by Decree 1095 /2011, defines the wild animals and plants prohibited from being hunted, traded, killed or captured.

Awareness sessions on the impact of hunting, trading, or killing wild animals will be provided to workers. Strict measures will be taken by the Project in case of non-compliance with the laws and regulations (including taking legal action).

Additionally, the Project will ensure that contractors are following proper mitigation measures, including proper waste and wastewater management according to legal requirements, to avoid the attraction of pests and other alien/invasive species and the growth of marginal vegetation.

- **Chance Find Procedure**

As indicated in section 4 above, there are no registered antiquities or cultural heritage sites within the project site based on the Egyptian Archeological Map (2022) and the UNESCO World Heritage List of Egypt. However, chance find procedures will be developed to address potential cases of encountering cultural heritage components during the project's construction activities.

The chance find procedure defines the actions to be taken in case of any finds during the construction activity excavations. Such finds could include Non-archaeological/Natural/Cultural Find, Insignificant Chance Finds, Potentially Significant Archaeological Finds or Human remains and/or Burial-related Material.

In general, the Ministry of Tourism and Antiquities (MOTA) has the responsibility for the discovery and exploration of antiquities across Egyptian territory. According to Law No. 117 of 1983, as amended by Law No. 3 of 2010, any person who discovers an unregistered archaeological artifact is obligated to notify the MOTA. The artifact shall be considered state property, and the MOTA must take the necessary measures to preserve it. Within three months, the MOTA must either remove the artifact found on private property or take the necessary procedures to expropriate the land on which it was found, or leave it in place and register it following the provisions of this law.

- **Staff Training and Awareness**

Construction workers will be trained and educated according to their respective responsibilities and assigned tasks. A workers' training program will involve training staff on safe handling of equipment, wastes, and on the use of equipment. Moreover, they will be trained on the safe operation of equipment and spill clean-up. They will also be trained on the use of fire hose reels and fire extinguishers. The training program will also tend to increase workers' awareness of the potential environmental impacts of various construction activities. Awareness will also include issues related to GBVH / SEAH, and developing measures for reporting these cases needs to be established.

The project will undertake an induction program to advise contractors and site visitors of basic health, safety, and emergency procedures, such as emergency signals and evacuation routes. Contractors and vendors on short-term assignments that do not have safety and emergency response training will work under the supervision of the Company staff.

#### **7.4.2 Environmental Management Plans During the Operation Phase**

Nefer company will be responsible for the preparation, implementation, and monitoring of the environmental management plan during the operation phase. The management plan will also comply with the EBRD/IFC and World Bank E&S "General Environmental, Health, and Safety Guidelines".

The following shows the minimum set of environmental management procedures that the facility operator will establish and follow.

- **Environmental Register**

During the operation phase, an Environmental Register will be developed for the project activities and the compliance status. The Environmental Register and the Hazardous Materials and Waste Register will be prepared in accordance with the requirements of Annex 3 of the ERs of Law 4/1994 and its amendments.

The Environmental Register as well as the Hazardous Materials and Waste Register will be updated on an annual basis. Nefer company will make both registers available for inspection by competent authorities.

In general, the register will include data on the following topics:

- General information;
- General description of the establishment;
- Laws and regulations related to the project;
- Operation activities and utilities;
- Liquid waste;
- Solid waste;
- Work environment; and
- Self-monitoring plan.

- **OHS Management Plan**

During the operation phase, Nefer company will implement an OHS Management Plan to ensure the health and safety of all employees, contractors, and visitors. The plan will be aligned with the international Standards, and applicable national legislation.

The OHS Management Plan will be based on hazard identification and risk assessment for operational activities, including electrical works, routine and non-routine maintenance, waste handling, traffic movement, and emergency situations. It will define safe operating procedures, permit-to-work systems where required, and the mandatory use of task-specific PPE.

The plan will also include OHS training and induction, incident and near-miss reporting, emergency preparedness coordination, and periodic inspections to monitor compliance. Overall responsibility for implementation and monitoring will rest with Nefer company designated OHS/HSE Officer.

- **Hazardous Materials and Wastes (HW) Management**

During the construction phase, on-site storage of diesel is expected for use by contractors. Nefer company ensures through contractual agreements and the established management plans that fuels are handled, stored, and managed in accordance with applicable national regulations and international good practice.

Hazardous wastes generated from various activities of the proposed project will be collected by an authorized contractor to be disposed of in designated safe disposal sites. HW will be stored in a specific storage area until safe disposal.

HW will be recorded in the hazardous wastes register in accordance with the legal requirements stipulated in Article 33 of the Environment Law 4/1994.

The project will endeavor to find sustainable means for the disposal of broken PV panels through recycling.

- **Solid Wastes Management**

The main source of solid waste is domestic activities from workers, as municipal solid waste will be generated from the warehouse, offices, and catering. In addition, it includes wooden pallets and PV panels plastic packaging materials. Other waste will be disposed of with the domestic solid waste by authorized waste contractors.

- **Preventive and corrective maintenance**

The main objective of maintenance is to maximize the utilization of the equipment in its proper operating conditions.

Planned maintenance

Maintenance will be carried out in accordance with:

- Equipment manufacturers' suggested requirements.
- Scheduled inspections according to good maintenance practices.
- Maintenance programs and procedures developed.

### Preventive Maintenance

The preventive maintenance guidelines are based on:

- A general maintenance plan according to which all maintenance activities are scheduled.
- Regular visual inspections will be conducted for inspecting modules, inverters, structures, the electric system, weather stations, the monitoring system, and the security system to detect existing and potential defects. It is particularly important to inspect all plant equipment exposed to the weather.

### Corrective Maintenance Plan and Response Times

Preventive maintenance reduces the frequency of breakdowns, but cannot avoid them. Unplanned maintenance involves corrective maintenance and emergency repairs resulting from equipment problems, required as a result of equipment breakdowns or deficiencies. Once a problem occurs, the plant maintenance staff is trained enough to carry out the repairs in a quick response time in order to return to normal operation levels. Corrective maintenance may involve the participation of specialized maintenance contractors.

#### • **Wastewater Management Plan**

A wastewater management plan will be developed. The emergency response plan is to include responses to potential acute leakage scenarios. Wastewater will be collected in an isolated internal sewage system and will be periodically collected by an authorized contractor for disposal.

#### • **Spill Prevention Management Plan**

The plan will address the spill prevention, preparedness, and response requirements to support the safe response to accidental spills, leaks, or releases of both hazardous and non-hazardous materials to the environment to eliminate or minimize the adverse effects should a spill occur and to protect the health and safety of employees.

#### • **Training and Capacity Building**

To ensure the competence of the project's employees in undertaking the environmental management procedures and plans, training will be delivered to the personnel according to their particular responsibilities.

A workers' training program will involve training on safe handling of equipment, waste management, and the use of protective equipment. They will be informed of any potentially harmful health effects related to the PV plant operations. Moreover, they will also be trained on the use of fire reel hose and fire extinguishers. Training plans will be put in place to:

- Ensure that all visitors and site personnel undergo a site-specific HSE Induction training session;
- Ensure that all records of attendance are kept on file.
- Ensure that all visitors and personnel are issued with an access card as proof of site induction.
- Provide a list of site-specific hazards identified.
- Train, inform, communicate, and instruct all workers regarding World Bank Equator Principles, worker rights, as well as workplace hazards and risks before any work commences and thereafter at regular intervals as the risks change and as new risks

develop. This training will be carried out in the form of risk assessment and toolbox talks. A record of attendance will be kept on file, and

- Ensure that Sub-Contractors will conduct their own task-specific risk assessments and keep records in the Health and Safety file.

- **Housekeeping and Cleanliness**

About the housekeeping and cleanliness of the site, good housekeeping and cleanliness activities will be applied, such as:

- Obstacles should not be placed in front of emergency exits or firefighting equipment;
- Minimize water usage during cleaning to conserve resources;
- Regularly inspect the panels for dirt, bird droppings, and other contaminants that can affect performance; and
- Ensure that all personnel involved in cleaning and maintenance are properly trained in safe handling and cleaning techniques as well as waste management procedures.
- Keep the flood protection channels clear, especially before the rainy season

- **Biodiversity Management**

The Project will ensure that personnel are aware of the importance of the biological environment. Awareness sessions on the impact of hunting, trading, or killing wild animals will be provided to workers. Strict measures will be taken by the company in case of non-compliance with the laws and regulations (including taking legal action). Moreover, the Project will ensure that waste management is done properly and according to the national regulations.

In order to raise the awareness of its onsite personnel with regard to issues relevant to the protection and preservation of biodiversity, the following is proposed:

- Display posters demonstrating the Project's commitment to the conservation of biodiversity throughout the site;
- Display throughout the site warning signs indicating that hunting or disturbance of wildlife is strictly prohibited;
- Display throughout the site signs prohibiting unauthorized wandering into the surrounding desert, outside the project boundaries;
- Good practice as related to protection of wildlife on the site should be included during toolbox talks or morning meetings; and
- Reminders of proper handling and disposal of food leftovers, as well as waste and material hazardous to wildlife, should be posted throughout the site.
- Increase the number of insulators where conductors that prevent birds from landing on them and forcing birds to perch on crossarms only at the project substation .
- Cover the crossarms at the project substation with insulating materials to ensure that birds are not earthed.
- Implement good housekeeping and waste/wastewater management to avoid the presence of water and the growth of marginal vegetation that would make the site "attractive" to birds.
- Monitoring of avifauna fatalities around the site and the substation

- **Emergency response plans**

Identify specific risks

The identification of risks includes potential risks related to equipment, devices, materials, buildings, and operation procedures. Risk identification is carried out to estimate the type, quantity, and magnitude of risks that could induce fire, personnel fatality, or building collapse.

These risks include the following:

- Activities that may pose risks to the workers;
- Quantities and types of hazardous materials/wastes used or stored; and
- Potential failure of the safety measures and procedures

Preparedness

Identify human, administrative, and organizational resources, as well as equipment and sites needed to combat risks. The following activities will be carried out:

- Identify the required training for staff and implementation schedule;
- Identify the essential tools/procedures for the protection of individuals and groups, and also determine the requirements for rescue and medical treatment;
- Prepare maps and detailed plans that include gathering points and escape routes, and evacuation plans in case of emergency, and determine the timeline for implementation;
- Identify the affected parties and stakeholders, provide the emergency support and services, and determine the type of assistance needed; and
- Determine fire prevention and control requirements.

Implementation

The plan should include the level of implementation carried out by individuals or groups according to the following steps:

*Warning and alarm plan*

The selected warning method should be effective in terms of communicating the warning message to all employees of the site and making sure that they are aware of the nature of the risk and provide them with the opportunity to confront or escape from it. The alarm must be visible and audible to reach all employees on the site.

*Response*

Responses are carried out according to the type, rate of spread, damages and consequences of the hazard through trained personnel, either directly or manually, using smart devices or through offsite control.

Medical assistance and services

A communication line for access to ambulance shall be available to provide medical care for the potential injured workers and transfer them immediately to hospitals, if needed.

Documentation

A record/report including time, duration of implementation, cost, expenditure, efficiency, effectiveness, and responsible personnel of each of the above measures shall be maintained. Nefer company will develop a reporting system for accidents, including injuries, damage to property, and environmental damage. The information and records mentioned will be used

to improve response procedures and to decrease and control potential hazards. General information to be recorded is as follows:

- Date, place of incident or emergency;
- The affected individual or groups;
- Description of the situation and conditions surrounding the site;
- Identify and assess the magnitude of injury, loss, damage or pollution;
- Actions taken to reduce the severity and degree of the situation; and
- Record the treatment or cleaning procedures that have been carried out.

#### Follow-up procedures

Once the hazard is managed, a throughout survey of the affected site must be carried out to ensure that the hazard is eliminated, and that the situation is restored to its original state. Follow-up procedures include the following:

- Identify the causes of the emergency.
- Assess the efficiency of emergency response procedures;
- Propose corrective action and remedial measures necessary to prevent recurrence of such incidents; and
- Identify the level of need to implement any treatment and/or monitor procedures to restore the site to its original state;

#### Update the emergency response plan and staff training program

The emergency plan will be updated every year or at the event that needs improvement of the plan and the staff training program.

### **7.4.3 Social Management Plan**

It is of key importance for Nefer company to have close and proactive communication with the local community and to disclose the project information for transparency and to enhance credibility. A detailed stakeholder engagement and management plan (SEP) will be developed for the project. Main aspects of the plan are summarized in the following sections.

#### **• Accommodation and Labour Influx Assessment and Management Plan**

The Nefer company will develop an accommodation and labour influx assessment and management plan. The plan aims to assess socio-economic baseline setup, identify areas fits for accommodation of non-local workers, highlight potential influx impacts and mitigation measures, and outline contractors' responsibilities.

The scope of the assessment will cover contractor(s) and subcontractor(s) workers' accommodation during the construction phase.

The accommodation will include on-site accommodation (camps), as well as off-site accommodation in several rented apartments/houses. Nearby local villages will be avoided, and accommodation will take place in larger urban centers.

Additionally, the plan will define accommodation requirements as per international standards (IFC/EBRD/ILO)



- **Recruitment Procedure**

The recruitment instructions for Nefer company will be developed for contractors for hiring workers, subcontractors, and equipment for the project. It will be guided by “equal opportunity”, “transparency” and non-discrimination approach, which maximizes the participation of the local community and increases female inclusion.

The recruitment procedure will clearly explain how the recruitment process works — from advertising the positions to selecting and approving candidates — and describe the criteria and documents required at each step.

Labour management plans will be developed that will commit the EPC contractor and subcontractors and supply chain to meeting Egyptian labour law and IFC PS2 / EBRD ESR2 requirements to ensure that they will be committed to key HR policies and procedures/labour commitments including protection of workers' rights, freedom to associate, prohibition of child labour and forced labour.

Mainly, the job announcement and Ads will be through the governorate’s Youth Employment Office (YEO) to handle applications for manpower.

- **Nefer company SEAH and GBV Management Plan**

The main key components of the policy include:

- Zero Tolerance for Sexual Harassment: The policy strictly prohibits all forms of sexual harassment, including sexual exploitation, abuse, and harassment (SEAH).
- Gender-Based Violence (GBV): Nefer company is committed to human rights and equal opportunities, with a comprehensive stance against all forms of GBV.

Integration with HR Policies: Nefer company will integrate its HR policies with the SEAH and GBV Management Plan to foster a safe and respectful workplace. This integration includes the establishment of clear protocols to prevent and respond to incidents. Implementation of this plan ensures non-discrimination and equal pay for all employees. To further address and resolve related issues, the project team will appoint a female Community Liaison Officer, providing a significant opportunity for female leadership within the project. The CLO will also participate in workers' awareness related to issues of GBVH / SEAH, and develop measures for reporting these cases.

- **Labour and Working Conditions**

During construction, the project will ensure that contractors are implementing suitable health and safety measures, and that workers are not exposed to forced or compulsory labour including child labour. The project’s hiring policies will ensure that priority employment would be for local hires.

During operation, the project will adhere to the requirements of the Labour Law 14/2025<sup>47</sup> and the general international workplace health and safety guidelines.

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<sup>47</sup>The new Labour Law has recently come into effect, the executive decrees of the previous labour law (law 12/2003) shall be applicable until issuance of the new executive decrees.

- **On-going Consultation**

Nefer company has already undertaken various activities to communicate and engage with key stakeholders and is willing to continue its engagement activities.

- **Information Disclosure**

Information regarding the Project shall be publicly available on an on-going basis and updated semi-annually as minimum. Information will be at an appropriate level of detail and presented in an accessible means (e.g., in Arabic with infographics used where beneficial).

This information is expected to include, but not be limited to, project progress updates; proposed future engagement and grievance mechanism; information about project activities; key contacts for the project; and other information, as needed.

The Nefer project ESIA package will be disclosed and uploaded to the following websites:

IPH: <https://weareinfinitypower.com/projects>

HAU: <https://www.hassanallam.com/sustainability>

EBRD: <https://www.ebrd.com/>

The ESIA disclosure package, including a disclosure log and external grievance leaflet, will be available at the following locations (where approved by authorities):

1. Governorate-level government buildings (Minya City)

- Minya Governorate Diwan (Diwan Aam El Mohafza) — Corniche El Nile, Minya City. Office of the Governor's Secretariat (Sekertaria Aama).
- Egyptian Environmental Affairs Agency (EEAA) – Central Department for Upper Egypt, Minya
- Minya Manpower & Labour Directorate (Mudiriyat El Quwa El Aamlia)

2. Markaz / city-level government buildings (closest to the site)

- Mallawi Markaz & City Council (Magles Madinat Mallawi / Wahda Mahaliya)
- Abu Qurqas Markaz Council
- Toukh El Kheil Local Unit
- Saft El Khammar Local Unit

3. Public spaces

- Egypt Post – Minya Main Office (Maktab Bareed Minya El Raisi)
- Egypt Post – Mallawi Main Office (Maktab Bareed Mallawi El Raisi)
- Mallawi Youth Centre (Markaz Shabab Mallawi)

4. NGOs

- Caritas Egypt – Minya Office
- Upper Egypt Association for Education and Development (Gameiyat Saeed Misr)

- Egyptian Red Crescent – Minya Branch
- National Council for Women (NCW) – Minya Branch (Far' El Magles El Qawmi Iel Maraa)
- National Council for Persons with Disabilities – Minya Branch

#### 5. Project- and lender-specific

- Project sponsor's site/liaison office (on or near the project footprint, with posted opening hours).
- EBRD Resident Office in Cairo — EGID Building, Block 72, Ninety Axis, 5th Settlement, New Cairo.

- **Grievance Management**

A grievance management plan will be developed to address external and internal grievance mechanisms.

- **Socio-economic Monitoring**

The project will monitor the following socio-economic aspects on a regular basis:

- Satisfaction of the local community with the project activities;
- Local community' needs (healthcare, water, etc.);
- GM is fully understood by the local community; and
- Any unsolved grievances;

#### 7.4.4 Project Decommissioning Plans

Decommissioning is defined as the close down of operations, the removal of process equipment, buildings, and structures, and carryout site cleanup and remediation, if required. The expected lifetime of the project ranges between 25 to 30 years, which will be renewable as long as the proper predictive maintenance measures are taken, and all the necessary revamps and upgrades are done. The following are the main issues addressed by the facility's decommissioning plan:

- Development of the decommissioning plan according to international and best practices guidelines.
- Removal procedures for all above-ground structures
- Disassemble the PV Modules and batteries: The components of the plant will be disassembled and removed. Thereafter, they will be reused, recycled (where possible), or disposed of in accordance with regulatory requirements.

#### 7.4.5 Summary of ESMP

Table 7-2 below provides a comprehensive overview of the project management plan, including potential environmental aspects identified in the ESIA for both the construction and operation phases of the project, as well as the proposed mitigation measures designed to minimize these impacts.



Table 7-2: Overview of the ESMP Plan

Aspect	Issues of concern	Actions/Mitigation measures	Party Implementing the Action	Indicator of completion	Estimated Cost	Required Completion Date
<b>Construction Phase</b>						
Air Quality	Dust emissions	<ul style="list-style-type: none"> <li>- Reduce idling times for vehicles and machinery;</li> <li>- Maintaining machinery and vehicles in good working</li> <li>- Speed restriction on site s;</li> <li>- Ensuring workers with awareness of safe driving and maintaining good practices in machinery usage; and,</li> <li>- Periodic measurements for stacks of generators</li> </ul>	Construction contractor	<ul style="list-style-type: none"> <li>- Monitoring plan</li> <li>- Air quality measurements</li> </ul>	Cost of measurements in the monitoring plan below	Throughout the construction phase period
	Working conditions of machinery	<ul style="list-style-type: none"> <li>- Ensure good working conditions through frequent inspection of all construction equipment</li> <li>- Implementation of OHS plans</li> </ul>	Construction contractor	Maintenance logs OHS plan	Cost of maintenance	
Noise Level	working conditions of machinery	<ul style="list-style-type: none"> <li>- Regular maintenance of construction equipment</li> <li>- Use low-noise equipment, where possible;</li> <li>- Schedule high-noise activities to avoid simultaneous operations that could amplify noise levels;</li> <li>- Schedule high-noise activities to take place in morning hours</li> <li>- Implementation of OHS plans</li> </ul>	Construction contractor	OHS plan Noise measurements and Maintenance logs	Cost of measurements in the monitoring plan + cost of maintenance	Throughout the construction phase period
	Provision of PPEs	<ul style="list-style-type: none"> <li>- Providing necessary PPEs for workers</li> </ul>	Construction contractor			
Soil	housekeeping practices	<ul style="list-style-type: none"> <li>- Develop and implement site management plan, solid waste management and wastewater management plans and spill prevention plan</li> </ul>	Construction contractor Developer (include provisions in the construction contracts. Developers to ensure contractors compliance)	<ul style="list-style-type: none"> <li>- Waste and wastewater management plans</li> </ul>	<ul style="list-style-type: none"> <li>- Part of construction activities management</li> </ul>	Throughout the construction phase period
	Waste/wastewater management	<ul style="list-style-type: none"> <li>- Proper collection, containment, and disposal of sanitary wastewater</li> </ul>		<ul style="list-style-type: none"> <li>- Solid/hazardous waste and wastewater</li> </ul>	<ul style="list-style-type: none"> <li>- Cost of transportation</li> </ul>	

Aspect	Issues of concern	Actions/Mitigation measures	Party Implementing the Action	Indicator of completion	Estimated Cost	Required Completion Date
<b>Construction Phase</b>						
		<ul style="list-style-type: none"> <li>- hazardous materials storage and handling (including fuel) according to the WBG General EHS Guidelines,</li> <li>- Transportation and disposal to be carried out through authorized waste contractors</li> </ul>		management contract - Contractor follow up documents - Contracts with authorized waste contractors	and disposal of waste	
Occupational Health and Safety	Site Staff and Workplace Safety	- Developing OHS plan and HSE procedures according to national requirements and international standards	Contractor	OHS plan and procedures HSE provisions in the construction contracts	Construction cost	Before construction activities
Emergency Response plans	Site Staff and Workplace Safety	- Develop procedures for emergency control	Contractor	Emergency response plan	Construction cost	Before project commissioning
Waste management	Worker's health	<ul style="list-style-type: none"> <li>- Developing solid and hazardous waste management plans in line with the WBG General EHS Guidelines."</li> <li>- Developing OHS plans</li> <li>- Different types of waste to be stored in designated waste areas, and transported by licensed contractors</li> </ul>	Construction contractor	Solid waste management contract with authorized contractors Waste manifest OHS plan	Cost of transportation and disposal - Part of construction activities management	Throughout the construction phase period
Biological Environment	Pests and invasive species	- Good housekeeping and proper waste management	Construction contractor	Waste management contract		Throughout the construction phase
	Disturbance to wildlife	<ul style="list-style-type: none"> <li>- Awareness (toolbox talks and awareness signs)</li> <li>- Implementation of mitigation measures</li> <li>- Supervision and implementation of deterring measures</li> </ul>	Construction contractor	Requirements specified in contracts	Management cost	Throughout the construction phase
Social Environment	Workers influx	<ul style="list-style-type: none"> <li>- Prioritize hiring local workers</li> <li>- Implement and maintain a community grievance mechanism; and,</li> </ul>	Developer/Construction contractors	Labour management plan, workers	Management cost	Throughout the construction phase period

Aspect	Issues of concern	Actions/Mitigation measures	Party Implementing the Action	Indicator of completion	Estimated Cost	Required Completion Date
<b>Construction Phase</b>						
		<ul style="list-style-type: none"> <li>- Selection of labour accommodation, away from existing communities, as possible, and considering establishing a labour camp on site.</li> <li>- Develop HR policies including GBV and SEAH plans</li> </ul>		accommodation inspection checklist GBV and SEAH policies Workers Awareness		
	Community health, safety and security- risks from road traffic accidents	- Develop Traffic Management Plan (TMP) and associated procedures	Construction contractors	TMP procedures and	Management cost	
	Cultural heritage	- develop chance find procedure	Developer/Construction contractors	Developed procedures	Management cost	Before construction activities

Aspect	Issues of concern	Actions	Party Implementing the Action	Indicator of completion	Estimated Cost	Required completion Date
<b>Operation Phase</b>						
Air quality	Backup generator emissions	<ul style="list-style-type: none"> <li>- Optimize the operation of backup generators to reduce usage and emissions.</li> <li>- Conducting regular maintenance and periodic emissions monitoring of generators to ensure efficient operation and minimize air emissions</li> </ul>	Developer	Emission measurements Maintenance records	Operation cost	Periodically Throughout operation stage
Noise	Transformers and BESS	<ul style="list-style-type: none"> <li>- Provide workers at noise generating machinery and equipment will be provided with suitable (PPEs).</li> <li>- A grievance mechanism will be adopted for assessing complaints,</li> </ul>	Developer	Noise measurements	Operation cost	Periodically Throughout operation stage
Biological Environment	Same as for construction phase	- Same as for construction phase	Developer	Reports	Operation cost	Throughout the project lifetime
Impact on social environment	Water consumption	- Water demand during the operation phase is minimal and will be coordination between the project and the water company to plan the sources of water	Developer	Water management plan	Operation cost	Throughout the project lifetime
	Wastewater management	- Wastewater generated during the operation phase is minimal and will be collected by an approved contractor and discharged to designated treatment plants	Developer	Wastewater management plan	Operation cost	Throughout the project lifetime
Labour rights and welfare	working conditions	Develop Human Resources policy	Developer	Contracts (with workers)	Operation cost	Throughout the project lifetime
Training and Awareness	competence of the project personnel	training for the personnel according to the particular responsibility	Developer	Training plans	Training cost	Throughout the project lifetime



Aspect	Issues of concern	Actions	Party Implementing the Action	Indicator of completion	Estimated Cost	Required completion Date
Occupational Health and Safety	Site Staff and Workplace Safety	- Developing HSE procedures	Developer	Development of HSE policies	Operation cost	Before project commissioning
Emergency Preparedness and Response	Operation risk management	- Adopt a probabilistic risk assessment framework	Developer	Emergency response plan	Operation cost	Before project commissioning
Community health, safety and site security	- Risk of road traffic accidents - Site security	- Develop site security and safety plan - Develop grievance mechanism	Developer	- security plan - SEP and grievance mechanism and register	Operation cost	Throughout the project lifetime

## 7.5 Environmental and Social Monitoring Plans

### 7.5.1 Environmental Monitoring

Although most potential impacts can be mitigated through management procedures, the monitoring plan is an essential element for the environmental management scheme of the project. It provides data for periodic review and necessary adjustments to the environmental management plan, ensuring environmental protection through the early detection of negative impacts.

The project will develop and implement a monitoring program for various environmental aspects during both the construction and operation phases. Monitoring results will inform the decision-making process, triggering corrective actions to maintain compliance with environmental laws and regulations, ensure environmental protection and workplace safety, and ensure the effective operation of mitigation measures and management plans.

According to Law 4/1994, establishments should maintain an environmental register to track the environmental aspects of their activities during the operational phase. This register will be updated annually. Moreover, a detailed monitoring plan will be made available by the company at the beginning of the operation phase.

It is worth mentioning that environmental monitoring is a dynamic process. Consequently, regular updates and modifications, as needed, shall be carried out based on the results of the first monitoring round. Moreover, as mentioned in Chapter (5), if different standards for the same parameter are mentioned, the project shall adopt the most stringent standard.

- **Air Quality Monitoring During Construction**

Workplace air monitoring of equipment exhaust will be performed quarterly. Emissions are generated from exhaust from construction equipment and motor vehicles and particulates during site works. Monitoring results will be compared with the allowable limits of Law 4/1994 provided in Chapter (5) of this study.

The following parameters shall be measured:

- Carbon monoxide, CO
- Sulfur dioxide, SO<sub>2</sub>
- Nitrogen oxides, NO<sub>x</sub>
- PM<sub>10</sub>

- **Workplace Monitoring**

#### ***Labour Audit***

Labour audits are the most common spot-check mechanism used to monitor labour standards during both the construction and operation phases. Essentially, they serve as tools to ensure and support the application of labour standards through a thorough formal examination of the labour practices at a specific workplace or company, based on corroborated evidence.

The purpose of an audit is to evaluate these practices against a defined standard, and it will extend to the supply chain" in accordance to Nefer company Human Rights policy, EBRD ESR2, ILO and relevant guidelines and Egyptian Labour law. Additionally, monitoring will include

tracking grievances received from workers and external stakeholders, as well as documenting how these grievances were resolved.

### **Workplace Noise**

#### *During Construction*

During construction, the project will ensure that the noise level from all construction equipment would not exceed the allowable limit set by Law 4/ 1994 for 8 hours duration shift (90 dB). In case the noise levels exceeded this limit, the exposure periods will be carried out according to those indicated in Annex (7) of Law 4/1994. Moreover, ear plugs will be provided for the workers at the locations generating increased noise levels. Noise level measurement will be carried out quarterly.

#### *During Operation*

Sources of noise result mainly from transformers and inverters. The measured noise levels will be compared to the levels set in Annex (7) of Law 4/1994. In case the noise exceeded the maximum limit of 90 dB, exposure periods will be proceeded as stipulated in Law 4/1994.

- **Solid and Hazardous Wastes**

Non-hazardous solid wastes will be recorded in the Environmental register of the plant. On the other hand, according to Law 4/1994, a register will be prepared for hazardous wastes. Information of the HW register should include types and quantities of hazardous wastes, storage means and disposal.

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An independent consultant would be hired for carrying out the monitoring activities. The following Table 7-3 provides the proposed monitoring plan. The costs only cover analysis and field measurements. However, they do not include specific sample collection costs.

- **Biodiversity monitoring**

Visual inspection will be conducted on daily basis. This inspection will cover aspects related to status of biodiversity and the presence of potential hazards to wildlife and habitats. The inspection will also check to ensure proper implementation of measures outlined in this ESIA to minimize potential risks associated with day-to-day activities.

A basic fauna encounter procedure will be established and implemented to keep records of animal sightings, including dead animals due to vehicle collisions or other reasons. A Fauna Encounter Form will be developed and distributed to selected onsite staff. A form will be filled for each encountered species and will contain basic information, including:

- Name of the animal;
- Brief description;
- Sighting location(s) (including coordinates, if possible);
- Number of sightings;
- Number of sighted animals;
- Avifauna fatalities around the site and the substation
- Notable behaviour;
- Interaction with the project; and
- Photos of the animal.

All compiled forms will be kept in a register and used for the development of monthly reports. Moreover, visual inspection carried out by onsite project staff will be sufficient to monitor aspects that could attract vermin and pests (such as water accumulation, unsafe disposal of solid waste and wastewater) and assess the potential presence of pests (rodents, insects, etc.).

In addition, the visual inspection and Fauna Encounter Procedure will also report the potential occurrence of any species alien to the area.

Table 7-3: Proposed Environmental Monitoring Plan

Receptors / Source of impact/risk	Type of monitoring	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Approximate annual costs
<b>Construction phase</b>							
Workplace	Noise measurements	Project site and borders near the industrial zone	Compliance of noise intensity to standards	Measurement at two locations quarterly	All contractors and sub-contractors, supervised by Nefer company	Third party (research entity or certified lab)	~10,000 EGP
	Air emissions	Project site and borders near the industrial zone	Compliance of air emission standards	Measurement at two locations quarterly	All contractors and sub-contractors, supervised by Nefer company	Third party (research entity or certified lab)	~ 35,000 EGP
	Biodiversity	Habitats and biodiversity	- Absence of hazards to wildlife and habitats - Proper implementation of mitigation measures	Daily	All contractors and sub-contractors, supervised by Nefer company	Nefer Company and contactors EHS personnel	Included in staff salaries
		Fauna	- Number of fauna encounters - No or reduced number of fatalities (such as road mortalities)	Chance encounters			
		Pests	- Good housekeeping - Absence of pests	Daily			
Social management	Waste management	Project site and waste storage areas	- Proper management of the different types of waste	Regular	All contractors and sub-contractors, supervised by Nefer company	Nefer Company and contactors EHS personnel	Included in staff salaries
	Wastewater management	Project site	- Good housekeeping - Absence of alien vegetation	Regular	All contractors and sub-contractors, supervised by Nefer company	Nefer Company and contactors EHS personnel	Included in staff salaries
	Workers influx	Project site and offsite accommodation	- Number of community grievance	Regular	All contractors and sub-contractors, supervised by Nefer company	Nefer Company and contactors EHS personnel	Included in staff salaries

Receptors / Source of impact/risk	Type of monitoring	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Approximate annual costs
	Traffic management	Project site and Vicinity (Aol)	<ul style="list-style-type: none"> <li>- No road accidents</li> <li>- No community grievances</li> <li>- Proper implementation of traffic management plan</li> </ul>	Regular during construction phase	All contractors and sub-contractors, supervised by Nefer company	Nefer Company and contactors EHS personnel	Included in staff salaries
<b>Operation phase</b>							
Workplace	Noise measurements	Transformers and inverters area	Compliance of noise intensity to standards	Annually	Project	Third party (research entity or certified lab)	~10,000 EGP
Emergency generators stacks	Exhaust measurements	Stacks of emergency generators (SO <sub>2</sub> , NO <sub>2</sub> , CO, PM <sub>10</sub> )	Compliance with point source air emissions standards	Annually	Project	Third party (research entity or certified lab)	~ 25,000 EGP
Project site and vicinity	Biodiversity (same as for construction phase)	Same as for construction phase	Same as for construction phase	Same as for construction phase	Project	Project personnel	Included in staff salaries

### 7.5.2 Social Management Plan

The main aspects of the social management plan are summarized in the following sections.

- **Labour and Working Conditions**

During construction, the project will ensure that contractors are implementing suitable health and safety measures, and that workers are not exposed to forced or compulsory labour, including child labour.

During operation, the project will adhere to the requirements of Law 14/2025 and the general international workplace health and safety guidelines.

- **Information Disclosure**

Information regarding the Project shall be publicly available on an on-going basis and updated semi-annually as minimum. Information will be at an appropriate level of details and presented in an accessible mean (e.g., in Arabic with infographics used where beneficial).

This information is expected to include, but not be limited to, project progress updates; proposed future engagement and grievance mechanism; information about project activities; key contacts for the project; and other information, as needed.

The Nefer project ESIA package will be disclosed and uploaded to the following websites:

IPH: <https://weareinfinitypower.com/projects>

HAU: <https://www.hassanallam.com/sustainability>

Furthermore, the SEP and NTS shall be disclosed locally, with hard copies distributed to relevant stakeholders, including the Menya Governorate Office, the Labor Office, the City Council, EEAA offices and representatives, and non-governmental organizations. These documents shall also be made available to nearby communities, particularly local and vulnerable groups in Toukh El Kheil, Azbet Harby, and Abo Qurqas, through local subcontractors.

- **Grievance Management**

A project grievance management plan will be developed will include external and internal grievance mechanisms.

Handling grievances related to Gender-based Violence (GBV), Sexual Exploitation and Abuse and Harassment (SEAH) will be undertaken in accordance with the requirements set within EBRD<sup>48</sup> good practice Addressing Gender-Based Violence and Harassment. For grievances related to the above, the steps to be undertaken will be in compliance with the project SEP.

- **Socio-economic Monitoring**

The project will monitor the following socio-economic aspects on a regular basis:

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<sup>48</sup>EBRD, Emerging Good Practice for the Private Sector Addressing Gender-Based Violence and Harassment, <https://www.ebrd.com/news/2020/new-guidance-for-private-sector-on-addressing-risks-of-genderbased-violence-and-harassment.html>

- Concerns of the communities/activities with regard to the project;
- Local communities' needs (healthcare, water, etc.);
- Grievance mechanism is fully understood by local community; and
- Any unsolved grievances;

The grievance mechanism will also entail process for monitoring community grievances related to: Gender-based Violence (GBV), Sexual Exploitation and Abuse and Harassment (SEAH).

- **Management Plan Review**

The ESMPs will be reviewed to reflect any potential E&S changes and procedures will be re-issued, as/if needed. The Site Manager will be responsible for ensuring that the workforce is complying with procedures, informing the staff of any changes and ensuring that the personnel are aware of changes before starting any works. Table 45



Table 7-4: Proposed Social Monitoring Plan

Receptors / Source of impact/risk	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Approximate annual costs
Labour and Working Conditions	Project site	Health and safety measures No instances of forced or child labour reported.	Ongoing during construction and operation	All contractors and sub-contractors, supervised by Nefer company	Nefer Company and contactors EHS/HR personnel	Included in staff salaries
Information Disclosure	Project's Disclosure channels	<ul style="list-style-type: none"> <li>– Publicly available information.</li> <li>– Semi-annual updates provided.</li> <li>– Information in Arabic with infographics where beneficial.</li> </ul>	On-going basis during construction and operation and updated semi-annually	Nefer company	Nefer Company EHS personnel	Included in staff salaries
Grievance Management	Project site	<ul style="list-style-type: none"> <li>– Grievance management plan developed for internal and external grievances.</li> <li>– Compliance with EBRD good practice for GBV and SEAH grievances.</li> </ul>	Ongoing during construction and operation	All contractors and sub-contractors, supervised by Nefer company	Nefer Company and contactors EHS/HR personnel	Included in staff salaries
Socio-economic Monitoring	Project site and Aol	<ul style="list-style-type: none"> <li>– Regular monitoring of community concerns and needs.</li> <li>– Grievance mechanism understanding assessed.</li> <li>– Monitoring of unresolved grievances.</li> </ul>	On regular basis (quarterly)	All contractors and sub-contractors, supervised by Nefer company	Nefer Company and contactors EHS/HR personnel	Included in staff salaries

## 8. Stakeholders Consultation

Consultation with the community and stakeholders is an important element in the ESIA process. The current chapter presents the details of the individual consultations carried out during preparation of the ESIA.

The consultation methodology followed for the proposed project complies with both national requirements, as outlined in the ESIA Procedures Guidelines issued by the Egyptian Environmental Affairs Agency (EEAA) in January 2010, and international best practices, particularly the European Bank for Reconstruction and Development (EBRD) Performance Requirement 10: Information Disclosure and Stakeholder Engagement.

In accordance with these guidelines and standards, the consultation process included:

- Early identification of stakeholders during the scoping phase of the ESIA;
- Ongoing consultation throughout the preparation of the ESIA to ensure stakeholder concerns were adequately addressed;
- Transparent information disclosure tailored to the local context, ensuring accessibility and meaningful participation.

### 8.1 E&S Scoping activities

The stakeholders scoping meetings with different stakeholders categories took place at the E&S scoping phase to support the process of assessing the effects of the different projects' aspects on the environmental and social attributes within the project Area of Influence (AoI) and the determination of the irrelevant impacts (scoped out) and relevant impacts (scoped in) to be further considered in the project's detailed ESIA.

The Project's Area of Influence (AoI), associated infrastructure, the extent of the anticipated impacts, and the areas potentially affected by the induced and cumulative impacts of the Project were considered to identify stakeholders at this scoping stage. Stakeholder groups can broadly be divided into stakeholders who:

- May be directly and/or indirectly affected by the project.
- May have an interest in the project or the areas that may be affected.
- Have the potential to influence project outcomes or operations.

A first set of scoping consultation meetings took place with different stakeholders during the period 3-5 November 2025 with the purpose of scoping the ESIA activities and identifying potential additional stakeholders. A second set of meetings took place on Monday 16<sup>th</sup> March 2026

The scoping meetings took place with various categories of stakeholders including:

- Officials at Menya Governorate;
- Menya City Council
- Menya and About Qurkas local council environmental units
- Menya Water and Wastewater company
- Menya governorate environmental unit
- EEAA Regional Branch office

- Local municipality units
- NGOs
- Manager of ATLAS for Surveying, Engineering and General Contracting;
- Local investors in surrounding agricultural activities;
- Officials at saft El Khammar Local Unit;
- Officials at Toukh El Kheil Local Unit; and
- Manager and technicians at Toukh El Kheil Potable Water Treatment Plant.

#### **Key Discussion Points:**

All discussions with the stakeholders were conducted in Arabic and all stakeholders had the opportunity to ask questions and express their view regarding the project.

The key message received from all attendees, that all were supporting the national efforts taken to enhance the infrastructure that would secure the national energy supply to meet the domestic and industrial growing needs. Meeting this growing demand with energy generated from renewable sources was specifically welcome as it cleaner and more reliable. Stakeholders also supported the project as it will provide work opportunities to the community members.

The topics raised by the stakeholders during discussions can be categorized as follows:

- **General feedback on the project**
  - The project is highly welcomed, not only because of its benefits on the national level, but will also contribute to reducing power outage in the region.
  - The noise impact, which is the most significant during construction, was seen not to highly affect the neighbouring agricultural areas due to its temporary and intermittent nature.
- **Socio-economic issues:**
  - Labour and job opportunities: provision of job opportunities was the dominant topic in all stakeholders meetings. Stakeholders emphasised on the importance of provision of work opportunities for the communities and required that El Menya people should have the priority in employment.
  - Labour accommodation: was also discussed mainly due to the significant distance between the project location and the communities.
  - Provision of job opportunities in the project may affect availability of workers for other small economic activities in the area.
  - Provision of capacity building and training to the communities on PV
  - Potential support to vulnerable groups in the communities
  - Role of NOGs in cooperation with the project.
  - Ability of water and wastewater treatment plants to meet the project demand during construction activities
  - Available waste management infrastructure within Menya governorate
  - Medical facilities in Menya governorate
  - New road infrastructure for Nile crossing for transportation of PV and BESS components and construction material (Samallout and Mallawi Axis)
  - Meet energy needs of neighbouring agricultural activities

- **Impacts of the project on the environment:** Issues related to project's need for utilities and services including quantities and sources of water, wastewater and fuel.
- **Impacts of the environment on the project:** with specific reference to potential impact of venoms at the project site.

Annex (2) presents the detailed minutes of meetings of the stakeholders' scoping process.

## 8.2 ESIA Consultation

According to the national EIA guidelines, the stakeholders consultation is to be undertaken twice during the ESIA preparation process for Category (C) projects (High Risk, corresponding to Category A according to international systems). Consultation during the ESIA scoping phase aims to agree on the aspects and impacts that will be addressed and analysed in the ESIA. Stakeholders' meetings could be held with each concerned party individually or can take the form of a collective meeting where the concerned parties are invited to attend the meeting.

However, since the Nefer PV and BESS Project is categorised under "**Scoped Category B**" according to the national system, it will not require undertaking public consultation meetings, according to EEAA guidelines, and the consultation already undertaken during the scoping phase is sufficient. However, as per the Client/Lenders, a stakeholder consultation and public disclosure is to be organised.

Within the above context, the approach to undertake the public consultation was based on:

### 1. Focus on Local Stakeholders

The stakeholders to which invitations were sent were limited to those on the local level, the municipal level and the governorate level. Representatives of national organizations (such as EEAA and EETC) on the local/regional levels have also been invited. The public consultation was organized to ensure that vulnerable groups such as women and special needs were particularly invited to the meeting.

### 2. Announcement

In addition to invitation of targeted stakeholders, the meeting was open to other local stakeholders. Announcements will be issued 10 days before the meeting date.

### 3. Material for Consultation

A Non-Technical Summary (NTS) in Arabic was attached to invitations and made accessible through a link advertised on the Infinity Power Holding website.

In addition, a comment form has been prepared to be filled by stakeholders and submitted either in person or through mail/WhatsApp, for a period of 2 weeks after the meeting.

### 4. Venue of Public Consultation

Location of the public consultation took place in Menya governorate on April 16<sup>th</sup> at Nefertity Hotel in Menya governorate.

### 5. Meeting outputs

The outputs and results of the stakeholders scoping and public consultation and all comments and contribution are provided in Annex (3) includes the discussion register together with the attendance sheets

## **Annex (1): OHTL E&S Risks and Impacts**

## Associated Facilities: Overhead Transmission line (OHTL)

An OHTL will be established by EETC to connect the Project to the national electricity transmission network. Electricity generated from the solar photovoltaic (PV) plant and the Battery Energy Storage System (BESS) will be collected and stepped up through the project's 33/220 kV pooling substation located within the project site. The electricity will then be transmitted through the proposed OHTL to connect with the existing high-voltage transmission network located east of the project site, in the vicinity of the Giza–Aswan Western Desert Road corridor.

The alignment presented in this ESIA is preliminary and may be modified subject to EETC's final routing arrangements and detailed engineering design. The specific route, number of towers, and the exact connection point will be confirmed by EETC during the detailed design phase.

Within this context, this annex addresses the key OHTL specific E&S aspects and impacts. The detailed ESIA to be prepared by EETC will include a full-scale assessment of all relevant aspects of construction and operation of the proposed OHTL.

The proposed OHTL route originates from the project boundary, where the 33/220 kV pooling substation will be located, and extends from the project site towards the existing north–south high-voltage transmission line running parallel to the Giza–Aswan Western Desert Road. The alignment crosses areas of desert land and reclaimed agricultural plots before reaching the existing transmission line corridor, which represents the preliminary interconnection point. The total length of the proposed OHTL alignment is approximately 36 km.

Figure (1) below presents the preliminary proposed OHTL route. It indicates that the OHTL alignment crosses reclaimed agricultural areas in limited sections of the route. The installation of transmission towers will require permanent land occupation at tower foundation locations, while temporary land access may be required during the construction phase for equipment movement and installation activities.

The OHTL is considered an Associated Facility to the proposed renewable energy project and its construction, operation, and maintenance will fall under the responsibility of EETC. A separate detailed ESIA for the OHTL will therefore be prepared by EETC and submitted to the Egyptian Environmental Affairs Agency (EEAA) for review and approval.

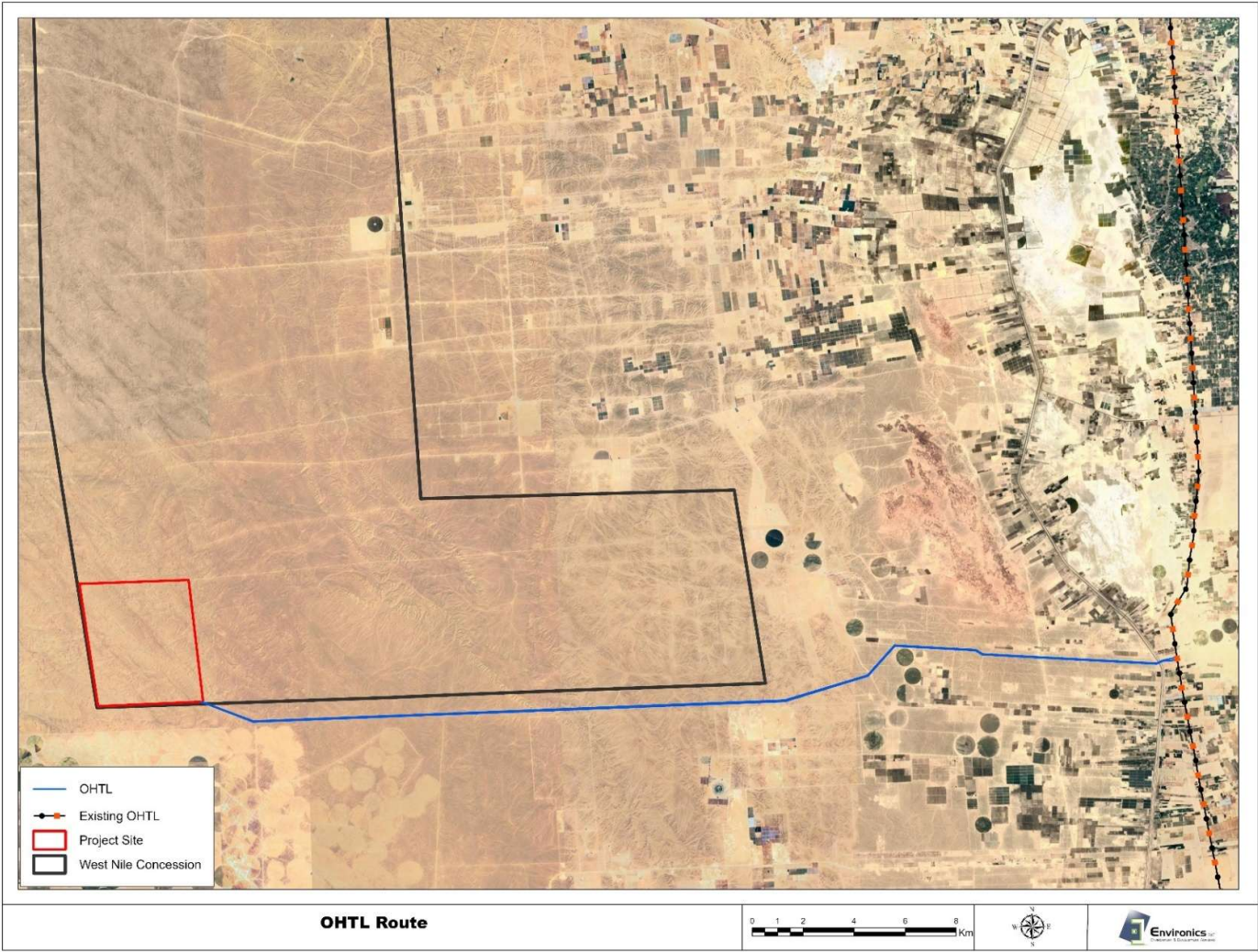


Figure 8: Preliminary proposed OHTL route



## 1. Project Description

The final design of the OHTL has not yet been confirmed. In this respect, the project description and assessment below are based on typical OHTL design and construction activities.

As this annex is meant to give a high-level understanding of potential impacts rather than the assessment of such impacts, the baseline environment was not specifically surveyed. However, its general nature of the OHTL alignment could be outlined as follows:

- There are no human settlements along the whole alignment.
- There are no water bodies along the alignment.
- The land use varies starting from the west (south of the project site), as desert land similar to the project context thoroughly described in the ESIA (Chapter 3), to reclaimed agricultural lands, and lands levelled in preparation for reclamation,
- Moving towards the east, land transformation from its natural state has already taken place
- On the other hand, although land to the west (the desert portion) is public land, reclaimed land and that prepared for reclamation is privately owned and/or used.

### 1.1. Project Components

The main components of the OHTL include transmission line conductors and supporting tower structures required to transmit electricity from the project 33/220 kV pooling substation to the existing electricity transmission network. The OHTL alignment presented in this ESIA represents a preliminary routing corridor identified for the purposes of environmental and social assessment. The final tower locations may change subject to EETC's detailed engineering design and routing arrangements.

The number and spacing of towers will be determined by EETC and the appointed construction contractor(s) and will be confirmed during the detailed design phase. IN general, typical distances between towers range between 400 to 600m.

#### Foundations

The specific tower locations will require site preparation prior to foundation installation. Tower foundations are typically constructed using reinforced concrete pad or pile foundations, depending on soil bearing capacity and geotechnical conditions identified during site investigations.

#### Lattice Steel Structure

Transmission towers are typically constructed using lattice steel self-supporting structures. The towers support the conductors through cross arms connected to the tower body. The final tower configuration (e.g., suspension towers or angle towers) will be determined during the detailed design phase.

### Right of Way (RoW)

Electricity transmission projects require a RoW to ensure safe construction, operation and maintenance of the line and to prevent contact with vegetation, buildings, utilities or other potential hazards that may affect the safety and reliability of the transmission system.

EETC will consider the requirements of Electricity Law No. 87/2015, which specifies a safe distance of 25m on each side of the OHTL centreline, in addition to maintaining appropriate safety distances from nearby infrastructure and other transmission lines.

The RoW will allow safe access for construction, inspection and maintenance activities.

### Conductors, insulators and Earth Wires

These components are installed on the transmission towers for electricity transmission and to ensure operational safety.

### Insulators

Insulator strings support the conductors and withstand both the normal operating voltage and potential surges caused by switching operations or lightning. Insulators are typically made of ceramic or toughened glass materials.

### Conductors

Conductors (power cables) are the primary components responsible for transmitting electrical power between the project and the national grid.

### Spacers and Dampers

Spacers are installed between bundled conductors to maintain the required separation and prevent conductor contact. Dampers are used to reduce oscillations and vibrations caused by wind effects.

A typical OHTL tower is shown in Figure 2 below.

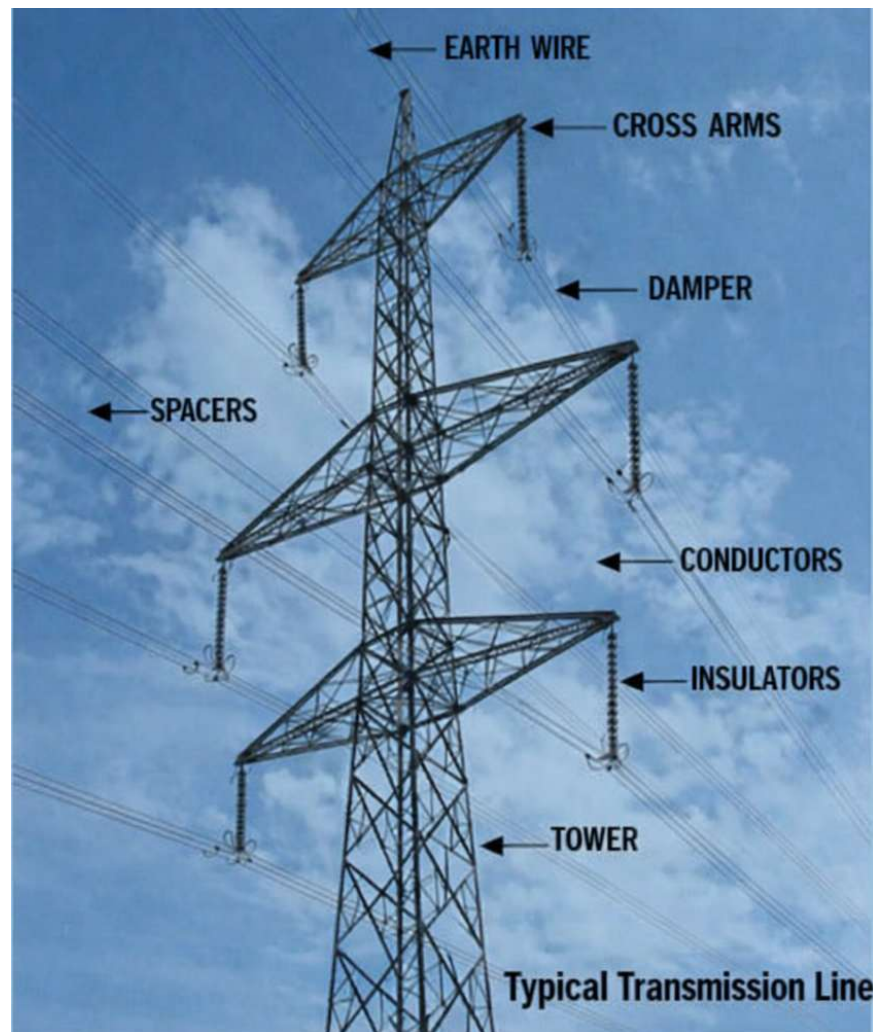


Figure 9: Typical Tower Components

## 1.2. OHTL Stringing process

Stringing refers to the set of activities associated with installing the conductors on the transmission towers.

The stringing process typically involves the following steps:

### Pilot line installation

A lightweight pilot line is installed between towers using rollers attached to the insulator assemblies.

### Pulling operations

The pilot line is connected to a conductor pulling rope attached to a tensioning machine. The conductor is then pulled through the towers using specialized pulling equipment. Pulling and tensioning equipment operate simultaneously to maintain proper ground clearance.

### Sagging and dead-ending

Once the conductor has been installed along the transmission line section, it is tensioned to achieve the correct sag. Proper sagging is necessary to accommodate conductor expansion and contraction resulting from temperature variations during operation.

Figure (3) below presents example for process of line stringing.

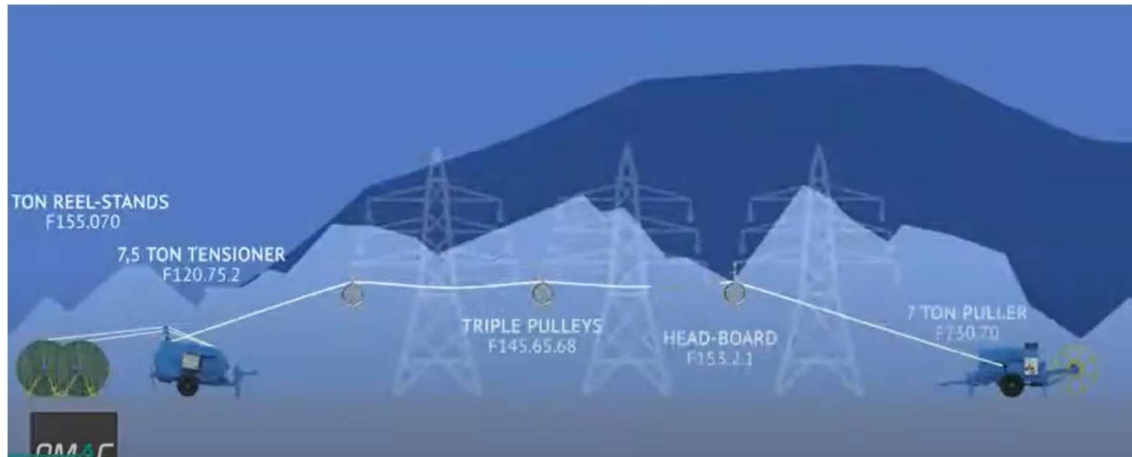


Figure 10: Example for line stringing

### 1.3. Pre-Construction Activities

Typical pre-construction activities may include:

- Surveying and marking tower locations and preparation of access roads.
- Geotechnical investigations.
- Design of tower foundations.
- Electrical design including tower configuration, grounding systems, sag and tension calculations.
- Preparation of OHTL EIA and submission to EEAA for approval.

### 1.4. Construction Activities

- Excavation for foundations.
- Construction of tower foundations.
- Excavation for tower foundations.
- Construction of reinforced concrete foundations.
- Assembly of transmission towers.
- Installation of electrical components and conductor stringing.
- Testing and commissioning of the transmission line.

### 1.5. Temporary Laydown Areas

During construction, temporary laydown areas may be established along with the alignment for storage of construction materials, equipment and tower components.

The location and size of laydown areas will be determined by EETC and the construction contractor(s) and will be confirmed during the detailed design phase.

### 1.6. Labour Requirements

During the construction phase, the project will require skilled labour (e.g., engineers, technicians and surveyors) as well as unskilled labour for construction activities.

During operation, no permanent staff are expected to be stationed along the OHTL alignment, as routine maintenance activities are typically undertaken by specialized maintenance teams from EETC.

Where possible, contractors may seek to recruit labour from local communities, subject to availability of the required skills.

### 1.7. Water Supply

Water required during construction will be supplied by water tankers sourced from approved suppliers. Drinking water will be bottled water.

### 1.8. Power Supply

Electricity required during construction activities will be supplied through temporary diesel-powered generators.

### 1.9. Waste Management

Solid waste generated during construction activities may include non-hazardous and hazardous waste streams.

Non-hazardous waste will be collected and transported by licensed contractors for disposal at approved facilities.

Hazardous waste may include used oils, contaminated containers and maintenance-related materials. These wastes will be temporarily stored in designated containers and managed in accordance with national regulations and GIIP.

Minimal waste generation is expected during the operational phase.

## 2. E&S Aspects and area of influence (Aoi)

### 2.1. E&S Aspects

E&S Aspect	Source(s)	
	Construction phase	Operation phase
<b>Land Uptake / Physical Transformation</b>	<ul style="list-style-type: none"> <li>Excavation for tower foundation construction at tower locations</li> <li>Temporary laydown areas for construction equipment and materials</li> <li>Temporary access routes for construction vehicles</li> <li>Anchoring areas for puller and tensioner equipment during conductor stringing</li> </ul>	N/A
<b>Land Acquisition / Land Use Restrictions</b>	<ul style="list-style-type: none"> <li>Permanent occupation of land areas at tower locations associated with installation of tower foundations</li> <li>Temporary access to land required for tower construction and conductor installation</li> <li>Temporary disturbance to agricultural land and crops where the alignment crosses reclaimed agricultural areas</li> </ul>	Land-use restrictions within the OHTL RoW corridor
<b>Ambient Noise</b>	<ul style="list-style-type: none"> <li>Operation of construction machinery and vehicles</li> <li>Excavation and tower installation activities</li> </ul>	Very low corona noise generated by high-voltage transmission lines under certain atmospheric conditions
<b>Air Quality (Dust / Emissions)</b>	<ul style="list-style-type: none"> <li>Dust generation from excavation activities and vehicle movement</li> <li>Exhaust emissions from construction machinery</li> </ul>	N/A
<b>Waste Generation / Hazardous Materials Handling</b>	<p><b>Non-hazardous waste:</b></p> <ul style="list-style-type: none"> <li>Construction material packaging</li> <li>Scrap metal and off-cuts</li> </ul> <p><b>Hazardous waste:</b></p> <ul style="list-style-type: none"> <li>Waste paints, oils, or solvents from equipment maintenance</li> <li>Potential soil contamination from accidental fuel or lubricant spills</li> </ul>	Minimal waste generation is expected
<b>Transportation Demand</b>	<ul style="list-style-type: none"> <li>Transportation of tower components, conductors, and construction equipment</li> <li>Movement of construction vehicles along local access roads</li> </ul>	Limited vehicle movement during periodic inspection and maintenance
<b>Workers Influx</b>	<ul style="list-style-type: none"> <li>Presence of skilled and unskilled construction workers during foundation construction, tower erection, and conductor installation.</li> </ul>	Limited personnel during inspection and maintenance activities
<b>Water Demand</b>	<ul style="list-style-type: none"> <li>Water required for concrete preparation and domestic use by construction workers</li> <li></li> </ul>	N/A
<b>Electromagnetic Fields (EMF)</b>	N/A	Electromagnetic fields generated by the transmission line
<b>Bird Collision / Electrocutation</b>	N/A	Potential bird collision or electrocution associated with overhead conductors

## 2.2. Area of Influence

Table 5: Environmental and Social Aspects AoI during OHTL construction phase

Environmental & Social Aspects	Area of Influence (AoI)
Land Uptake / Physical Transformation	Tower foundation temporary laydown areas, and temporary access routes along the OHTL alignment
Ambient Noise	Immediate vicinity of tower construction locations and nearby receptors along the OHTL alignment
Air Quality (Dust / Emissions)	Immediate construction areas along the OHTL alignment and nearby reclaimed agricultural land where the alignment intersects cultivated areas
Waste Generation / Hazardous Materials Handling	Construction areas along the OHTL alignment and temporary laydown areas
Land Acquisition / Land Use Restrictions	Tower foundation locations and temporary construction working areas along the OHTL alignment
Transportation Demand	Existing access roads and tracks leading to tower locations along the OHTL alignment, including the Giza–Aswan Western Desert Road corridor
Workers Influx	Construction sites along the OHTL alignment and their immediate surroundings The communities where the workers will be accommodated, if any
Water Demand	Construction areas along the OHTL alignment; water supplied by tanker trucks from authorized sources water treatment plants from which water will be sourced, as well as the communities served by these plants

Table 6: Environmental and Social Aspects AoI during OHTL Operation Phase

Environmental & Social Aspects	Area of Influence (AoI)
Land Uptake / Physical Transformation	N/A
Ambient Noise	Immediate vicinity of the OHTL alignment
Air Quality (Dust / Emissions)	N/A
Waste Generation / Hazardous Materials Handling	HTL alignment
Land Acquisition / Land Use Restrictions	OHTL RoW corridor where restrictions on buildings and tall vegetation apply
Transportation Demand	OHTL alignment and access roads used for periodic inspection and maintenance
Workers Influx	OHTL alignment during occasional inspection and maintenance visits
Water Demand	N/A
Electromagnetic Fields (EMF)	25m at each side of the line
Bird Collision / Electrocution	OHTL alignment and surrounding airspace where birds may interact with conductors and towers

### 3. Assessment of Potential Environmental and Social Impacts of the Proposed OHTL

In light of absence of detailed OHTL specific information, this section presents an overview of the potential environmental and social impacts of construction of the OHTL towers and in the potential anchoring of stringing machinery.

The comprehensive OHTL impact assessment should be discussed in the detailed ESIA that will be developed by EETC based on the project specific data. This document provides a high-level impact assessment that is to be revised at the project specific ESIA.

#### 3.1. Impact on physical environment

##### A. Land Uptake / Physical Transformation

- **Construction Phase**

During the construction phase, disturbances to land may occur as a result of tower foundation excavation, establishment of temporary access routes, movement of construction machinery, and conductor stringing activities along the proposed OHTL alignment.

Construction of the OHTL will require excavation works for tower foundations at tower locations along the alignment. The installation of tower foundations will result in permanent land transformation at the tower footprint locations. In addition, temporary working areas will be required during construction activities, including tower assembly areas, storage of construction materials, movement of construction equipment, temporary laydown areas, and temporary access routes for construction vehicles. Temporary anchoring areas may also be required for puller and tensioner equipment used during conductor stringing operations.

These disturbances will occur mainly at tower foundation locations and temporary working areas along the alignment. The duration of the disturbance is temporary during the construction phase, except for the permanent land occupation at tower foundation locations. The intensity of the disturbance is considered Slight, given the relatively small footprint of tower foundations and the localized nature of construction activities. Accordingly, the magnitude of the aspect is considered **Small**.

The main receptors affected by this impact include the existing land uses along the proposed OHTL route, which mainly consist of predominantly desert land with localized reclaimed agricultural areas. Desert land is considered to have low sensitivity, while reclaimed agricultural land is considered to have medium sensitivity due to its economic value and land productivity. Considering the limited extent of reclaimed agricultural areas intersected by the OHTL alignment, the Small magnitude of the aspect, the overall impact significance is assessed as **Minor**.



Proposed Mitigation Measures for EETC consideration

- Restrict construction activities to designated tower locations.
- Minimize the footprint of temporary working areas.
- Restore disturbed areas following construction activities where feasible.

Residual Impact

With the implementation of the above Proposed Mitigation Measures for EETC consideration, the residual impact on land use is expected to be **Insignificant**.

**B. Ambient Noise**

- **Construction Phase**

Construction activities associated with the installation of transmission towers may generate noise from excavation works, tower assembly, operation of construction machinery, and movement of construction vehicles.

These activities are temporary and localized within the construction areas. The duration of construction works is expected to be limited to the construction phase, and noise levels will decrease significantly once construction activities are completed.

The nearest residential receptor is Ezbet Muslim Abd El-Khalik, located approximately 8.5 km east of the proposed OHTL alignment. Other potential receptors include agricultural land users in localized reclaimed agricultural areas crossed by the OHTL alignment. The intensity of the disturbance is considered Slight, given the large distance to residential receptors, the temporary nature of construction activities, and the relatively small scale and localized nature of works, the magnitude of the aspect is considered **Small**.

The sensitivity of the receptors is considered **Low**, as the surrounding environment consists predominantly of desert land with limited agricultural activity and no nearby residential settlements. Considering the Small magnitude of the aspect and the Low sensitivity of the receptors, the overall impact significance is assessed as **Insignificant**.

Proposed Mitigation Measures for EETC consideration

- Machines and construction equipment must comply with the best practice technical developments.
- Periodical maintenance of machines and equipment with internal combustion engine according to the manufacturer's instructions.
- In addition, a grievance mechanism is to be adopted for assessing complaints associated with construction noise, if any.
- restrict construction activities generating significant noise to daytime hours where feasible to minimize disturbance to nearby receptors.

**Residual Impact**

No residual impacts.

- **Operation Phase**

During operation, overhead transmission lines may produce very low levels of noise due to the corona effect, which may generate faint crackling or humming sounds under certain atmospheric conditions, particularly during humid weather or rainfall.

Typical corona noise levels from high-voltage transmission lines range between 25–40 dB(A) at ground level under fair weather conditions and may increase to approximately 40–50 dB(A) during wet weather (EPRI, 2008; IFC, 2007). Such noise levels generally decrease rapidly with distance from the transmission line.

Given the low noise levels and their rapid attenuation with distance, the magnitude of the aspect is considered **Negligible**.

The potentially affected receptors include agricultural land users along parts of the OHTL alignment, while the nearest residential receptor, Ezbet Muslim Abd El-Khalik, is located approximately 8.5 km east of the alignment. The sensitivity of these receptors is considered **Low**, given the absence of nearby residential settlements and the predominantly desert setting.

Therefore, the operational noise impact from the proposed OHTL is assessed as **Insignificant**.

### **C. Potential Impacts on Air Quality**

- **Construction Phase**

Construction activities associated with the installation of transmission towers, including excavation works, soil handling, and the movement of construction vehicles, may generate dust emissions. In addition, construction machinery and vehicles may generate gaseous emissions from fuel combustion.

The spatial extent of this aspect is localized to tower foundation locations and temporary construction working areas along the OHTL alignment, where excavation activities and vehicle movements occur. The duration of the aspect is temporary and limited to the construction phase during periods of active excavation, soil handling, and equipment operation. The intensity of emissions is considered Slight, given the limited scale of excavation works and the intermittent nature of construction activities. Accordingly, the magnitude of the aspect is considered **Small**.

The receptors potentially affected include construction workers at the site and agricultural land users in reclaimed agricultural areas along parts of the OHTL alignment. The sensitivity of these receptors is considered **Medium**, as the surrounding environment mainly consists of open desert land with localized reclaimed agricultural areas and limited sensitive receptors. Considering the Small magnitude of the aspect and the Medium sensitivity of the receptors, the overall impact significance is assessed as **Minor**.

#### Proposed Mitigation Measures for EETC consideration

- Apply dust suppression measures where necessary.
- Apply strict speed limits on non-paved roads
- Maintain construction equipment to reduce exhaust emissions.
- Regular inspection and maintenance program for vehicles

Residual Impact

Residual impacts on air quality are expected to be **Insignificant**.

- **Operation Phase**

During operation, the transmission line is not expected to generate any continuous or process-related air emissions. Minor dust emissions could be expected from vehicles for maintenance, which impact is **Insignificant**.

**D. Waste Generation/ Hazardous Materials Handling**

- **Construction Phase**

Construction activities associated with tower foundation works, tower assembly, and equipment operation may generate both non-hazardous and hazardous wastes.

*Non-hazardous waste* may include packaging materials, scrap metal, and construction off-cuts, while *hazardous waste* may include empty containers of hazardous substances and small quantities of waste oils, paints, or solvents generated during equipment maintenance.

In addition, accidental spills of fuels or lubricants from construction machinery may occur, which could potentially result in localized soil contamination.

These waste streams will be generated primarily within the construction working areas and temporary laydown areas. The generation of such wastes will be limited to the construction period and will occur intermittently during construction activities. Given the relatively small scale of construction works and the limited quantities of materials involved, the intensity of waste generation is Slight, and therefore the magnitude of the aspect is considered **Small**.

The receptors potentially affected include surrounding soil and agricultural land within the construction working areas and temporary laydown areas. The sensitivity of these receptors is considered **Medium**. However, the nature of overhead transmission line projects involves discrete tower locations distributed along the alignment, meaning that construction activities will occur in small, localized, and discontinuous areas rather than across the entire corridor. Considering the Small magnitude of the aspect and the Medium sensitivity of the receptors, the overall impact significance is assessed as **Minor**.

Proposed Mitigation Measures for EETC consideration

- Segregate waste and store it in designated areas.
- Consider recycling and/or reuse whenever possible
- Dispose of waste through licensed contractors to be disposed of at authorized disposal facilities.
- Establish waste monitoring procedures to follow up on the proper implementation of mitigation measures
- Although quantities of Hazardous waste are expected to be minor, a parallel similar but separate system for adequate management and monitoring will be implemented

Residual Impact

Residual impacts related to waste generation are expected to be **Insignificant**.

- **Operation phase**

During operation, waste generation is expected to be minimal and limited to periodic maintenance activities, such as the replacement of minor components and packaging waste from spare parts. These activities are infrequent, short-term, and localized along the OHTL alignment. Hazardous waste, if any, and non-hazardous waste will be handled the same way they are during construction. Accordingly, the overall impact significance is assessed as **Insignificant**.

### 8.3 Impact on Socio-economic Environment

#### A. Land Acquisition and Land Use Restrictions

- **Construction Phase**

Construction activities associated with mobilization of construction equipment, establishment of temporary laydown areas, and conductor stringing will require temporary access to land along the OHTL alignment. These activities may result in temporary land use within construction working areas and may cause localized disturbance in reclaimed agricultural areas crossed by the OHTL alignment, particularly where construction vehicles access tower locations.

In addition, the installation of transmission towers will require permanent tower foundations, which will occupy small areas of land at individual tower locations throughout the operational lifetime of the transmission line.

This aspect is localized to tower foundation locations, temporary working areas, and access routes in reclaimed agricultural areas crossed by the OHTL alignment, while most of the OHTL route traverses desert land. The impact is temporary during the construction phase, except for the permanent occupation of land at tower foundation locations. The intensity of disturbance is considered Slight, given the small footprint of tower foundations and the localized nature of construction activities. Accordingly, the magnitude of the aspect is considered **Small**.

The receptors potentially affected include farmers and land users in reclaimed agricultural areas crossed by the OHTL alignment. Agricultural land represents an economically productive resource for local land users, and therefore the sensitivity of these receptors is considered **Medium**. Considering the Small magnitude of the aspect and the Medium sensitivity of the receptors, the overall impact significance is assessed as **Moderate**.

#### Proposed Mitigation Measures for EETC consideration

- To Identify and document landowners and land users potentially affected by tower foundation installation and temporary construction activities.
- Engage with affected landowners and land users prior to construction to inform them about planned works, access requirements, and applicable land use restrictions.
- Avoid or minimize disturbance to agricultural land where feasible through careful planning of tower locations, access routes, and temporary working areas.
- Restore temporarily disturbed agricultural land to pre-construction conditions to the extent feasible following completion of construction works.

- Provide compensation for any verified crop damage, loss of access, or permanent land occupation associated with tower foundations, in accordance with applicable national regulations and international lender requirements.
- Establish and communicate a grievance mechanism to allow affected land users to raise concerns related to land disturbance, access restrictions, or crop damage during construction.

### Residual Impact

After implementation of the proposed mitigation measures for EETC consideration, the residual impact is expected to be **Minor**.

- **Land Use Restrictions within the OHTL RoW**

- **Operation Phase**

During operation, land use restrictions will apply within the OHTL RoW corridor. These restrictions may limit certain activities, such as the construction of buildings, the use of certain irrigation systems (e.g., pivot irrigation), and the planting of tall trees directly beneath the transmission line, in order to maintain safe clearance between the conductors and ground-level activities. However, agricultural activities such as crop cultivation can generally continue within the RoW corridor.

The duration of these restrictions extends throughout the operational lifetime of the transmission line. The intensity of the restriction is considered Slight, as agricultural activities can generally continue within the corridor and only specific activities are restricted. Accordingly, the magnitude of the aspect is considered **Small**.

The potentially affected receptors include farmers and land users in reclaimed agricultural areas crossed by the OHTL alignment. The sensitivity of these receptors is considered **Medium**, as agricultural land representing an important livelihood resource for local land users, can still be used for its original purpose. Considering the Small magnitude of the aspect and the Medium sensitivity of the receptors, the overall impact significance is assessed as **Moderate**.

### Proposed Mitigation Measures for EETC consideration

- Identify land users potentially affected by land-use restrictions within the OHTL Right-of-Way corridor.
- Inform affected landowners and land users about the applicable land-use restrictions prior to construction and operation of the transmission line.
- Ensure that agricultural activities can continue within the corridor where compatible with safety requirements.
- Provide compensation for any verified economic losses resulting from land-use restrictions in accordance with national regulations and the requirements of EBRD PR5 / IFC PS5.
- Establish and maintain a grievance mechanism to allow affected land users to raise concerns related to land access or restrictions.

Residual Impact

Residual impacts are expected to remain **Minor**.

**B. Transportation Demand and traffic safety**

- **Construction Phase**

Construction of the OHTL will require the transportation of tower components, conductors, construction equipment, and materials to tower locations along the alignment, which may lead to temporary increases in vehicle movement along existing access roads and tracks.

These transportation activities will occur along existing access roads and tracks leading to tower locations along the OHTL alignment. The increase in traffic will be temporary and limited to the construction phase during the transport of materials and equipment. Given the limited scale of construction works and the intermittent nature of vehicle movements, the intensity of the traffic increase is considered Slight. Accordingly, the magnitude of the aspect is considered **Small**.

The receptors potentially affected include local road users and nearby land users along the access routes. The sensitivity of these receptors is considered **Low**, as the OHTL alignment is primarily accessed through unpaved desert tracks with limited existing traffic and few sensitive receptors. While traffic levels may be higher on main roads, such as the Giza–Aswan Western Desert Road, these roads can accommodate the additional traffic occurring during specific construction activities. Considering the Small magnitude of the aspect and the Low sensitivity of the receptors, the overall impact significance is assessed as **Minor**.

Proposed Mitigation Measures for EETC Consideration

- Plan transportation activities to avoid peak traffic hours where feasible.
- Ensure construction vehicles use designated access routes.
- Implement appropriate traffic management and safety measures during construction activities.

Residual Impact

With implementation of the above mitigation measures, the residual impacts are **Insignificant**.

- **Operation Phase**

During operation, transportation demand will be limited to occasional inspection and maintenance visits using existing access roads; therefore, impacts are expected to be **Insignificant**.

**C. Workers Influx**

- **Construction Phase**

Construction activities associated with tower foundation works, tower erection, and conductor stringing will require the presence of skilled and unskilled workers during the construction period.

The number of workers required for OHTL construction is expected to be relatively small, and construction activities will occur for a limited duration along the OHTL alignment. Workers are expected to be recruited locally where possible or accommodated within existing nearby larger towns. Therefore, the magnitude of the aspect is considered **Small**.

The receptors potentially affected include communities in which workers will be accommodated. As smaller settlements will be avoided, these will be larger towns. The sensitivity of receptors in larger towns are considered **Medium**, as larger town dwellers typically interact with out of town temporary residents. However, interactions of a concentrated number of single male workers may still cause community disturbance. . Considering the magnitude of the aspect and the Medium, sensitivity of the receptors, the overall impact significance is assessed as **Moderate**.

#### Proposed Mitigation Measures for EETC Consideration

- Prioritize local hiring where feasible.
- Ensure workers comply with codes of conduct, applicable on and off site, and community interaction guidelines.
- Develop labour management plans and code of conduct
- Maintain clear communication channels with the host communities in case of concerns related to worker influx.

#### Residual Impact

With implementation of the above mitigation measures, the residual impacts are **Minor**.

- **Operation Phase**

During operation, only a limited number of personnel will conduct periodic inspection and maintenance visits; therefore, impacts related to workers influx are expected to be **Insignificant**.

#### **D. Water Demand and Wastewater management**

- **Construction Phase**

Bottled water will be supplied to the workforce for drinking.

Potable Water will also be required during construction activities associated with the installation of tower foundations, particularly for concrete preparation and limited domestic use by construction workers. Even with ready mix concrete, water will still be needed for concrete curing. Water will be required for the workforce sanitary purposes.

Water will likely be supplied through water tankers from existing potable water sources, and the required quantities are expected to be relatively small due to the limited workforce and short construction duration. Domestic wastewater will be collected in tanks periodically emptied and disposed of in wastewater network/treatment plants. Therefore, the magnitude of the aspect is considered **Small**.

The receptors potentially affected are communities served by the water plants. The sensitivity of these receptors is considered **Low**, given that water is sourced from water plants of larger towns with adequate capacity. Considering the Small magnitude of the aspect and the Low sensitivity of the receptors, the overall impact significance is assessed as **Minor**.

#### Proposed Mitigation Measures for EETC Consideration

- Optimize water use during construction activities.
- Coordinate the supply of water requirements with the Water and Wastewater company to ensure that water is sourced from plants with adequate capacity.

#### Residual Impact

With implementation of the above mitigation measures, the residual impacts are **insignificant**.

- **Operation Phase**

During the operational phase of the OHTL, no routine water consumption is expected.

### **8.4 Community Health, Safety and Security**

#### **A. Increased Traffic**

- **Construction Phase**

Additional Traffic is expected during the construction phase for transportation of workers, material, equipment and components through vehicles of different sizes. This is distributed over the construction period, and destination is spread along the length of the OHTL alignment.

All vehicles will use the western desert road, on which the incremental traffic per day is expected to be small although some vehicles could be oversized. However, as traffic moves to unpaved roads leading to the construction site, it could expose the users of reclaimed land to safety risks

#### Proposed Mitigation measures for EETC Consideration

- Coordinate with the traffic department especially concerning the circulation of oversized vehicles
- All drivers are certified for safe driving
- Speed limits are strictly respected
- Grievances concerning safe driving are promptly addressed

- **Operation Phase**

Traffic will only be related to inspection and maintenance activities and is expected to be minimal

#### **B. Electromagnetic Fields (EMF)**

- **Operation Phase**

During operation, EMF are generated by the overhead transmission line as electric current flows through the conductors. These fields are a normal physical phenomenon associated with the operation of electrical transmission infrastructure.

Potential exposure would occur within the OHTL corridor and the surrounding buffer zone of approximately 25 m from the transmission line alignment. However, EMF intensity decreases rapidly with increasing distance from the transmission line and is expected to remain within



internationally recognized exposure limits, such as those recommended by the International Commission on Non-Ionizing Radiation Protection (ICNIRP)<sup>49</sup>. Considering the limited spatial extent of potential exposure and the rapid attenuation of EMF with distance from the transmission line, the magnitude of the aspect is considered **Small**.

The receptors potentially affected include agricultural land users and workers present within agricultural areas along the OHTL corridor and its buffer zone. The sensitivity of these receptors is considered **Low**, as exposure to EMF is intermittent and of short duration, and no permanent residential receptors are located in close proximity to the alignment. Accordingly, the overall impact significance is assessed as **Insignificant**.

#### Proposed Mitigation Measures for EETC Consideration

- Ensure that the design and operation of the transmission line comply with international EMF exposure guidelines, such as those established by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).
- Maintain appropriate RoW distances between the transmission line and surrounding land uses.
- Inform nearby land users about the safe use of land within the OHTL corridor.

#### Residual Impact

With implementation of the above mitigation measures and compliance with international safety standards, **no residual impacts** related to EMF exposure are expected.

## 8.5 Impact on the Biological Environment

### A. Bird Collision and Electrocution

- **Construction Phase**

There is no interaction with birds during the construction phase.

- **Operation Phase**

During the operational phase, overhead transmission lines (OHTL) obstruct air space<sup>50</sup>. This may pose a potential risk of bird collision or electrocution. Such interactions may occur when birds collide with conductors during flight or perch on tower structures and come into contact with energized components.

The potential interaction would occur along the proposed OHTL alignment connecting the project to the existing transmission network. The OHTL corridor extends over a considerable distance but traverses predominantly desert land, with reclaimed agricultural areas increasing eastwards towards the Nile Valley. The duration is permanent during operation, while the intensity of the impact is considered high, as the presence of overhead conductors may create a continuous obstruction within the airspace over a substantial length of the alignment, which

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<sup>49</sup> <https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf>

<sup>50</sup> The extent of such obstruction is a function of the OHTL design, which will be prepared by EETC at a later stage.

could result in potential bird interactions, particularly in areas where bird activity may occur. Accordingly, the magnitude of the aspect is considered **High**.

AVISTEP screening indicates that the OHTL crosses areas classified as having moderate to high avian sensitivity (approximately 46–55%), with records of species of conservation concern such as Steppe Eagle and Egyptian Vulture, as well as large-bodied birds that are more susceptible to collision.

On the other hand, MSBT results indicate that the OHTL alignment Site has a very low sensitivity index ( $\leq 0.001$ ) and is not considered a key location for migratory soaring birds at the site level. It is noted that MSBT assessments are based on a coarse spatial resolution (5 km buffer) and may not fully capture localized variations along the entire alignment. Nevertheless, the results are consistent with the broader ecological context, as migratory birds are known to primarily follow the Nile Valley, which provides more suitable conditions. The OHTL alignment does not cross key habitats such as wetlands or major roosting areas and is mainly located within desert areas of low ecological value, with only sections where reclaimed agricultural land that may attract localized bird activity.

While a total of 16 migratory species have been recorded within the wider area, and some migration routes may intersect parts of the alignment, these do not indicate a significant concentration of migratory activity at the site level. Only limited sections near reclaimed agricultural land may attract localized and occasional bird activity.

Current bird activity along the alignment is therefore expected to be limited; however, bird presence may increase in the future in response to potential expansion of agricultural activities in the surrounding area.

Accordingly, while the value of the receptors is high (especially for species of conservation concern), the exposure of receptors is considered **Low**, as the area crossed by the OHTL does not include major flyways and is of limited importance for migratory birds, as confirmed by MSBT results, and is predominantly characterized by low-value desert habitat. However, this may increase to **Medium** in the future with the potential expansion of agricultural activities in the surrounding area. The high aspect magnitude and the currently low receptor exposure makes the overall impact significance could safely be considered **Moderate**, but is likely to increase in the future.

#### Proposed Mitigation Measures for EETC consideration

- Ensure appropriate tower design to minimize electrocution risk, including adequate insulation and safe spacing between energized components, in line with international good practice for bird-safe powerline design.
- Avoid tower configurations that encourage perching or nesting on hazardous components, and incorporate bird-safe design features where feasible.
- Conduct periodic, risk-based inspections of the OHTL to identify bird interactions and apply adaptive management where required.
- In addition, install bird flight diverters on conductors and shield wires, particularly in sections near agricultural areas, as a precautionary measure considering the potential increase in bird presence associated with future agricultural expansion.

### Residual Impact

Following the implementation of the proposed mitigation measures, the residual impact is will be more Moderate to **Minor** in the future.

## 8.6 Occupational health and safety

### • Construction Phase

Construction activities associated with the installation of transmission towers, including excavation for tower foundations, tower erection, conductor stringing operations, and movement of construction machinery, may expose workers to a range of occupational health and safety hazards. These hazards may include exposure to construction noise, dust emissions from excavation activities, handling of heavy materials and equipment, working at heights during tower assembly, and potential risks of slips, trips, and falls within the construction site.

These impacts will occur within the construction areas along the OHTL alignment and will be limited to the construction phase of the project. Given the nature of OHTL construction activities and the presence of heavy equipment and work at height, the intensity of occupational hazards is expected to be moderate. Accordingly, the overall magnitude of occupational health and safety risk is assessed as **Medium**.

Sensitive receptors include construction workers and on-site personnel. Given that the identified risks are confined to routine construction activities within a controlled work environment, receptor susceptibility is considered **Medium**. Therefore, the overall significance of occupational health and safety impacts is assessed as **Moderate** prior to the implementation of mitigation and control measures.

### Proposed Mitigation Measures for EETC Consideration

EETC will ensure that contractors implement appropriate occupational health and safety measures, including:

- Compliance with national occupational health and safety regulations, including Labour Law No. 14/2025.
- Provision of appropriate Personal Protective Equipment (PPE) such as helmets, safety harnesses, gloves, and hearing protection.
- Development and implementation of a site-specific Health and Safety Management Plan.
- Provision of worker training programs on safe work practices, working at heights, and safe handling of equipment and materials.
- Implementation of site supervision and safety monitoring procedures.

### Residual Impact

With the implementation of the above mitigation measures and proper occupational health and safety management, the residual impact is expected to be **Minor**.

- **Operation Phase**

During the operational phase, occupational health and safety risks will mainly be associated with inspection and maintenance activities, including inspection of towers, maintenance of conductors, and access to tower structures.

These activities will occur infrequently and involve a limited number of maintenance personnel. The spatial extent of the activities will be limited to tower locations and exposure duration is short and intermittent. However, the nature of the activities involves working at height and potential exposure to electrical hazards, which may result in injuries if not properly managed. The intensity of the aspect is therefore considered Moderate. Therefore, the magnitude of the aspect is considered **Medium**.

The receptors include maintenance personnel responsible for inspection and repair of the transmission line infrastructure. The sensitivity of these receptors is considered **Medium**, as maintenance personnel are typically trained and experienced in handling electrical infrastructure. According, the overall significance of occupational health and safety impacts is assessed as **Medium**.

Proposed Mitigation Measures for EETC Consideration

- Implementation of appropriate maintenance safety procedures.
- Provision of specialized safety training for maintenance personnel.
- Use of appropriate PPE and fall protection equipment.
- Compliance with applicable electrical safety standards and procedures.

Residual Impact

With implementation of the above mitigation measures, the residual impact is expected to be **Minor**.

## **Annex (2): Stakeholders scoping meetings**

Topic	Discussions
<b>3/11/2025: Menya Governorate</b>	
<p><b>Secretary General Office</b></p> <p><b>Attendees:</b>  Labour  EIA  OHTL (associated facility)  Workers accommodation  Waste management and disposal  Water and WW management  Project access roads</p>	<ul style="list-style-type: none"> <li>The meeting included the relevant heads of the concerned departments in the governorate. These included: <ul style="list-style-type: none"> <li>Secretary General of Menya Governorate</li> <li>The governorate environmental unit</li> <li>EEAA regional branch office (RBO)</li> <li>The governorate urban planning department</li> <li>Governorate energy efficiency unit</li> <li>Governorate information system</li> <li>Youth Employment department</li> <li>Governorate information center</li> <li>Labour office</li> <li>social solidarity</li> </ul> </li> <li>Issues raised included the following: <ul style="list-style-type: none"> <li>E&amp;S categorization according to EEAA guidelines</li> <li>The responsibility for the OHTL construction and operation</li> <li>the number and qualifications of workforce required</li> <li>the project's daily water demand</li> <li>the workers accessibility to the project given its significant distance from the communities.</li> <li>Jobs advertisement mechanism</li> <li>Workers accommodation</li> <li>Administrative affiliation of the project site area</li> <li>Existing access roads</li> </ul> </li> </ul> <p><b>Discussions/responses</b></p> <ul style="list-style-type: none"> <li>Upon discussion with the representative of EEAA RBO it was confirmed that the project category is Scoped B according to EEAA project classification lists issued in June 2023. Accordingly, EEAA would not require organizing a public consultation meeting.</li> <li>The number of workers will reach up to 5000 workers during peak construction and about 100 during the operation phase.</li> <li>The labour qualifications required include low and semi-skilled labour for the construction works as well as highly skilled technical qualifications for the installation of the PV panels in addition to project management engineers.</li> <li>The project team clarified that the main contractors and sub-contractors will be encouraged to seek labour from the surrounding communities.</li> <li>Due to the site remoteness, attended advised that an on-site workers camp is the most suitable option for workers accommodation. In addition, the closest communities (at about 50km) are small communities and would not be able to accommodate large number of workers.</li> <li>The advertisement mechanism of the job opportunities and receipt of workers applications is proposed to take place through the governorate youth employment department.</li> <li>The head of the labour directorate advised that a data base exists including the different categories of construction contractors and their specialisations.</li> <li>It was clarified by the project team that the estimated water demand for the project during the construction phase is about 120m<sup>3</sup>/day. The attendees proposed utilizing groundwater to meet the project needs to avoid daily water trucking from the nearest water treatment plant which is at Toukh El Kheil located at about 49 km from the site.</li> <li>The project can be accessed through the Western Desert Road main road at about 40km east of the project site then through Al Ain service road (under construction).</li> </ul>
<b>4/11/2025: Meeting at ATLAS and with Local investors in surrounding agricultural activities</b>	
<b>ATLAS</b>	<ul style="list-style-type: none"> <li>A meeting was held with the Manager of ATLAS for Surveying, Engineering and General Contracting</li> <li>Discussions delt with groundwater wells in surrounding agriculture activities and potential use of groundwater by the project.</li> </ul>

Local Investors	<p>The meeting included representatives surrounding agricultural activities. The issues raised of included:</p> <ul style="list-style-type: none"> <li>– Energy demand in the area and potential project contribution to support the energy needs of the surrounding agriculture activities</li> <li>– Groundwater resources and quality</li> <li>– Water and wastewater and waste management facilities</li> <li>– Labour availability and labour accommodation in the communities</li> </ul> <p><b>Discussions/responses:</b></p> <ul style="list-style-type: none"> <li>– The attendees inquired if the project could provide the required energy to the neighbouring agriculture activities. It was clarified that the project will evacuate the generated energy to the national grid and not to the individual users.</li> <li>– It was clarified that the project will generally support the national energy demand.</li> <li>– Regarding water supply, attendees advised that there are various licensed groundwater wells in the area that are used by the surrounding agricultural activities. They advised that instead of water trucking, the PV project may purchase water from the neighbouring wells. The project team advised that such option could be investigated including the allowable water abstraction from the different wells.</li> <li>– Reportedly, the nearest wastewater treatment plant in Tukh El Kahil village can receive the generated wastewater.</li> </ul> <p>The nearest waste landfill is located in Balansoura village at about 50km east of the site.</p>
<b>5/11/2025: Saft El Khammar and Toukh El Kheil Local Units – Toukh El Kheil Water Treatment Plant</b>	
Saft El Khammar Local Unit	<ul style="list-style-type: none"> <li>– The meeting was held as it was reported that the project is administratively affiliated to Saft El Khammar Local Unit</li> <li>– After reviewing the different maps Head of the Local Units, mentioned that the project is affiliated to Toukh El Kheil Local Unit and not to Saft El Khammar.</li> <li>– Accordingly, , Saft El Khammar representatives suggested to meet the Head of Toukh El Kheil Local Unit, and accompanied the team to Toukh El Kheil.</li> </ul>
Toukh El Kheil Local Unit	<ul style="list-style-type: none"> <li>– The project site is administratively affiliated to Toukh El Kheil Local Unit.</li> <li>– Reportedly the population of Toukh El Kheil is about 95,000 persons. The vast majority of population work as farmers.</li> <li>– The municipality has one primary school, one preparatory school and one secondary school. No technical schools are available in the area.</li> <li>– The municipality is served by one water treatment plant, and one wastewater treatment plant is currently under construction and not yet operational. The area currently uses underground tanks for domestic wastewater disposal.</li> <li>– Reportedly, the area experiences frequent water shortage, especially in summer, when the water consumption increases and the water plant cannot meet such increasing seasonal demand.</li> </ul>
Toukh El Kheil Water Plant	<ul style="list-style-type: none"> <li>– The plant was established in 2007 with capacity of about 5,184 m<sup>3</sup>/d.</li> <li>– It is located at about 49 km from the project site.</li> <li>– The water treatment takes place through sand bed filtration and chlorine dosing</li> <li>– Reportedly, the capacity of the plant has not been increased since its establishment and there are no current plans for expansion to meet the continuously growing population demand.</li> <li>– It is not certain that this water plant can meet the project water requirements during the construction activities.</li> <li>– There is a larger plant at Towa Village, with a capacity of about 8,000 m<sup>3</sup>/d.</li> </ul>

<b>16/3/2026 Menya City Council</b>	
<b>Attendees</b> <ul style="list-style-type: none"> <li>– Deputy Head of Menya City Council</li> <li>– Head of environmental department –Menya city</li> <li>– Head of environmental department – Abu Qurkas city</li> </ul>	<ul style="list-style-type: none"> <li>• Issues discussed included the following: <ul style="list-style-type: none"> <li>– The project's water demand and the capacities of existing water treatment companies within Menya and Abo Qurkas cities. The head of Menya city council indicated that the project needs to apply to the Menya water company indicating the required water demand. He advised that the water company will be able to secure the required water demand.</li> <li>– The Menya city waste management capacity: The head of Menya council environmental department advised that a solid waste landfill is currently under development at Toukh El Kheil area. Another waste dumpsites exist in Balansoura in Abo Qurkas and Mallawi.</li> <li>– The workforce required: It was advised that job advertisements, labour qualifications of and receipt of workers applications can be done through the Menya governorate labour office.</li> <li>– Workers accommodation: it was advised that accommodation within the closest villages is not a preferred option mainly because housing in the villages are mostly family homes and do not offer renting for strangers from outside the village. In this respect, accommodation would be recommended to take place within Menya of Abo Qurkas urban areas where renting is available</li> <li>– The wastewater of the town of Meny is treated in the Talla Wastewater treatment plant which has a capacity of 53,600 m3/day and could accommodate the wastewater generated by the project in its peak construction period. .</li> </ul> </li> </ul>
<b>Chairman of Menya Water and Wastewater company</b>	<ul style="list-style-type: none"> <li>– The total water design capacities of the water treatment plants in Menya and Abo Qurkas are 313,240 and 106,320 m3/day respectively.</li> <li>– The Markaz of Menya has a total of 15 water treatment plants. Their capabilities vary from 2000 to over 100,000 m3/.day of which only 5 have capacities of more than 20,000 m3/day</li> <li>– On the other hand, Markaz Abo Qorkas has only 2 treatment plants of capacities of 4,320 and 102,000 m3 /day.</li> <li>– Discussions focused on the ability of the nearest water treatment plants to meet the project water demand. Representatives advised that the daily water needs, about 500m3/day, cannot be met through one of the nearby water treatment plants.</li> <li>– In this respect, the project needs to coordinate with the water company in advance to enable planning the supply from different water treatment plants within the governorate.</li> <li>– There are two options to acquire water, namely this could be through direct contract with the water company for water supply. In this case, water could be provided from the plants in which capacity permits, and the water company would use its own trucks. Alternatively, the project could contract a private company using its own trucks to acquire water from points specified by the water company.</li> </ul>
<ul style="list-style-type: none"> <li>– Head of EEAA Menya RBO</li> <li>– Head of environmental department- Menya governorate</li> </ul>	<p>Discussions included the following topics:</p> <ul style="list-style-type: none"> <li>– The catagorisation of the project where it was indicated that project is categorised as Scoped B project according to the national EIA system.</li> <li>– Accommodation of workers: Eng. Eftat advised that accommodation can be provided within Menya urban centres. In addition, considering workers camps on site, similar to the practice of the agricultural projects in the area, will reduce the costs of extensive transportation given the significant distances between the site and the Menya city centres.</li> <li>– Transportation: it was indicated that the new Sammalout and Mallawi axes can be used for transportation of imported PV modules and BESS components whether from Sokhna or Safaga ports.</li> </ul>



	<ul style="list-style-type: none"> <li>Labour: It was advised that unskilled labour are available in Menya governorate, while highly skilled technical and specialised labour will need to be sought from outside the governorate.</li> </ul>
NGOs	<p>A meeting took place with various NGOs working in different community support areas. Discussions included the following issues:</p> <ul style="list-style-type: none"> <li>Labour: the project may attract skilled construction workers in the governorate, thus potentially adversely affecting other construction activities. However, it was clarified that the temporary nature of construction activities is not expected to have significant impact on the other construction activities</li> <li>Capacity building: an issue was raised regarding the potential provision of capacity building to the technical school students to qualify them to work for the project. It was clarified that due to the relatively limited project construction time frame, provision of capacity building can be provided within the scope of the project CSR plans.</li> <li>Workers code of conduct is emphasized where accommodation of workers would take place within urban communities to control for potential frictions with the community including GBV.</li> <li>Role of NGOs: attendees indicated that NGOs may play a role in providing awareness to the communities with regard to the project and information about the skills needed by the project. They can also play a role with regards to potential areas of community supporting the project 's CSR plans. Moreover, NGOs can support the project through monitoring many issues including e.g. workers' conduct or impact on rental costs Agreement with the project on issues to monitor could be discussed in due time</li> </ul> <p>NGOs can also contribute to training personnel on general skills such as first aid.</p> <p>Employment of physically or mentally disabled individuals: Although a 5 % share of employment is required by law, this is not expected to apply to individual projects especially in the construction phase but rather on the total employment of the contractors. During operation, more permanent jobs could be available depending on the specific conditions of individuals.</p>
<b>17/3/206- New Menya Urban Authority</b>	
Deputy Head of New Menya Urban Authority	<p>Discussions included the following topics:</p> <ul style="list-style-type: none"> <li>Water treatment capacity: it was indicated that the design capacity of new Menya city is about 95,000m<sup>3</sup>/day to be operated in two phases of 45,000 and 50,000 m<sup>3</sup>/day. The current production of the first phase is 36,000m<sup>3</sup>/day</li> <li>It was advised the construction activities within the new Menya city are still on going and have not yet reached its maximum capacity. Accordingly, the current excess capacity makes it easy to supply the water needs of the project. Wastewater treatment capacity is also available</li> <li>It was also indicated that large number of the existing buildings are not yet occupied, thus providing sufficient workers accommodation. However, it was recommended to avoid concentrating large number of workers (especially unskilled workers), in one neighbourhood to avoid potential disturbances to the communities.</li> <li>Potential adverse impacts of the project may include increasing the cost of construction labour. However, due to the temporary nature of the construction activities, such impacts would not be significant.</li> <li>Waste management: there are two waste dumpsites for solid and construction wastes.</li> <li>Regarding medical services, there is only one specialized hospital, Cardiothoracic Hospital, within new Menya city. Plans for construction of a Central Hospital are underway expected to be established in 2027. In addition, a number of small health units exist that can provide first aid services.</li> </ul>

## **Annex (3): ESIA Consultation Meeting**

## ESIA Consultation Meeting: Stakeholders Comments and Responses

No.	Affiliation	Questions Raised	Responses
1.	Director of the Department of Environmental Affairs in Menya Governorate	<ul style="list-style-type: none"> <li>You mentioned that a labor camp will be set up and I think their number will be large, so what will be done about their sewage waste, especially since the nearest sewage treatment plant will at considerable distance?</li> </ul>	Domestic wastewater will be collected and properly contained in tanks that will be regularly emptied and transported to an authorized wastewater treatment. And given the distance there have been discussions about potential use of the grey water onsite for dust suppression, not yet confirmed, such that it would minimise the quantities of wastewater to be transported. In addition, transportation of large quantities may increase the demand transportation price in the area, which is a social impact that is worth paying attention to.
2.	Egyptian Countryside Development Company (El Reef El Masry)	<ul style="list-style-type: none"> <li>The project is close to the reclaimed agricultural lands that the company is working on reclamation, and you mentioned that the generated electricity will be transmitted to the national unified electricity grid. The company has already a medium voltage power line under construction, so can the Nefer PV project support our electricity needs directly or it he to be through the national grid?</li> </ul>	<ul style="list-style-type: none"> <li>The contractual agreement between the PV project company and the Government of Egypt states that all the generated electricity is to be transmitted to the national grid. The PV project does not have the freedom to choose to sell electricity.</li> <li>El Reef El Masry company may need to approach the Egyptian Electricity Transmission Company to ask if it is possible to coordinate direct transmission to you.</li> </ul>
3.	Better Life Foundation for Development	<ul style="list-style-type: none"> <li>It was mentioned that this project is not the first to be established by the Nefer PV project consortium since they have established similar projects in Benban. So will the previous experiences of these projects be benefited in this one?</li> </ul>	<ul style="list-style-type: none"> <li>The Benban project was the beginning of the big PV projects in Egypt. The proposed project is has a larger capacity than Benban and the consortium companies had extensive experience in Banban project. This</li> </ul>

No.	Affiliation	Questions Raised	Responses
		<ul style="list-style-type: none"> <li>Second, only environmental risks were mentioned, and I think that there are other risks that should have been studied and prepared for.</li> </ul>	previous experiences will of be very beneficial especially in training workers as well as coordination between investors in the construction of utilities
4.	Director of the Energy Conservation Unit in the Governorate	<ul style="list-style-type: none"> <li>Why has the BESS been considered whilst it would be more expensive even though previous projects were direct to the company?</li> </ul>	<ul style="list-style-type: none"> <li>Current national strategy is to rely on renewable energy to a greater extent which is planned to be 42% by 2030, and since such energy is variable in production, so it has become necessary to involve storage in times of abundance so that it can be used in times of low production such it does not affect the grid stability.</li> <li>There is another benefit of batteries, which is when performing maintenance for parts of the plant or the need to pump a larger amount as a result of overloads, so the stored energy is taken advantage of.</li> </ul>
5.		<ul style="list-style-type: none"> <li>What are the management measures to ensure proper waste and wastewater disposal</li> </ul>	<ul style="list-style-type: none"> <li>Waste contractors will be required to install a GPS tracking device in their waste transportation vehicles so that their route is confirmed and it is ensured that the have submitted to the authorized waste/wastewater disposal facilities. transport companies have a contract with the exchange companies.</li> <li>Only authorized waste contractors will be used. In addition, a waste manifest system will be applied.</li> <li>Regarding the wastewater tanks these will be insulated PVC tanks properly contained to make sure that no leakage takes place. are placed and covered from the top to</li> </ul>

No.	Affiliation	Questions Raised	Responses
			<ul style="list-style-type: none"> <li>On the other hand solid waste and other types of hazardous waste these will be stored onsite in designated areas and properly segregated.</li> <li>Hazardous waste quantities are somewhat limited and is mostly batteries, used tires, or filters, while the solid waste during the construction period is mostly wood, cardboard, paper, and so on.</li> <li>Clinical waste will be disposed off through authorised contractors.</li> </ul>
6.		<ul style="list-style-type: none"> <li>What is the negative effect of glare?</li> </ul>	<ul style="list-style-type: none"> <li>The panels are designed to absorb light, and only very small fraction could be reflected that may be reflected and result in glare,</li> <li>It is annoying and not dangerous, especially since the surrounding area has no road, so drivers are affected by it.</li> </ul>
7.	Directorate of Labor in Menya	<ul style="list-style-type: none"> <li>There must be an occupational safety and health organisational capacity in the project to ensure the proper application of occupational safety and health policies, and is to be responsible for identification of the different potential occupational risks and develop the risk management plans.</li> <li>The labour directorate at Menya governorate can provide the project with a OHS checklist to apply them in the project.</li> </ul>	<ul style="list-style-type: none"> <li>The project company already has highly qualified and experienced EHS team that develops the occupational health and safety plans and undertakes training of workers on such plans.</li> <li>All plans are developed and implemented in accordance with the national regulations and international E&amp;S standards,</li> <li>In addition, the EHS officers will also follow up on the procedures for the implementation of these management plans.</li> </ul>
8.	Future Eve Foundation	<ul style="list-style-type: none"> <li>The first point you mentioned is that there will be a high demand for transportation and we did not mention how to deal with it, especially that the</li> </ul>	<ul style="list-style-type: none"> <li><b>Regarding traffic</b>, coordination will be made with the local traffic departments to develop traffic plans</li> </ul>

No.	Affiliation	Questions Raised	Responses
		<p>entrance to Menya or the agricultural road and the entrance to the desert road is already very crowded, especially in the winter and the movement of students</p> <ul style="list-style-type: none"> <li>• Regrading the welfare of workers, are there clear procedures meant by workers' welfare, especially that it is a large number?</li> <li>• Regrading contractors' commitment to occupational safety and health, has it been announced in sufficient time for contractors and workers to prepare by preparing the required legal requirements?</li> <li>• Regrading protection of women and integrating them into the supply chains this is a good thing, please clarify the measures to be implemented to address this issue.</li> </ul>	<ul style="list-style-type: none"> <li>• The working hours of the project will avoid the rush hours during the day time of the students going out in schools or universities, for example, such that the work in the project does not affect the roads during this period.</li> <li>• <b>Workers' welfare:</b> <ul style="list-style-type: none"> <li>○ The worker's work area must be suitable (e.g. providing fresh water, meals during the working day and transportation to and from the work area) as well as other workers amenities at the workers camp</li> <li>○ Proper rest area will be provided.</li> <li>○ Providing mobile bathrooms within the project area and providing health standards in them.</li> <li>○ A grievance mechanism will be developed to address workers' complaints with the utmost transparency.</li> </ul> </li> <li>• <b>Subcontractors' compliance with international standards</b> <ul style="list-style-type: none"> <li>○ It will be the responsibilities of the EPC contractor.</li> <li>○ The EPC contractor will hold a consultation session with the representatives of the local community and will talk about the project and its needs, whether from different companies for supplying water, drainage, equipment... etc.</li> </ul> </li> </ul>

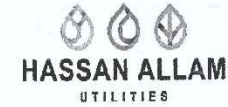
No.	Affiliation	Questions Raised	Responses
			<ul style="list-style-type: none"> <li>○ The general contractor will have a list of specifications or requirements from each contractor depending on the task or job they will be performing</li> <li>○ A project <b>Community Liaison Officer (CLO)</b> will be appointed who will be responsible for coordination and communication with the local community, and among the tasks assigned to him is to make sure that the local community has received all the information about the project, and to introduce the available jobs and how to apply for them, and to make sure that they have reached the largest possible number of people.</li> <li>● <b>Job advertising:</b> There will be a project website in coordination with the Labour Office where jobs will be advertised.</li> <li>● There will be announcements on the Ministry of Labour page, the Labour Directorate's e-page, and the governorate's page, and the required jobs and their requirements will be clarified. The project can also benefit from the database at the youth employment department at the governorate.</li> </ul>
9.	Directorate of Labour in Menya	<ul style="list-style-type: none"> <li>● There is an office at the labour directorate called employment offices that have a ready database for all the required professions in which all artisanal workers are registered as well as different categories of contractors.</li> </ul>	

No.	Affiliation	Questions Raised	Responses
10.	Secretary General of Menya Court and member of the National Council for Women	<ul style="list-style-type: none"> <li>We need to know the role of women and is she an actress in this project</li> <li>I see that the project has hard work, will it be suitable for women's work and will there be real opportunities for women's work?</li> </ul>	<ul style="list-style-type: none"> <li>The jobs available to women in the project are many, including occupational safety and health jobs, human development specialist, complaints specialist, etc. etc.</li> <li>We faced a challenge in the Benban project in Upper Egypt for women's work – and a large percentage of women are now working on this project.</li> <li>Job opportunities are offered in full transparency and here will be no discrimination between males and females - there will be full transparency and those who meet the terms of the job will be hired</li> </ul>
11.	Not mentioned	<ul style="list-style-type: none"> <li>Are there expectations for the role of NGOs in the project?</li> </ul>	<ul style="list-style-type: none"> <li>NGOs can be the communication channel between the project and the community.</li> <li>For example, the NGO would be the channel through which information about the complaints mechanism and the effort that will be made with it are disseminated and communicated to the communities.</li> <li>It is also possible to have cooperation protocols with NGOs and local universities includes organising periodic visits to the project.</li> <li>NGOs can be also the facilitate the project reach out to vulnerable groups within the communities such as women people with disabilities.</li> </ul>
12.	Al Karma Contracting & General Supplies Company	<ul style="list-style-type: none"> <li>We as a company represented in the local community – when will it be our turn, who we will work with and when will work on the project begin?</li> </ul>	<ul style="list-style-type: none"> <li>The start of the project when it takes all the necessary approvals from the concerned authorities, including the Environmental approval.</li> </ul>



No.	Affiliation	Questions Raised	Responses
			<ul style="list-style-type: none"> <li>• The start of the project will be several months after the appointment of the EPC contractor.</li> <li>• The EPC contractor, after being appointed, will start communication with the communities and the different contractor to discuss all issues related to procurement and the mechanism of tendering will be clarified.</li> <li>• All procedures are done transparently and are announced by the EPC contractor</li> </ul>
13.	Director of the Environmental Affairs Authority in Menya	<ul style="list-style-type: none"> <li>• How will the hazardous wastes resulting from excavation and also non-hazardous wastes be disposed of?</li> <li>• How will solid waste be disposed of?</li> </ul>	<ul style="list-style-type: none"> <li>• As previously mentioned the disposal of solid waste will take place through authorised contractors</li> <li>• Hazardous wastes, mostly include used oils, batteries, medical waste and will be transported and disposed off by authorized hazardous waste contractrs.</li> <li>• Other non-hazardous wastes such as wood, paper and cardboard, they will be recycled, so the party that will take these wastes must be an approved entity and then have the necessary environmental licenses and approvals</li> </ul>
14.	National Council for Women	<ul style="list-style-type: none"> <li>• Is there a specific plan to train workers before they are hired?</li> </ul>	<ul style="list-style-type: none"> <li>• This project will be the nucleus of the big project in Menya Governorate where other PV projects with be constructed with NREA concession..</li> <li>• Workers on this project will be qualified to work and train other workers in the coming PV projects.</li> </ul>

No.	Affiliation	Questions Raised	Responses
			<ul style="list-style-type: none"> <li>As for training from universities and technical schools: as happened in the Benban project.</li> <li>There are two types of training: (1) training to work in this project, and it will often be in the operational phase because it is extended – I can train them and then they work on the project. (2) Training resulting from social responsibility – in the sense that I train people although I will not benefit them in working on this project, but they will be the nucleus of the labor market in other similar future projects.</li> </ul>
15.	Professor at the Faculty of Engineering, Menya University	<ul style="list-style-type: none"> <li>Solar panels are cleaned periodically, so is there any idea to use the water from cleaning in agriculture so that it improves the environment under solar panels like plants that don't need the sun?</li> <li>Will the panels be titanium coated?</li> </ul>	<ul style="list-style-type: none"> <li>Cleaning will be dry most of the time, and the expectation is that wet cleaning of the panels will take place only twice a year.</li> <li>Cleaning with water will not result in a lot of water that can be utilized.</li> <li>In addition, most of the panels on the market are coated with layers that prevent dust from sticking to them such that they do not require wet cleaning.</li> </ul>
16.	Head of the EEAA RBO in Menya and Beni Suef	<ul style="list-style-type: none"> <li>Is there a future thought to maximize the utilization of residues and reuse greywater back into agriculture?</li> <li>Is it possible to make a green fence with sewage waste?</li> </ul>	<ul style="list-style-type: none"> <li>There is a Difficulty in Using Grey Water in Agriculture and the resulting water will not be large</li> <li>It is not possible to establish green landscape because it will attract insects, reptiles and may affect cables</li> </ul>



## التشاور العام للدراسات البيئية والاجتماعية

### لمشروع محطة نيفر للطاقة الشمسية

محافظة المنيا

٦ أبريل ٢٠٢٦

رقم المحمول	الجهة	الاسم	م
	مجلس الحياة الافضل للتميز		١
	مجلس قروى مخطط الجمار ٢ احفظها		٢
	مجلس مجلس الراحمين المساحه		٣
	انفيسى جاور		٤
	مؤسسة, لكرمة للزنا - الاثابيه		٥
	شركة الصفا للمحركات البيئية		٦
	مدير ادارة شؤنه البيئيه بابو غرقا		٧
	شركة أنفيسى جاور		٨



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## التشاور العام للدراسات البيئية والاجتماعية

لمشروع محطة نيفر للطاقة الشمسية

محافظة المنيا

١٦ أبريل ٢٠٢٦

رقم المحمول	الجهة	الاسم	م
	مقر الشركة		١
	مدير عام شركة النهر في (المنيا)		٢
	الطلاب الكرام للمطاولات		٣
	مدير عام شركة النهر في (المنيا)		٤
	مدير عام شركة النهر في (المنيا)		٥
	مدير عام شركة النهر في (المنيا)		٦
	مدير عام شركة النهر في (المنيا)		٧
	مدير عام شركة النهر في (المنيا)		٨



## التشاور العام للدراسات البيئية والاجتماعية

لمشروع محطة نيفر للطاقة الشمسية

محافظة المنيا

١٦ أبريل ٢٠٢٦

رقم المحمول	الجهة	الاسم	م
	المجلس القومى للرأه		١
	المنع لعمرك للرأه		٢
	رؤس محله اندوس كبريا رحل		٣
	بشركه صفا بوسيد		٤
			٥
			٦
			٧
			٨



## التشاور العام للدراسات البيئية والاجتماعية

### مشروع محطة نيفر للطاقة الشمسية

محافظة المنيا

١٦ أبريل ٢٠٢٦

رقم المحمول	الجهة	الاسم	م
	شركة تنمية الریف المصری الجدید		١
	مدير مشورہ البيئہ بالدعمه المحليه لمركز تنمية المنيا		٢
	شركه اكلسا (محتلى لزاوہ ارض المملوك)		٣
	شركة حسن علم		٤
	مدير إدارة مشورہ بيئہ		٥
	م. س. هوارا كستيل		٦
	SLR		٧
	SLR		٨



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التشاور العام للدراسات البيئية والاجتماعية

لمشروع محطة نيفر للطاقة الشمسية

محافظه المنيا

١٦ أبريل ٢٠٢٦

م	الاسم	الجهة	رقم المحمول
١		FMO	
٢		مديره العمل بالمنيا	
٣		شركة أطلسم	
٤		مدير شركة كاسمير الحياه	
٥		عضو المكتب شركة دقا لفرامس النهر	
٦		صاحب شركة الألبم للنقل والتو	
٧		جواند المتحضر البقر	
٨		المالك الاستشاري/ آر ميل	





## التشاور العام للدراسات البيئية والاجتماعية

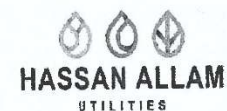
### لمشروع محطة نيفر للطاقة الشمسية

#### محافظة المنيا

١٦ أبريل ٢٠٢٦

رقم المحمول	الجهة	الاسم	م
	جهاز شئون البيئة		١
	جهاز شئون البيئة بالمنيا		٢
	جهاز شئون البيئة بالبحري		٣
	جهاز شئون البيئة		٤
	جهاز شئون البيئة		٥
	المجلس القومى للمرأة		٦
	مكتب المجلس (جهاز مدينة)		٧
	دعوة		٨





## التشاور العام للدراسات البيئية والاجتماعية

### لمشروع محطة نيفر للطاقة الشمسية

محافظه المنيا

١٦ أبريل ٢٠٢٦

رقم المحمول	الجهة	الاسم	م
	جهاز ستون البيئة مدبر قسم لتوجيه		١
	جهاز ستون البيئة - أحياء نامري		٢
	جهاز ستون البيئة - إدارة البيئة		٣
	جهاز ستون البيئة - الإدارة العامة		٤
	جهاز ستون البيئة - الإدارة العامة		٥
	جهاز ستون البيئة - الإدارة العامة		٦
	جهاز ستون البيئة - الإدارة العامة		٧
	جهاز ستون البيئة - الإدارة العامة		٨