# NON-TECHNICAL SUMMARY

SCATEC NAGA HAMMADI 1GW SOLAR PV + BESS

FEBRUARY 2025

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# 1. INTRODUCTION

## 1.1 Background

Sctatec ("Obelisk") is planning to develop a Photovoltaic (PV) Power Plant with a capacity of 1GW, including a 100mW/200MWh Battery Energy Storage System (BESS). The proposed project is located on 21 km² of vacant desert land south of Nagaa Hammadi, Qena, Egypt. It has been allocated by the Egyptian government to NREA for Renewable Energy Project. The project site is located at about 0.5 km west of the Hiw light industrial zone in Nagaa Hammadi. The nearest residential area is approximately 5.6 km away north of the site as well as a number of reclaimed agricultural lands. The Giza-Luxor Road is 3 km to the north. The site can be accessed via a paved road approximately 0.5 km to the east of the site.

The Project will enhance the reliability of solar power generation in Egypt by incorporating battery storage, enabling the country to meet its declared renewable energy targets. This project is significant for Egypt, as it introduces one of the first utility scale BESS in the country and its implementation will pave the way for a broader rollout of storage-integrated renewable projects, helping to address the challenges posed by the intermittent nature of renewable energy sources. It will also support the country's efforts to increase its renewable energy share of total energy generation.

More broadly, the Project will be delivered under the 10 GW renewable programme under the Nexus Water-Food-Energy Programme (NWFE) country platform. EBRD leadership in developing the Energy Pillar under NWFE is a major policy engagement first announced at COP27.

Environics was assigned by Obelisk to develop the project's ESIA according to the national laws as well as the environmental requirements of international financing institutions, including the Performance Standards (PS) of the International Finance Corporation (IFC), the Performance Requirements (PR) of the European Bank for Reconstruction and Development (EBRD), and the regulations of multilateral development banks such as the African Development Bank (AFDB).

# 2. PROJECT DESCRIPTION

The project site spans approximately 3888 Feddan in an undeveloped desert area, located about 0.5 kilometers west of the Hiw light industrial zone in Nagaa Hammadi. The nearest residential area is approximately 5.6 km away north of the site as well as a number of reclaimed agricultural lands. The Giza-Luxor Road is 3 km to the north. The site can be accessed via a paved road approximately 0.5 km to the east of the site Figure 1 below shows the activities/land uses surrounding the proposed site.

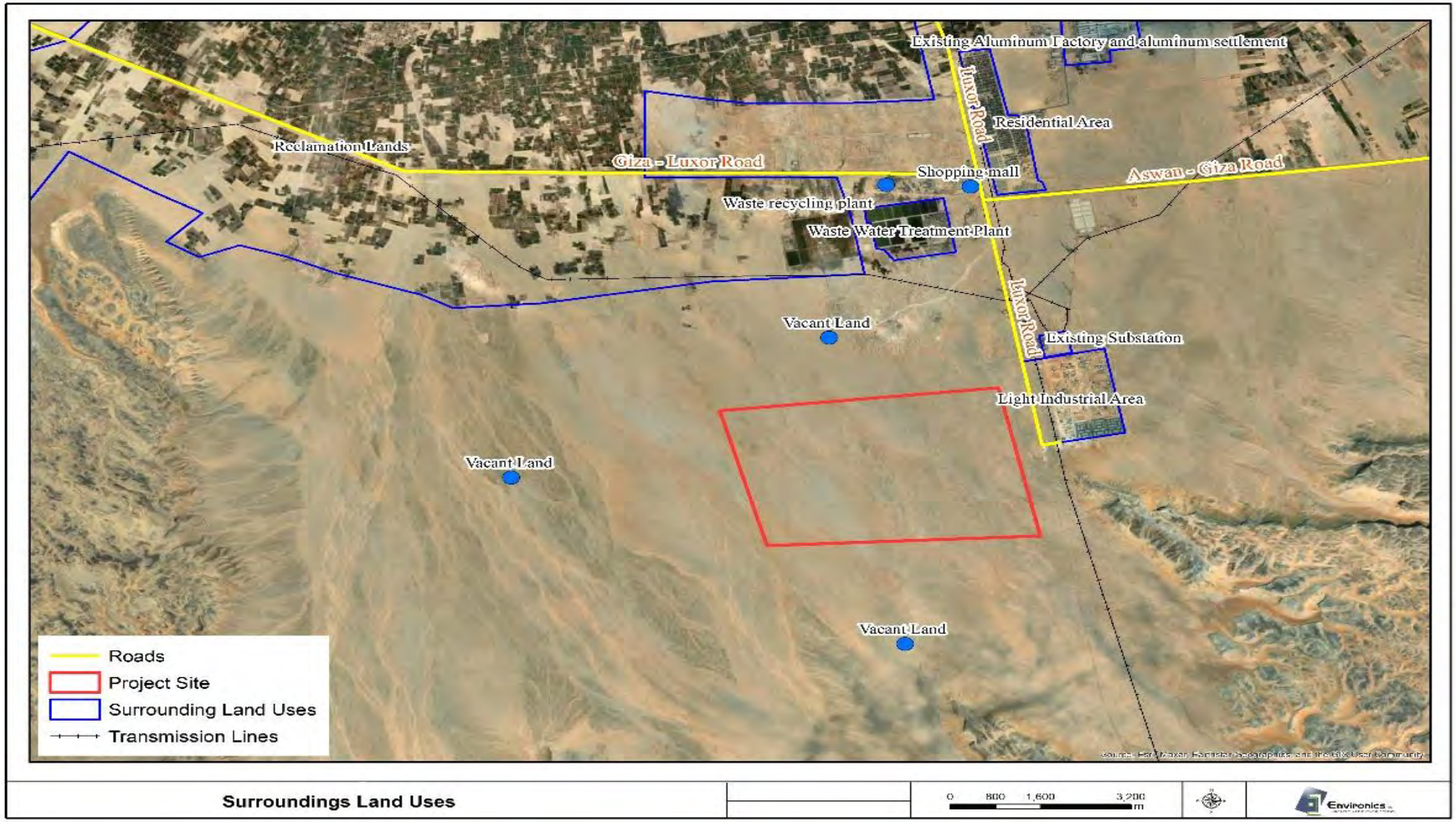



Figure 1: Location and surrounding activities of the project site

In February 2025, the Project land area changed. The previous project land area was approximately 3888 feddan (~16.3km2), to which an additional ~4km2 have been added[1] to become ~4800 feddans (~20.2 km2). The whole land area, including its extension, is located within an undeveloped desert area, at about 162 meters west of the road serving Hiw light industrial zone in Nagaa Hammadi, which also provides access to the project site.

The extension of the project area does not change its relation to the surrounding land uses/receptors. The nearest residential area as well as a number of reclaimed agricultural lands are still approximately 4.7 km away north of the site and the Giza-Luxor Road is 4 km to its north.

Figure 2 below presents the land area modifications.

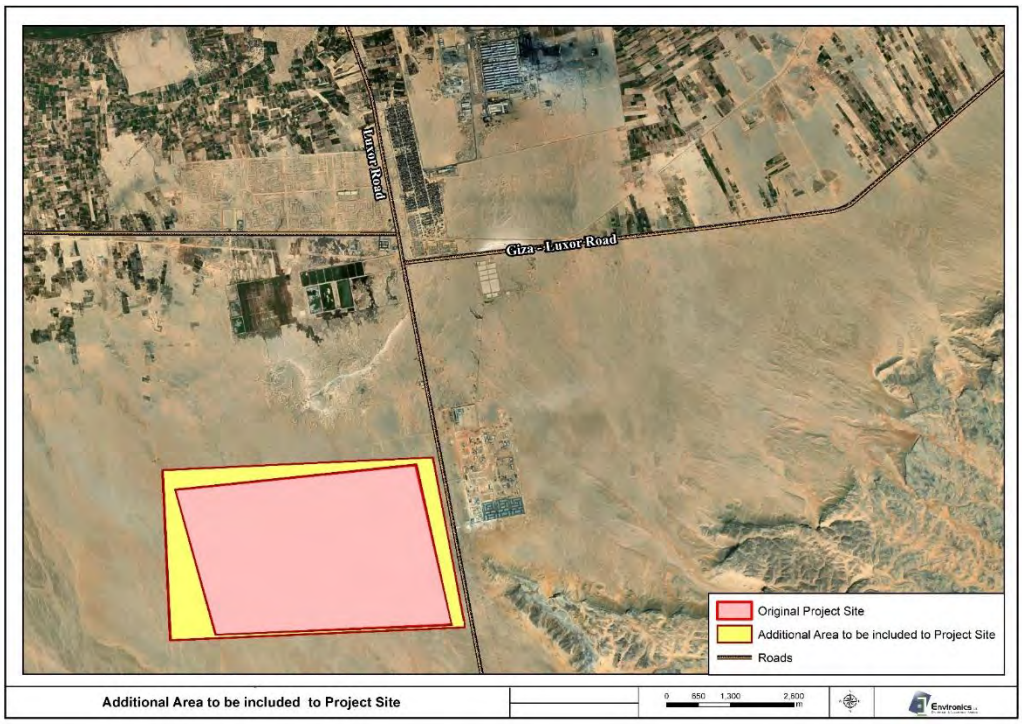



Figure 2: Project land area modifications

[1] The 4km2 has been requested for and are in advanced stages of finalization with NREA.

## 2.1 General Outline

The Photovoltaic Power Plant will utilize high-efficiency mono-crystalline silicon solar panels along with single-axis tracking systems (horizontal single axis tracker -1P Dual Row) to maximize energy capture. Additionally, a BESS using lithium-ion battery modules will be integrated to store and manage the generated energy.

The project will be connected to the national grid through an overhead transmission line (OHTL) to be constructed by the Egyptian Electricity Transmission Company (EETC) and to connect to existing substations.

## 2.2 Project Components

a) Component 1: Solar field Photovoltaic modules: High-efficiency mono-crystalline silicon solar panels

- Solar Panels
  - PV Plant using 1,620,750 photovoltaic modules, each with a peak power output of 710 watts. These modules are known for their high efficiency and bifacial technology, which allows them to generate electricity from both sides, maximizing energy production.
  - Mono-crystalline silicon PV panels will be connected in series to produce DC output from incident irradiance. The Key design parameters include the orientation and tilt angle, and shading from surrounding obstructions.

- Mounting structures
  - For optimal performance, PV systems aim to maximize the time they face the sun. In static mounted systems modules are often set to latitude tilt, an angle equal to the latitude. To continuously orient the panels towards the sun, the project will adopt a single-axis horizontal tracking system.
  - PV modules will be installed at a single-axis horizontal tracking system that has a maximum height of approx. 105 m at -60°/+60° turning angle range. The following table describes the PV module.
  - The PV arrays will be spaced appropriately, considering local topographic conditions. This spacing is designed to minimize shading effects and optimize solar exposure, ensuring maximum efficiency and environmental compatibility.

Table 1: Module Description (1000MWac/ 1150MWp)

| Item Description | Unit | Total Qty for 1000MWac |
|---|---|---|
| PV Modules (710Wp) | Nos | 1 620 750 |
| Substructure –Tracker | Tables | 18007 (3/2 strings per table) |
| No. of PV Module per table | Module | 90/60 |
| Inverter | Nos | 3975 |
| No. of blocks/ MV transformer station | Nos | 133 |
| Technology | ---- | Bifacial |
| BESS Container | Nos | 48 |
| 220/33kV Pooling Substation (4 X 250 MVA Power transformers) | | |

- Inverter systems

  Inverter systems are used for converting the direct current (DC) generated by photovoltaic modules into alternating current (AC) and can be fed into the grid. The components of the inverter system are as follows:

  - *Inverters*

    The project will utilize 3,975 inverters to convert the DC generated by the photovoltaic modules into AC for use in the power grid. These inverters will handle the conversion process, ensuring efficient energy transmission. The project will employ inverters with a total capacity of 1,131 MVA, and approximately 80 MVar of reactive power will be supplied by the BESS.

  - *Switchgear*

    The electrical equipment used to manage and protect the medium voltage (33kV) circuits before the voltage is stepped up to 220kV for transmission. This switchgear is crucial for ensuring the safe and efficient operation of the electrical system within the substation.

b) Component 2: 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 use lithium nickel manganese cobalt oxide (NMC) or lithium iron phosphate (LFP) for their cathodes.

The BESS will comprise multiple battery units or modules housed in shipping containers or suitable housing 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. The solid-state batteries under consideration are Lithium-ion systems. Figure 3 illustrates the BESS.

Key Components of the BESS

1. Battery Modules
   - The core of the BESS, typically lithium-ion batteries with a designed capacity of 205 MWh and a dispatchable capacity of 100MWac/200MWh AC-coupled BESS, with no augmentation (degrades over the project lifetime)
   - Connected in series and parallel to achieve the required capacity.
   - Housed in weatherproof, insulated containers to protect from environmental conditions.
   - BESS is designed to operate on only one full cycle per day. Once the BESS is charged to 100% State of Charge (SoC), it will accommodate Ancillary Services and load shifting. However, upon the first measurement of 0% SoC, all services will be suspended for the remainder of the day.
   - The BESS can store energy and then release it during the specified time frame of 7 pm to 9 pm, depending on how much of its capacity is allocated for Ancillary Services. Ancillary Services are essential for maintaining the stability and reliability of the power grid.
   - 
2. Battery Management System (BMS)

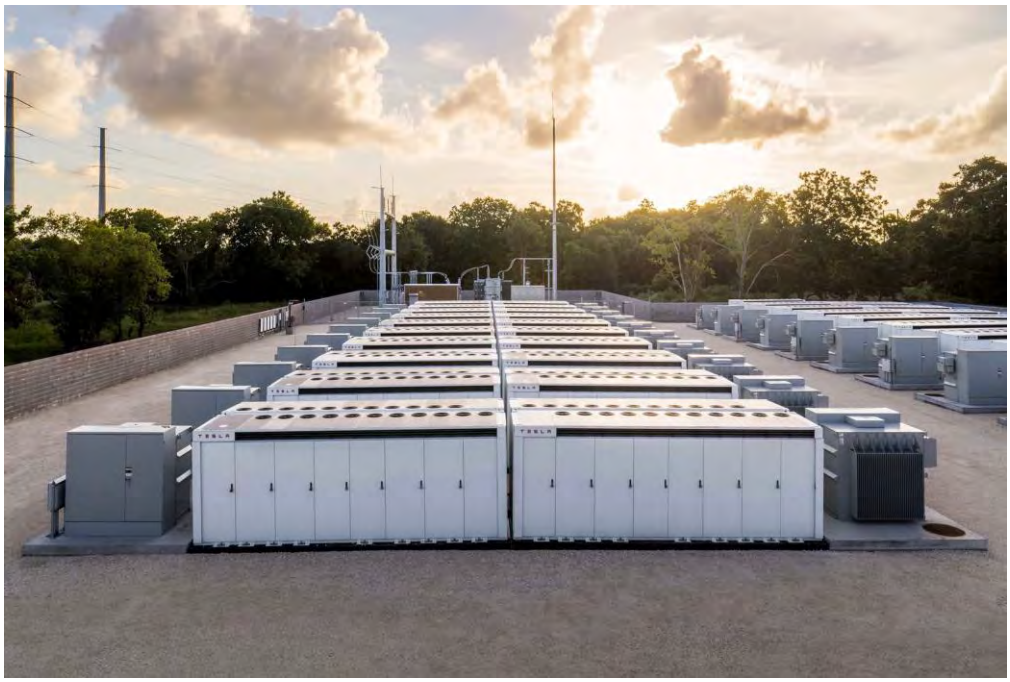
The BMS is an essential component of the battery-based energy storage system. This system aims to monitor and manage the performance of batteries to ensure they operate efficiently and safely. Some of the main tasks performed by the BMS include:

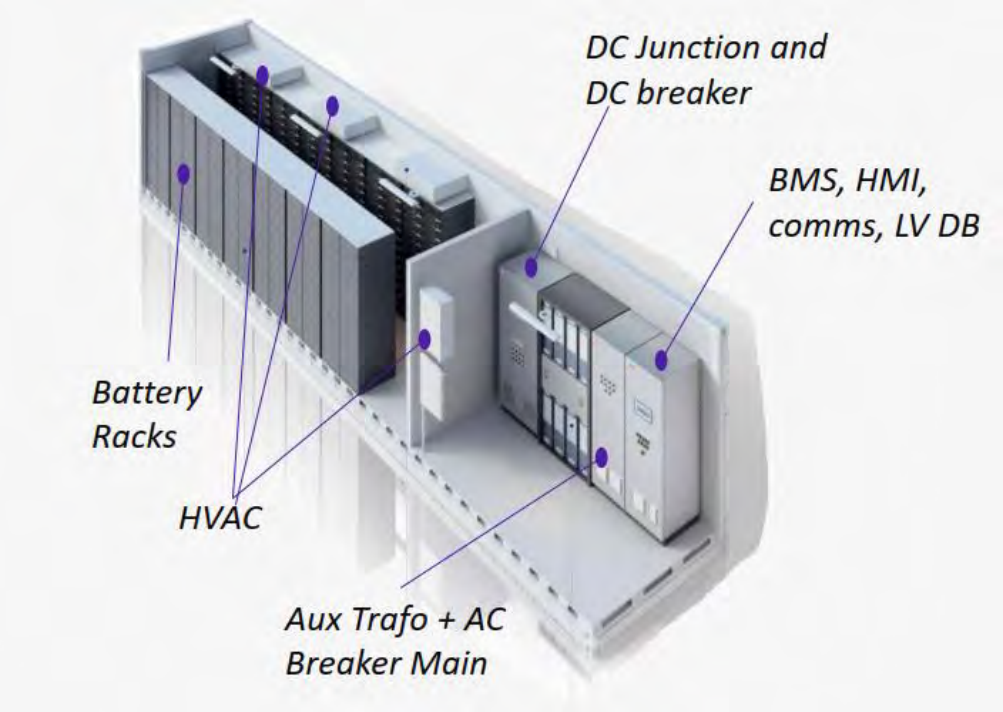
- Voltage and Current Monitoring: to ensure they operate within safe limits.
- Charge Balancing: ensures balanced charging among all cells in the battery, which helps improve performance and extend battery life.
- Temperature Monitoring: The BMS monitors the battery temperatures and activates cooling or heating systems as needed to maintain optimal temperatures.
- Protection system: It protects against abnormal conditions such as overcharging, over-discharging, and short circuits.
- Diagnostics and Maintenance: The BMS provides regular reports on the battery status and helps detect potential faults before they cause significant problems.

3. Cooling and Ventilation Systems
   - Batteries generate heat during charging and discharging. Cooling systems ensure that the temperature remains within safe limits to prevent overheating, which could degrade battery performance or even cause fires.
   - They use liquid-cooled temperature control system to optimize the auxiliary power consumption for fans required to circulate air, to absorb heat from the batteries.

4. Control and Monitoring Systems
   - Provides real-time data on the performance of the BESS.
   - Components include SCADA systems, sensors, and communication interfaces.

5. Auxiliary Systems
   - Includes lighting, emergency power supplies, and fire suppression systems.
   - Supports the safe and reliable operation of the BESS.




DC Junction and
DC breaker
BMS, HMI,
comms, LV DB
Battery
Racks
HVAC
Aux Trafo + AC
Breaker Main

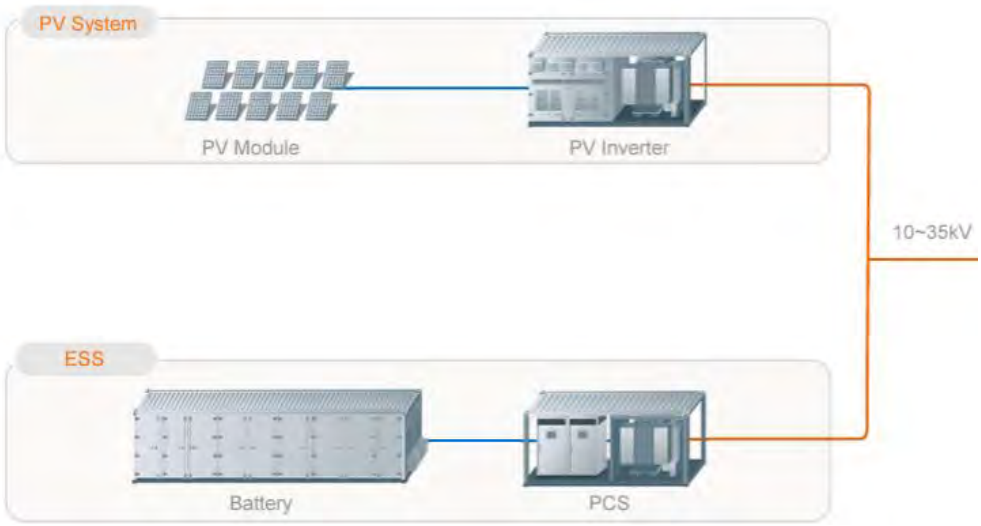



Figure 3: Battery Energy Storage System (BESS)

The installation of the BESS for the proposed project will adhere to the following standards and regulations:

- NFPA 855: Ensuring installations are performed appropriately with vital life safety considerations.
- ISO 45001: Emphasizing occupational health and safety management.
- EN 62485-2: Covering safety requirements for secondary batteries and battery installations.
- Local Building and Fire Codes: Complying with local regulations for safety and construction.

c) Component 3: Connection to the grid

*33kV/220kV Pooling Substation*

A 33/220kV pooling substation has 4 transformers, each with a capacity of 250 megavolt-amperes (MVA) to step up the voltage from 33kV to 220kV for efficient long-distance transmission. It integrates renewable energy into the grid, ensuring reliability and reducing energy losses. Key components include switchgear, circuit breakers, and Power System Stabilizer (PSS). For electrical insulation, current interruption and arc quenching in the transmission and distribution systems, SF6 gas and Air insulations are typically used in electric power systems, where SF6 the mostly used insulation material.

An internal 33kV medium voltage (MV) overhead transmission line (OHTL) corridor will be constructed within the project land area through which the output power of the MV Inverter Transformer Stations will be transmitted via an intermediate MV collector unit to the 220/33kV HV substation.

The internal 33kV OHTL lines will extend over a span of approx. 5km and is supported on towers of approx. height of 28m (with a possibility to reach 34m max.) along west to east through the middle of the overall project land. The OHTL's electrical design shall meet the IEC 60850 (Nominal voltage ratings) and other relevant IEC standards to ensure correct conductor selection, insulation, and voltage regulation in line with Egyptian Grid Code local

regulations, EETC standard design/ drawings and IEC standards. The design shall include the OPGW circuits along with all the junction and splice boxes.

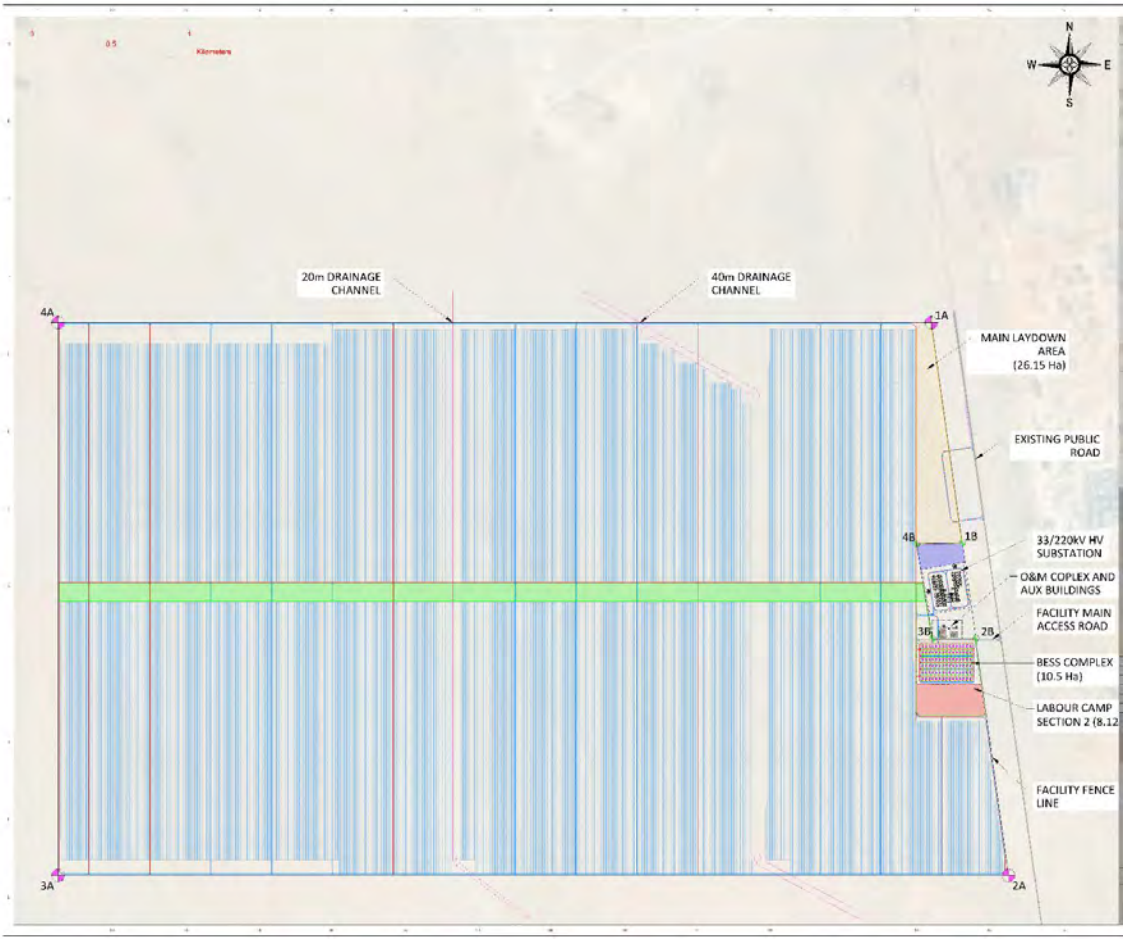



Figure 4: Layout of the project

## 2.3 Project Schedule

According to the proposed timeframe, the project will be completed in September 2026 upon obtaining all the necessary permits and approvals, starting February 2025. The construction works including site facilities, civil, electrical, and mechanical works are expected to take about 17 months. Different phases of the Project are illustrated in Figure 5.

## 2.4 Project Phases

The Project will go will include three main phases: Construction, Operation, and Decommissioning.

1) Construction Phase

Key activities during the construction phase include:

- **Site Preparation:** Clearing and leveling the land to ensure a stable foundation.

- **Installation of Solar Panels & Mounting Structures:** Setting up 1,620,750 high-efficiency solar panels on a single-axis tracking system to optimize sunlight exposure.
- **BESS Installation:** Placing lithium-ion battery modules in secure, insulated containers.
- **Grid Connection:** Building a 33kV/220kV substation and power lines to connect the plant to the national grid.
- **Safety & Environmental Measures:** Implementing dust control, noise reduction, and waste management plans to minimize environmental impact.

2) Operation Phase:

Once construction is complete, the plant will generate and store clean energy. Key activities include:

- **Energy Production:** The solar panels convert sunlight into electricity, which is then fed into the grid.
- **Battery Storage & Management:** The BESS stores excess energy during the day and releases it in the evening to stabilize power supply.
- **System Monitoring & Maintenance:** Regular inspections, cleaning, and repairs of panels, inverters, and batteries to ensure efficiency.
- **Safety & Compliance:** Continuous monitoring of environmental and safety standards, including temperature control, fire prevention, and worker safety measures.

3) Decommissioning Phase

At the end of the project's lifespan, the site will be safely dismantled and restored. Activities include:

- Removal of Equipment: Solar panels, batteries, and supporting structures will be safely dismantled.
- Recycling & Waste Management: Reusable components will be recycled, while hazardous materials will be disposed of according to environmental regulations.
- Site Restoration: The land will be restored to its original state or repurposed for other sustainable uses.

# 3. ASSOCIATED FACILITIES: OVERHEAD TRANSMISSION LINE (OHTL)

An overhead transmission line (OHTL) will be constructed by EETC to connect the project to the national grid through the existing Nagaa Hammadi substation. The proposed OHTL route runs parallel to the Nagaa Hammadi industrial zone, east of the project site, heading north, crossing the Giza–Luxor Road. It connects to an existing OHTL traversing the buffer area between El Baraka village residential area and the Aluminium Complex, located to the north of the site. The existing OHTL also traverses reclaimed agricultural lands to ultimately reach the Nagaa Hammadi substation north of the farmlands. As illustrated in Figure 5 below show the proposed OHTL route.

For the points from 1 to 5 crossing the farmlands and bordering El Baraka village from the east, no new towers will be built, only cables and conductors will be installed on the existing towers at this segment. Transmission towers will be constructed from point 5 southwards to the Project's substation. This segment, south of point 5, representing the majority of the proposed OHTL route, is located within empty publicly owned desert land.

According to the national laws, the construction, operation and maintenance of OHTLs are within the scope of responsibility of the Egyptian Electricity Transmission Company (OHTL). In this respect, a

separate ESIA for the OHTL is to be prepared by EETC and submitted to the EEAA for approval. In addition, a separate SEP will be developed for the OHTL by EETC.

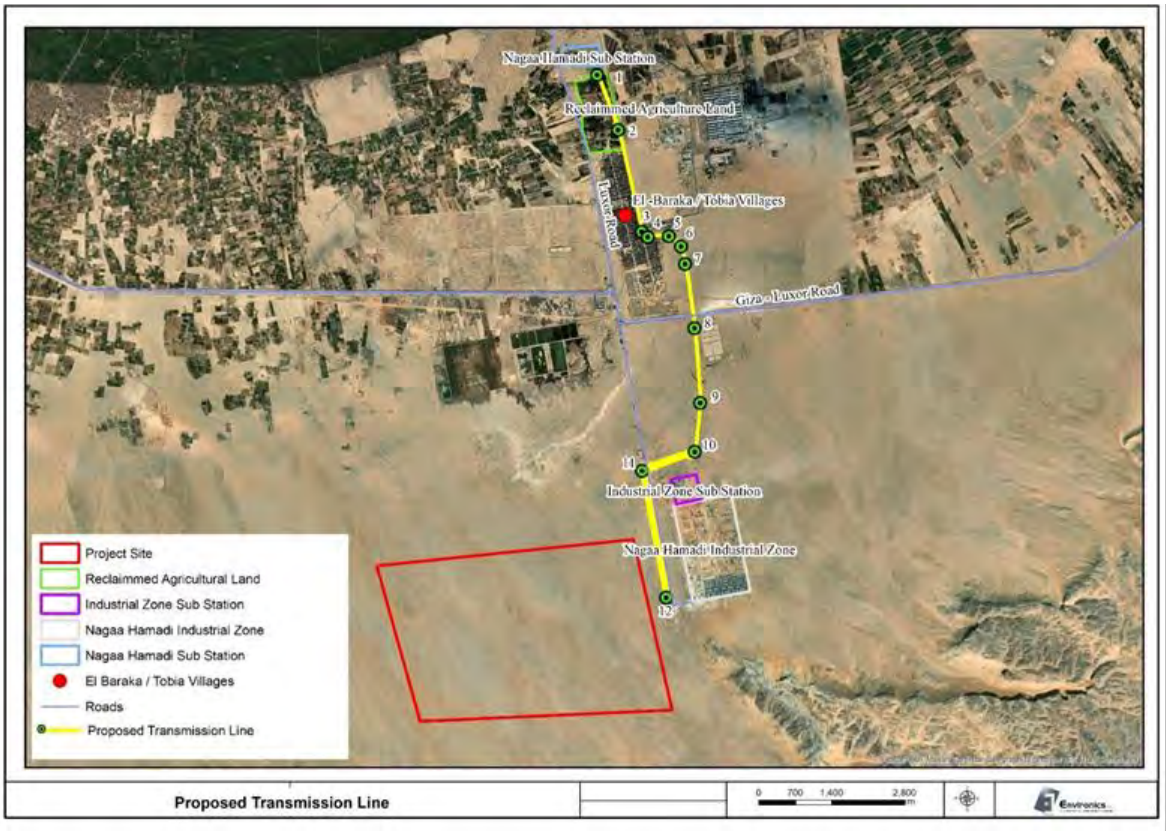



Figure 5: Proposed OHTL route

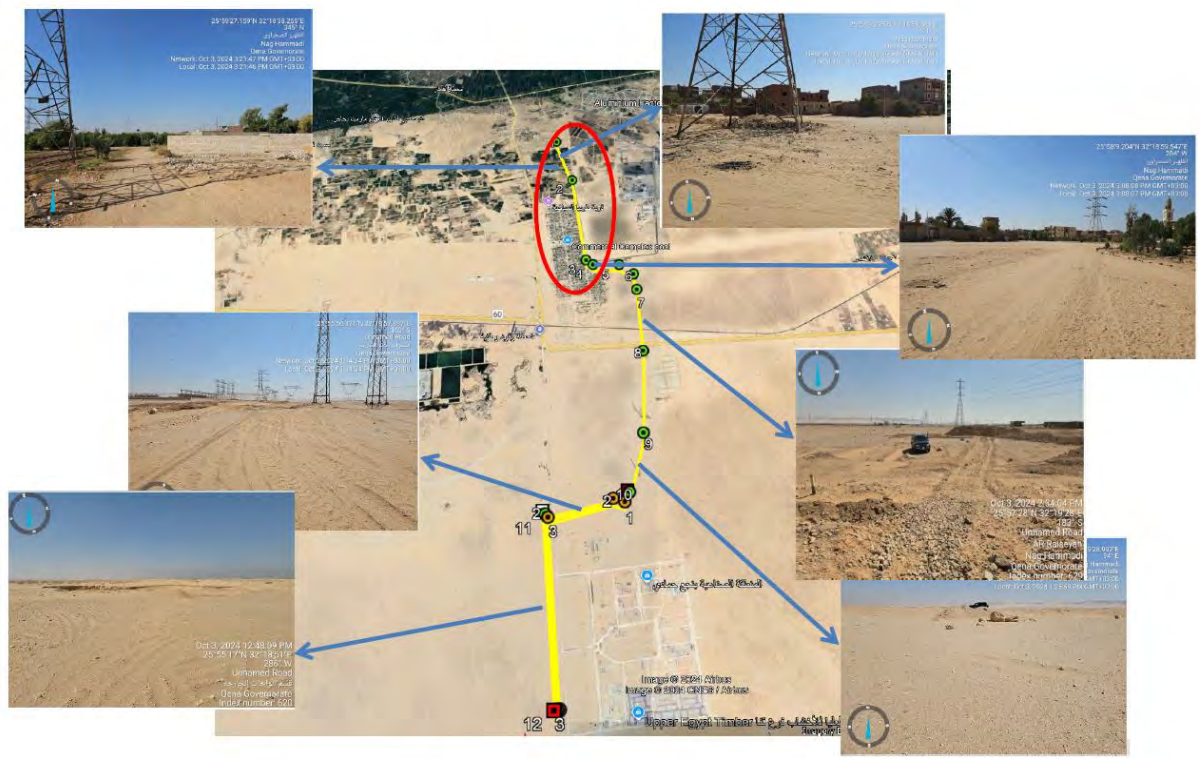


Figure 6: Characteristics of the OHTL surrounding area

# 4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This section summarizes the environmental and social legislation and regulations of relevance to the project. Relevant laws and guidelines were identified based on the project's type, location, and potential impacts.

## 4.1 National Environmental Regulations

As per Egypt's Environmental Law No. 4/1994 (amended by Laws 9/2009 and 105/2015), an Environmental Impact Assessment (EIA) must be conducted for new projects. The New and Renewable Energy Authority (NREA) serves as the Competent Administrative Authority (CAA) for this project, overseeing the submission and review process through the Egyptian Environmental Affairs Agency (EEAA).

EEAA classifies projects into four categories (A, B, Scoped B, and C) based on environmental impact.

The Obelisk PV Plant and Battery Energy Storage System (BESS) are classified as a Scoped B project, meaning a full Environmental and Social Impact Assessment (ESIA) is not required, and public consultation is not mandatory. This classification was confirmed in a meeting with EEAA on October 7, 2024. The table below lists the key relevant legislation and regulator/entity relevant to each of the environmental and social parameter being studied and assessed within this ESIA. Throughout the following Chapters, reference to the requirements set out within those legislations is provided under each relevant parameter.

Table 2: National Regulations and Laws

| Legislation |
|---|
| **Management of non-hazardous solid waste and hazardous waste generated from the facility during generation, handling, transportation and disposal** |
| Law 4/1994 amended by Law 9/2009 and ER 1095/2011 amended by Decree 710/2012) |
| Law 202/2020 on waste management and its executive regulation 722/2022 and 1113/2024 |
| **Control of the wastewater discharge into the sewage system and public network.** |
| Ministerial Decree 44/2000, Decree of Law 93/1962 |
| **Biodiversity Protection** |
| Article 28 of the Environmental Law No. 4 of 1994 |
| Annex 4, as amended by ERs 1095 of 2011 of the Environmental Law No. 4 of 1994, |
| Law No. 102 of 1983. |
| Law 53 of 1966 (the Law of Agriculture) and amended by Decree 1227 of 1988 |
| **cultural heritage** |
| Law 117/1983 amended by Law No. 3 of 2010 |
| **Air quality and noise** |
| Article 36 of Law 4/1994 and Article 37 of ER 1095/2011 |
| Article 35 of Law 4/1994, article 34 of its modified ER 1741/2005, and annex (5) of modified ER 710/2012 |
| Article 42 of Law 9/2009 and Article 44 of its modified ER (1095/2011), |
| Annex 7 of the ER replaced by Decree 710/2012. |
| **Ground water** |
| New Water Resources and Irrigation Law (Law 147/2021) Article 78, 79, 80 & 81 |
| Executive regulations No. 81/2023. |
| **Infrastructure and utilities** |
| Petroleum pipelines Law 4/1988 |
| **Register/Records: Environmental Register & Hazardous Materials & Waste Register** |
| Article 22 of Law No. 9 of 2009 |
| Article 17 No. 1741 of 2005 Article 17 and Annex 3 of the aforementioned Executive Regulations. |
| Article 56 of Law No. 202 of 2020, |
| Article 211 of Law No. 12/2003 |
| Appendix (3) of the ERs of Law No. 4/1994 |
| Article 50 and Appendix (7) of the ER of Law No. 202/2020 on waste management and its executive regulations (654/2021), |
| **Workplace Emissions** |
| Part 3 of Book 5 of the Labour Law 12/2003, articles 208 through 215, |
| The Ministerial Decree 134/2003 |
| Ministerial Decree 211/2003 |
| **Workplace Noise** |
| Annex 7 of the ER 710/2012 of Law 4/1994. |

| |
|---|
| **Occupational health and safety** |
| Ministerial Decree 153/2003 for the labor law 12/2003 |
| Law 12/2003 on Labour and Workforce Safety |
| **Child Labour** |
| Article 64 of the "Child Law" 12/1996 |
| o Articles 98 to 103 of the Labour Law 12/2003 (amended by law 90/2005) |
| The Minister of Labour decree 118/2003 |
| **Persons with Disabilities** |
| the articles 21,22 and 23 from Egyptian Law No. 10 of 2018 |
| EEAA EIA guidelines |
| **Equal opportunities** |
| Article 9 of the Egyptian Constitution |
| Article 35 of Labour law 12/2003 |
| Law 10/2018 |
| **Protection from Harassment** |
| Article 90 of Labor Law No. 12/2003 |
| Anti-harassment Law No. 141/2021 |
| **Grievance** |
| Article 103 of the Environmental law 4/1994 |
| Article 85 of the Egyptian Constitution |
| **Community Investment:** |
| the Egyptian Investment Law 72/2017 |

## 4.2 Strategic National Intiatives

### Egypt National Climate Change Strategy (NCCS) 2050

Launched in May 2022, the NCCS 2050 provides a roadmap for Egypt's climate action through five key goals: mitigation, adaptation, governance, financing, and scientific research. The PV and BESS projects contribute to:

- **Renewable Energy Goals**: Supporting Egypt's target of 42% renewable energy by 2035.
- **Climate Resilience**: Incorporating measures to withstand extreme weather conditions in Qena.
- **GHG Emissions Reduction**: Replacing fossil fuel energy with renewables.
- **Sustainable Development**: Aligning with Egypt's Vision 2030 for low-emission economic growth.

### Nationally Determined Contribution (NDC)

Egypt signed the Paris Agreement in 2016 and ratified it in 2017, outlining commitments to GHG reduction and climate adaptation. The updated NDC (2023) includes:

- **Sectoral Emission Reductions**: Focusing on energy, oil and gas, transport, industry, waste management, and tourism.
- **Oil & Gas Sector Targets**: Cutting emissions from 2,575 GgCO2-eq (BAU scenario) to 0.89 GgCO2-eq by 2030 through cleaner fuels and alternative energy.

### Egypt's National Strategy for the Empowerment of Egyptian Women 2030

Launched in 2017, this strategy promotes women's empowerment through:

- **Political Empowerment**: Increasing women's leadership roles.
- **Economic Empowerment**: Expanding job opportunities and female entrepreneurship.
- **Social Empowerment**: Improving access to education, healthcare, and social services.
- **Protection & Response**: Addressing violence against women.

## 4.3 International Conventions

### Biodiversity Conventions

Egypt has ratified several agreements to protect biodiversity, including:

- **AEWA (1995):** Protects migratory waterbirds and their wetland habitats.
- **UNCBD (1992):** Promotes sustainable management of biological diversity.
- **CMS (1979):** Ensures conservation of migratory species.
- **CITES (1973):** Regulates international trade in endangered species.
- **African Conservation Convention (1968):** Promotes sustainable use of natural resources.

### Climate Change Conventions

Egypt has taken steps to address climate change by ratifying:

- **Paris Agreement (2016):** Aims to limit global temperature rise to below 2°C.
- **UNFCCC (1992):** Provides a global framework for addressing climate change.
- **Kyoto Protocol (1997):** Sets binding emission reduction targets.

### Cultural Heritage Conventions

Egypt is committed to safeguarding its cultural heritage through:

- UNESCO Convention for Intangible Cultural Heritage (2003): Protects traditions, expressions, and knowledge.
- World Heritage Convention (1972): Identifies and preserves cultural and natural heritage sites.

### Work Environment Conventions

Egypt follows international labor standards set by the **ILO**, covering:

- **Workers' rights** (freedom of association, collective bargaining, equal pay).
- **Child labor** (minimum working age, elimination of worst forms).
- **Workplace safety** (occupational health, prevention of forced labor).

## 4.4 International Standards and Guidelines

The Environmental and Social Impact Assessment (ESIA) for the Obelisk PV Power Plant and Battery Energy Storage System (BESS) in Nagaa Hammadi complies with both Egyptian Law 4/1994 and international financial institutions' requirements, including EBRD, AfDB, DFC, and IFC standards.

### EBRD Performance Requirements (PRs)

- **PR1:** Calls for integrated environmental and social impact assessment and stakeholder engagement.
- **PR2:** Ensures fair labor conditions, health, safety, and monitoring of suppliers.
- **PR3:** Focuses on pollution prevention and resource efficiency.

- **PR4:** Addresses health, safety, security risks, and gender-based violence risk assessment.
- **PR5:** Land acquisition and resettlement provisions do not apply to this project.
- **PR6:** Assesses biodiversity conservation and sustainable resource management.
- **PR7:** Indigenous peoples' provisions do not apply.
- **PR8:** Ensures protection of cultural heritage (no registered sites found).
- **PR10:** Emphasizes stakeholder engagement and transparent information disclosure.

AfDB Operational Safeguards (OSs)

- **OS1:** Addresses environmental and social risk management throughout the project lifecycle.
- **OS2:** Supports fair labor practices and a safe workplace.
- **OS3:** Covers pollution control and resource efficiency.
- **OS4:** Ensures community health, safety, and security.
- **OS5:** Land acquisition/resettlement provisions do not apply.
- **OS6:** Focuses on biodiversity conservation and sustainable resource use.
- **OS7:** Protects vulnerable groups from negative impacts.
- **OS8:** Addresses cultural heritage protection (no expected impacts).
- **OS9 & OS10:** Financial intermediaries' provisions do not apply, but stakeholder engagement is required.

DFC Environmental and Social Policy & Procedures (ESPP)

- Aligns with IFC Performance Standards and World Bank EHS Guidelines.
- Prioritizes GHG reduction, climate risk assessment, and sustainable project development.

IFC Environmental & Social Performance Standards (PSs)

- **PS1:** Mandates social and environmental risk management.
- **PS2:** Enforces fair labor conditions and workplace safety.
- **PS3:** Addresses pollution prevention and waste management.
- **PS4:** Ensures community health, safety, and security.
- **PS5:** Land acquisition/resettlement provisions do not apply.
- **PS6:** Assesses biodiversity conservation and mitigation measures.
- **PS7 & PS8:** Indigenous peoples' provisions do not apply; cultural heritage protection measures are included.

World Bank EHS Guidelines:

The World Bank Environmental, Health, and Safety (EHS) Guidelines provide technical reference documents outlining Good International Industry Practices (GIIP) for various projects. They include both general guidelines and industry-specific ones for complex projects. These guidelines set performance measures achievable with existing technology at reasonable costs. For existing facilities, site-specific targets and timelines may be required. Their application is based on environmental assessments considering project-specific risks, local contexts, and environmental capacity.

# 5. PROJECT ALTERNATIVES

The "no-development" alternative was excluded from consideration, as the proposed land would still be utilized for other renewable energy projects. Key alternatives considered include:

Site Location: The proposed project, located on 21 km² of vacant desert land south of Nagaa Hammadi. It has been allocated by the Egyptian government to NREA for Renewable Energy Project and does not conflict with other land uses. Therefore, alternative site options were not considered, making the selected site suitable for the project.

PV Panel Types: Different PV panel technologies, including monocrystalline and thin-film, were assessed. High-efficiency mono-crystalline silicon panels were selected for their optimal balance of performance, cost-effectiveness, and environmental considerations.

Tracking Systems: The investigation of tracking systems for maximizing solar energy capture led to the selection of an active single-axis solar tracking system for the project. This choice was made because it is generally less expensive and requires less maintenance due to having fewer moving parts.

Module Cleaning: Various module cleaning methods, including manual cleaning and automated systems, were evaluated. The selected option for PV Module Cleaning is the automatic robotic dry-cleaning systems.

BESS Alternatives: Different BESS technologies, such as lithium-ion and flow batteries, were considered. Lithium-ion batteries were selected for their high energy density, efficiency, and proven track record in utility-scale applications.

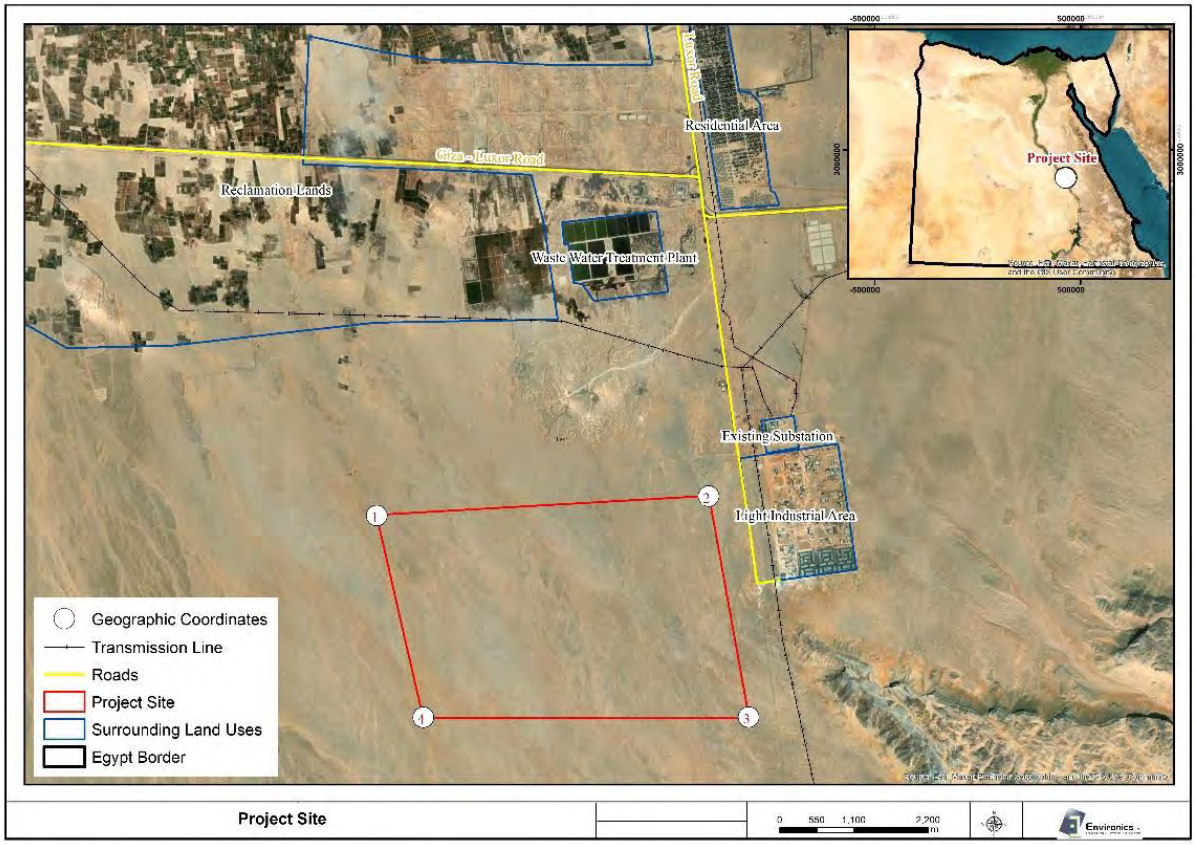
Water Sources: Alternative water sources, including groundwater abstraction and water trucking from the nearest water plant, were investigated. Ultimately, the project will utilize water trucking and pipeline supply for its water needs will also be considered.

Wastewater Management: Options for wastewater treatment and disposal were assessed. The project will consider wastewater trucking to the nearest authorized wastewater treatment plant.

# 6. ENVIRONMENTAL AND SOCIAL BASELINE

## 6.1 Project Site Location

The project site is in the Qena governorate, within the desert hinterland of Nagaa Hammadi, about 15 km southeast of the town. The nearest settlement is 5.6 km north, while the Nile Valley is 12 km north, and Qena City is 50 km northeast. The site's coordinates, nearby roads, and land use details are provided in the following figure.




| Corner No. | Latitude | Longitude |
|---|---|---|
| 1 | 32.262144 | 25.913870 |
| 2 | 32.311175 | 25.916710 |
| 3 | 32.317281 | 25.887197 |
| 4 | 32.269188 | 25.886933 |

Figure 7: Location of the Project Site, and the locations of the nearest roads and land use

## 6.2 Physical Environment

### Climate and Meteorology

The Qena governorate experiences extreme temperature variations, with very hot summers, cold winters, and significant daily temperature differences. The region is characterized by arid conditions, minimal rainfall, and high solar radiation levels, particularly in summer.

- **Temperature:** The annual average temperature is 23.9°C, peaking at 37.9°C in July and dropping to 5.3°C in January.
- **Solar Radiation:** High solar radiation levels range between 2,191–2,264 kWh/m² per year, peaking in July at 27 MJ/m²/day and reaching a minimum of 12 MJ/m²/day in December.
- **Day Length:** Varies between 11 hours in December and 14.2 hours in June.
- **Wind Speed & Direction:** The average wind speed is 12 km/h, peaking at 13.7 km/h in April. Winds predominantly blow from the north and northwest.
- **Precipitation:** Negligible rainfall, with an annual peak of 0.4 mm in May.
- **Relative Humidity:** Varies between 30% in May and 54.2% in December, with an annual average of 41%.

### Dust and Sandstorms

The project site, like the rest of Upper Egypt, is exposed to dust, sandstorms, and haze, as observed over a 22-year monitoring period:

- **Haze Events:** Recorded for 2,864 hours (1.5% of total time), peaking in February and linked to low wind speeds.
- **Dust Storms:** Occurred for 544 hours (0.29% of total time), mainly in March, with moderate winds (2–5 m/s).
- **Rising Sand:** Recorded for 446 hours (0.23% of total time), associated with high wind speeds (>5 m/s), peaking in March.
- **Sandstorms:** Rare, occurring for 34 hours (0.02% of total time), mostly in March, driven by strong westerly winds.

### Air Quality

Air quality data from the Qena meteorological station (December 2023) indicates high levels of PM10 (166 µg/m³), exceeding the regulatory threshold of 70 µg/m³, due to the surrounding desert environment. However, other pollutants, including sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), and ammonia ($NH_3$), remained within safe limits.

Annual data from 2022 also recorded elevated PM10 levels (149 µg/m³), surpassing both national and WHO guidelines, while $SO_2$ and $NO_2$ remained within acceptable ranges.

### Geomorphology and Topography

The Project Site lies in the ancient alluvial plains between the rugged terrain and the limestone plateau to the south and the young alluvial plains along the valley to the north. The old alluvial plains form terraces at different heights above the level of the young alluvial plains.

According to the soil map of Egypt, the soils of the entire Project Site are primarily developed from limestone. More specifically, the soil type at the Project Site is classified as sandy loam soil, which is particularly shallow or stony

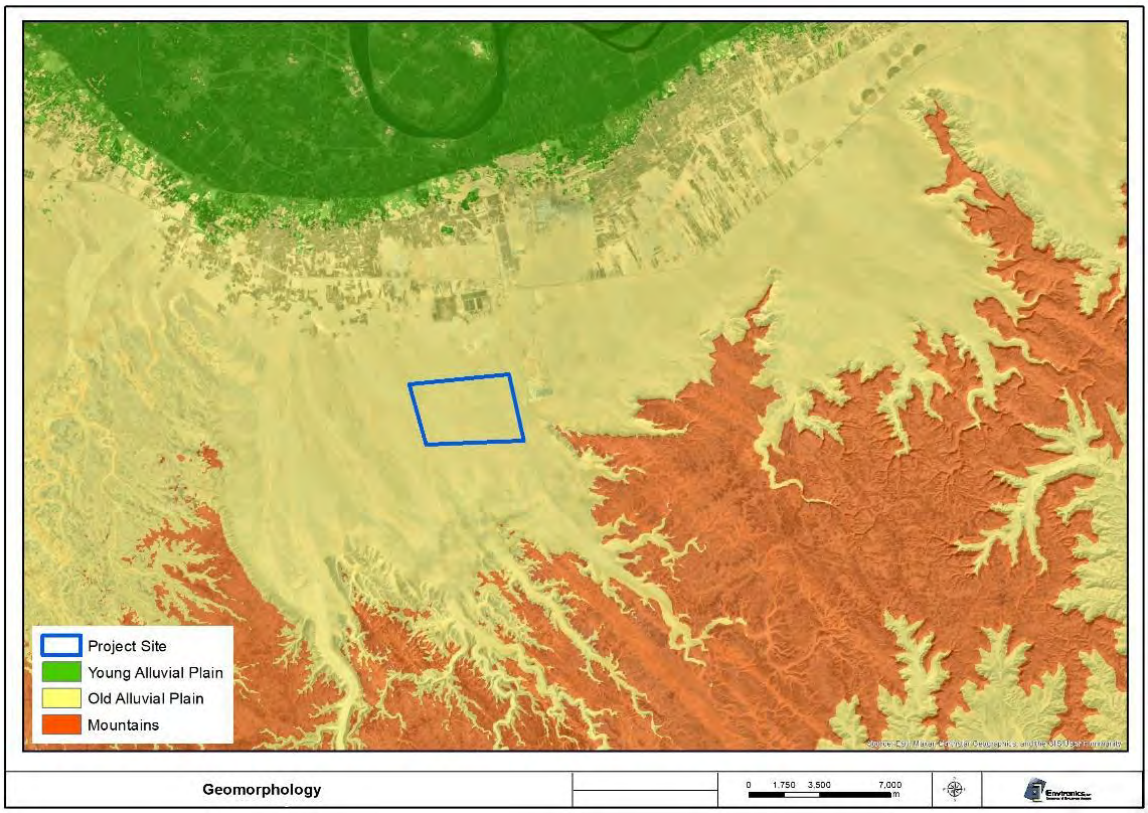



Figure 8: Geomorphological features of the Project Site

### Topography

Elevations outside of the Project Site increase towards the south, peaking at a range of 450 - 500 m above Mean Sea Level (MSL). Within the Project Site, elevations peak at 213 m above MSL in the northern parts and 250 m MSL in the southern parts

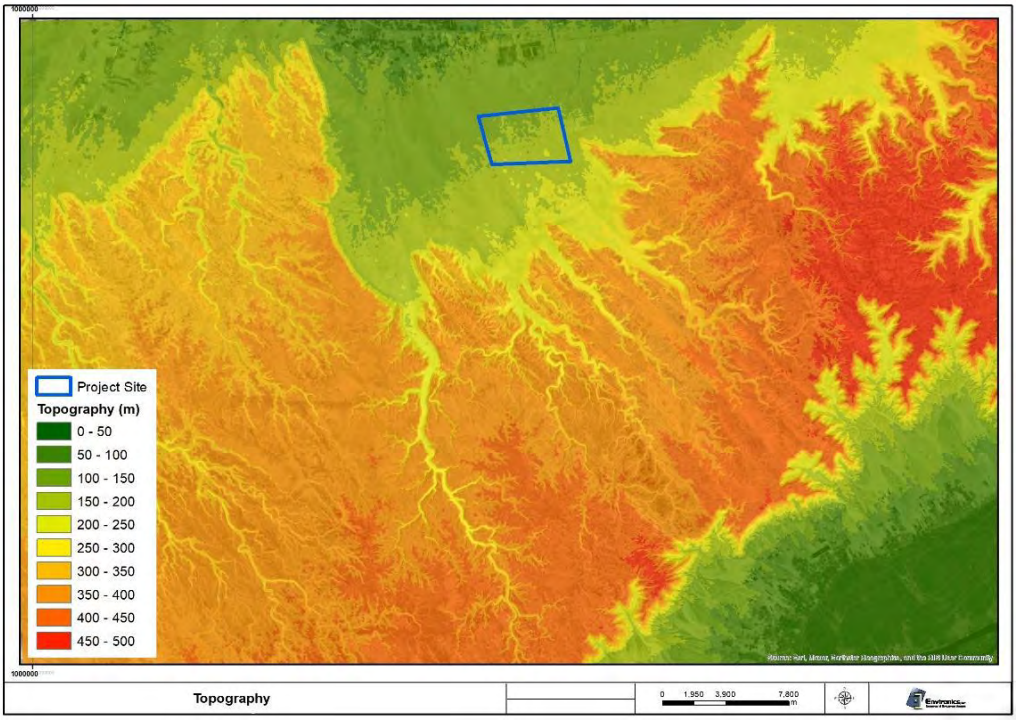



Figure 9: Topography of the Project Site (indicated in blue)

### Hydrology and Hydrogeology

The **Project Site** is located in the desert hinterland of Markaz Nagaa Hammadi and does not contain any surface water bodies or canals within its boundaries. However, three water bodies are situated to the north:

- **Alranan Canal** (10.5 km away)
- **Almarashda Canal** (11 km away)
- **The Nile River** (12 km away), the only naturally occurring surface water body nearby.

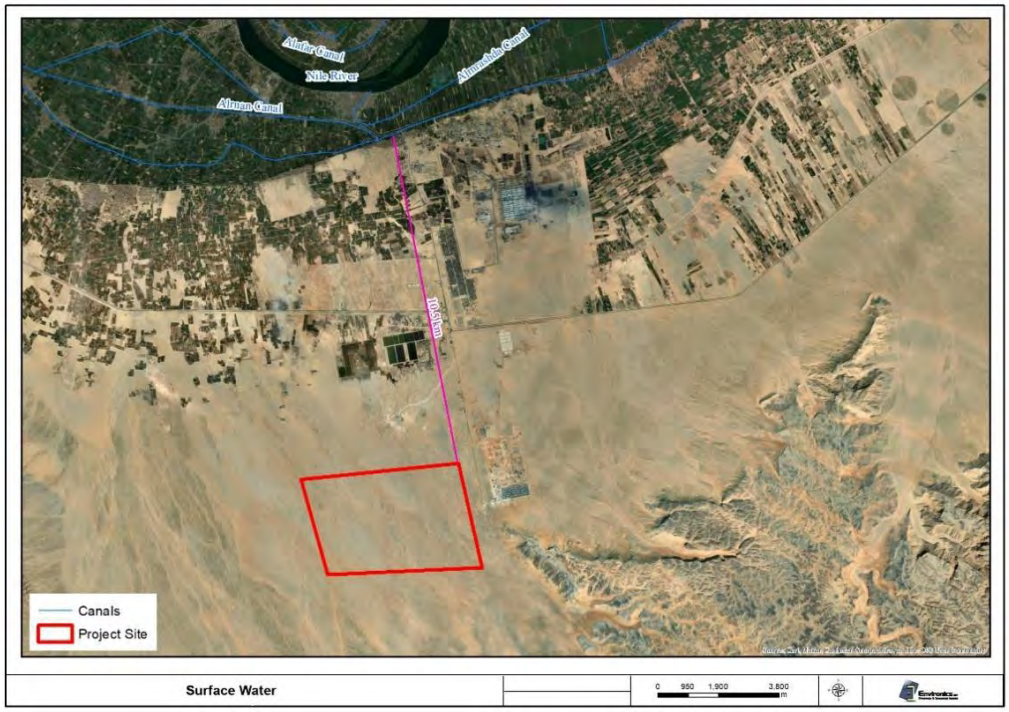



Figure 10: Surface water bodies and canals in close proximity to the Project Site

### Groundwater

The site is underlain by the Quaternary aquifer, the primary groundwater resource in the Nile Valley. This aquifer consists of sand, gravel, and clay layers, with groundwater occurring under unconfined conditions. The aquifer depth varies, ranging from 30-36 meters near cultivated lands to over 70 meters towards the plateau. The site is located in an area with high groundwater recharge potential due to irrigation water and occasional rainfall.

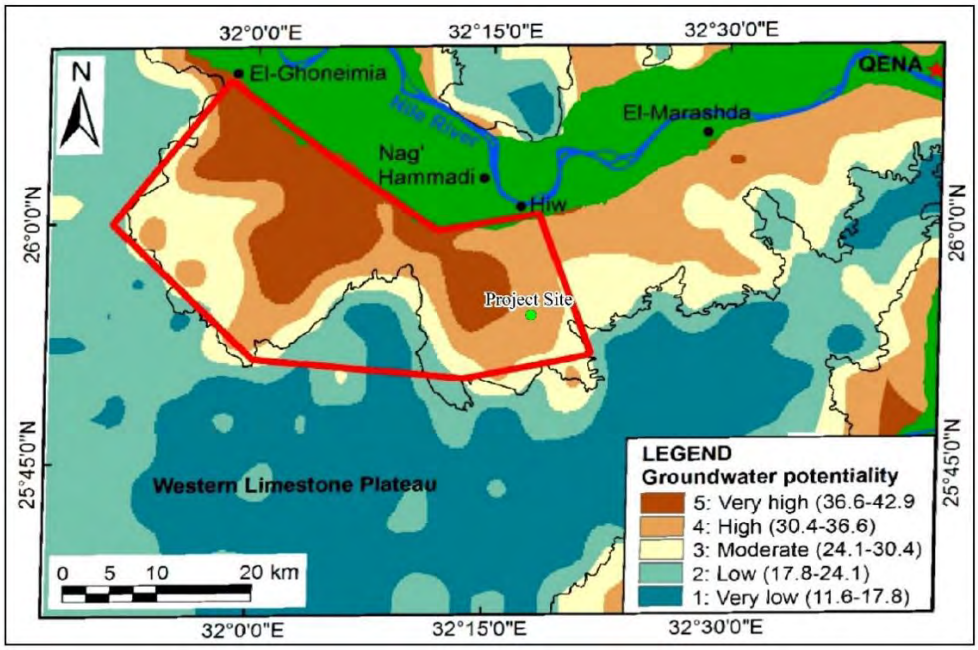



Figure 11: Groundwater recharge potentiality map including the Project Site, indicated by a green circle

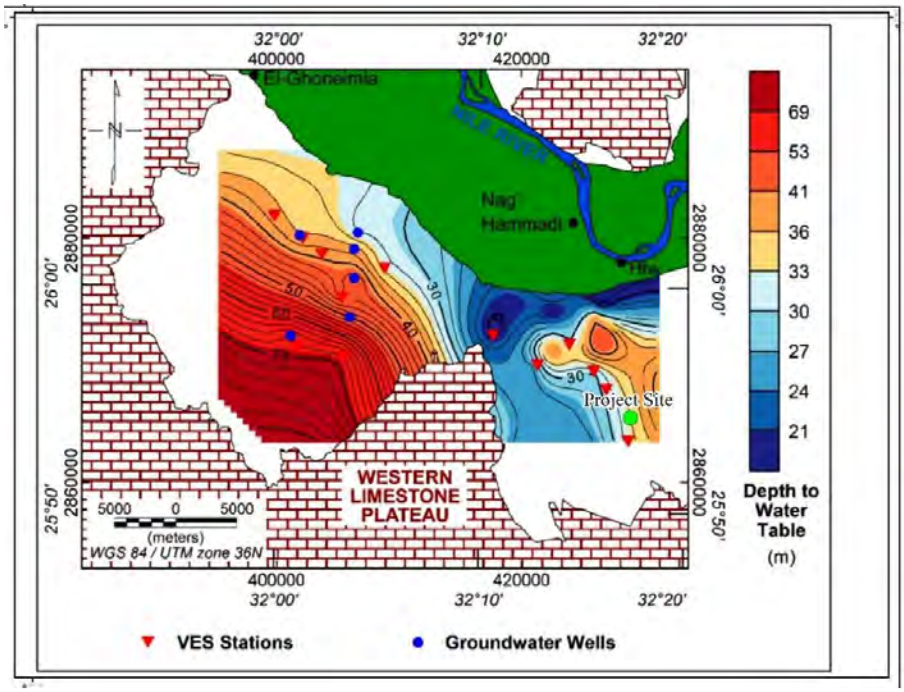



Figure 12: Depth to water contour map in relation to the Project Site

### Flash Flood Risks

Despite low annual rainfall, **Qena governorate** is one of the most susceptible regions in the Nile Valley to **flash flooding**, particularly in winter (October–February). Historical records of flooding in the region date back to **1938**.

- Digital Elevation Models (DEM) and satellite images were used to analyze drainage patterns and flood risks.
- Natural wadis direct water from higher grounds in the south to lower areas in the north.
- **Flood mitigation structures**, including **dams and culverts**, have been built west of the project site and along the **Luxor–Giza Road** to control potential flooding.
- The **constructed flood protection measures do not impact the Project Site**.

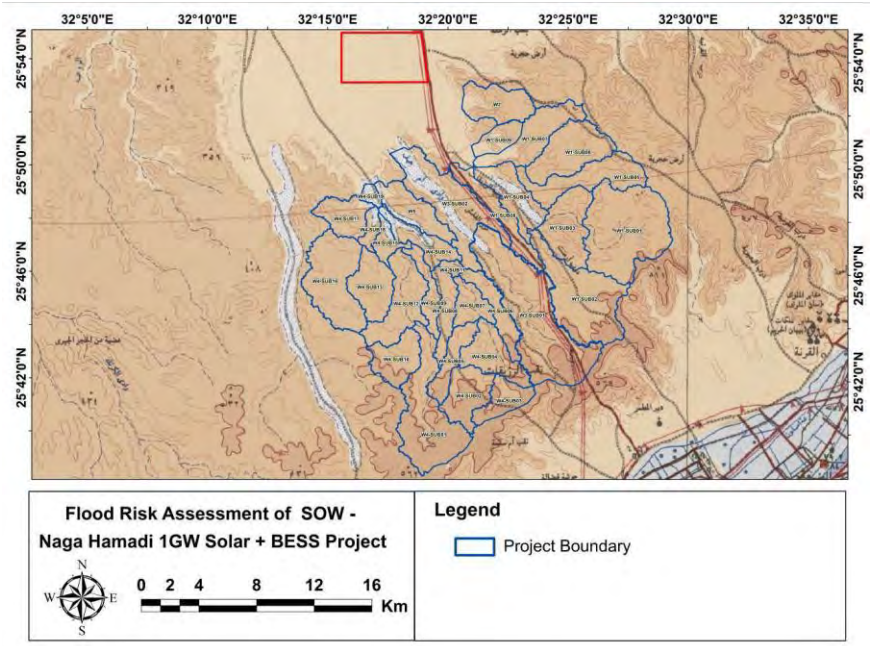



Figure 13: Natural Wadis in the project area

## 6.3 Biological Environment

The Project Site is located within the Middle Limestone Plateau (MLP) of the Western Desert, a vast arid region covering two-thirds of Egypt's total area. This plateau extends from latitude 25°N to 29°N and includes several oases that rely on groundwater for sustenance. The Project Site is specifically situated in the southeastern part of the MLP, characterized by dry sandy terrain with minimal vegetation.

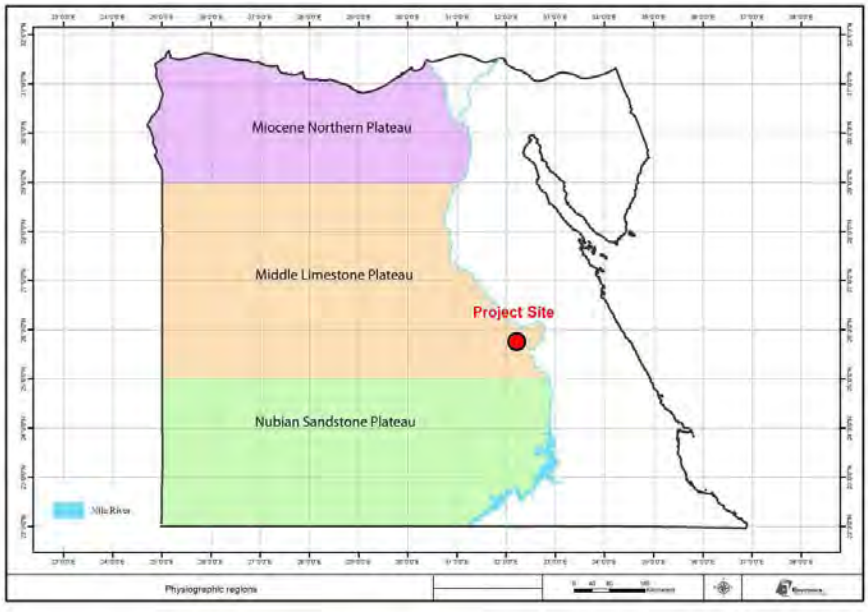



Figure 14: Physiographic regions of the Western Desert and location of the Project Site

### Habitats Near the Project Site

The ecosystems within 15 km of the Project Site can be classified into four main habitat types:

- Nile Valley Farmlands (12 km north) – Largely modified agricultural lands that support weeds and ruderal plants along canals and drain banks.
- Reclaimed Agricultural Lands (5 km north) – Desert areas converted for farming, attracting species from the Nile Valley due to water and vegetation.
- Urban Habitats – Found along roads, railways, and waterways, home to introduced plant species and opportunistic fauna (e.g., feral dogs, rats, and birds).
- Middle Limestone Plateau – A vast, dry landscape with almost no precipitation and minimal vegetation, primarily consisting of scattered shrubs adapted to desert conditions.

Figure 15: Cattle Egrets (Bubulcus ibis) land and a Common Hoopoe (Upupa epops) in a reclaimed agricultural

### Project Site Conditions

A comprehensive site survey and remote sensing analysis confirmed that the entire Project Site consists of bare ground with no significant vegetation or water sources. According to IFC Performance Standard 6 (IFC PS6), the Project Site is categorized as a natural habitat, meaning it remains largely undisturbed by human activity.

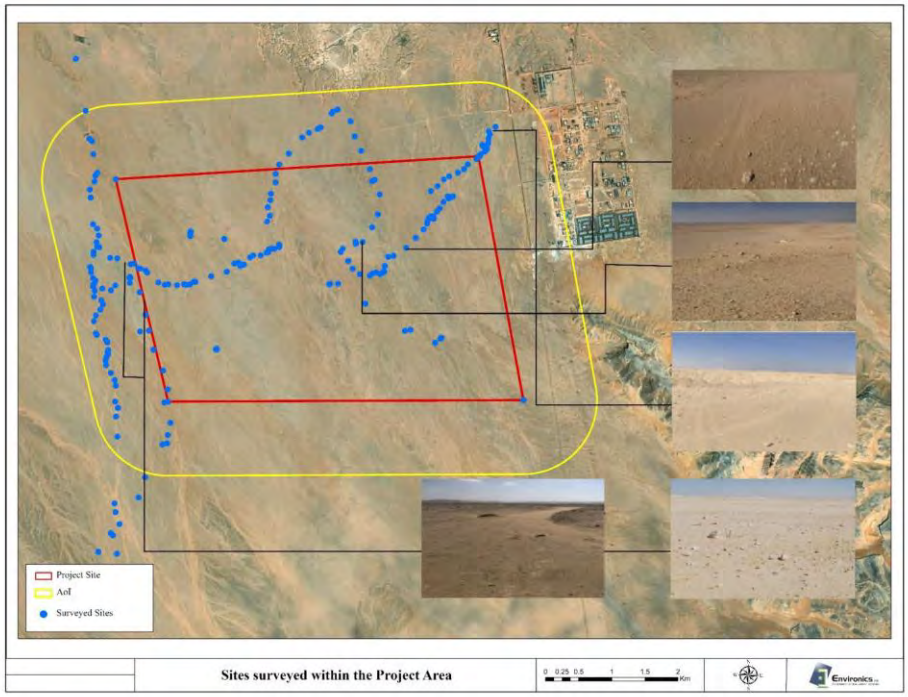



Figure 16: Surveyed locations within the Project Site and surroundings

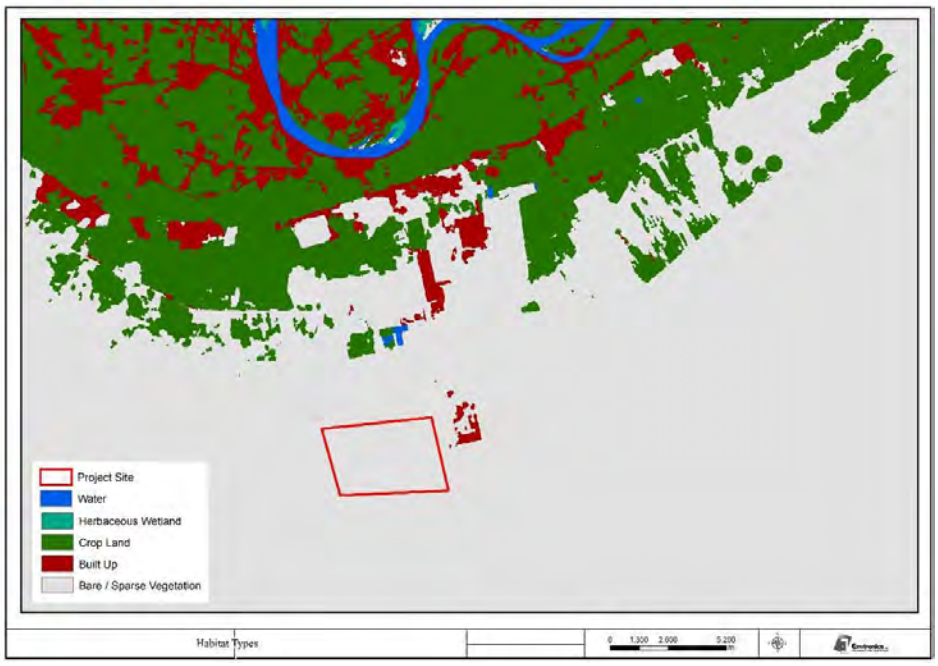



Figure 17: Habitat types of the Project Site and the localities within its vicinity

### Flora:

The Project Site in the Western Desert (WD) and Middle Limestone Plateau (MLP) is extremely arid, with poor plant diversity and no permanent vegetation. The only plant life found in the surrounding region includes drought-resistant species such as Syrian mesquite (Prosopis farcta) and Caroxylon imbricatum. However, an October 2024 survey found the site completely devoid of vegetation, with only a few desert shrubs observed outside the area.

### Fauna:

- **Reptiles**: The Project Site could potentially host desert-dwelling snakes, including Sahara Sand Viper (Cerastes vipera), Horned Viper (Cerastes cerastes), Saharan Sand Snake (Psammophis aegyptius), and Diadem Snake (Spalerosophis diadema). However, no traces of these species were found during site surveys.
- **Lizards:** Species like the Desert Monitor (Varanus griseus) and Bosc's Fringe-toed Lizard (Acanthodactylus boskianus subsp. asper) could occur in the area, along with geckos such as the Elegant Gecko (Stenodactylus sthenodactylus) and Anderson's Short-fingered Gecko (Stenodactylus petrii).
- **Birds: Resident Birds:** The site lacks food, water, and shelter, making it inhospitable for breeding birds. However, desert-adapted species like Spotted Sandgrouse, Desert Lark, and Brown-necked Raven might occur nearby. **Migratory Birds**: Although 17 migratory soaring bird species, including Black Kite, Osprey, and Egyptian Vulture, might pass over the area, the site is not considered important for bird migration due to its barren nature.
- **Mammals:** Possible species include Rüppell's Fox (Vulpes rueppellii), which is well-adapted to desert conditions, and Fennec Fox (Vulpes zerda), which can survive without water.

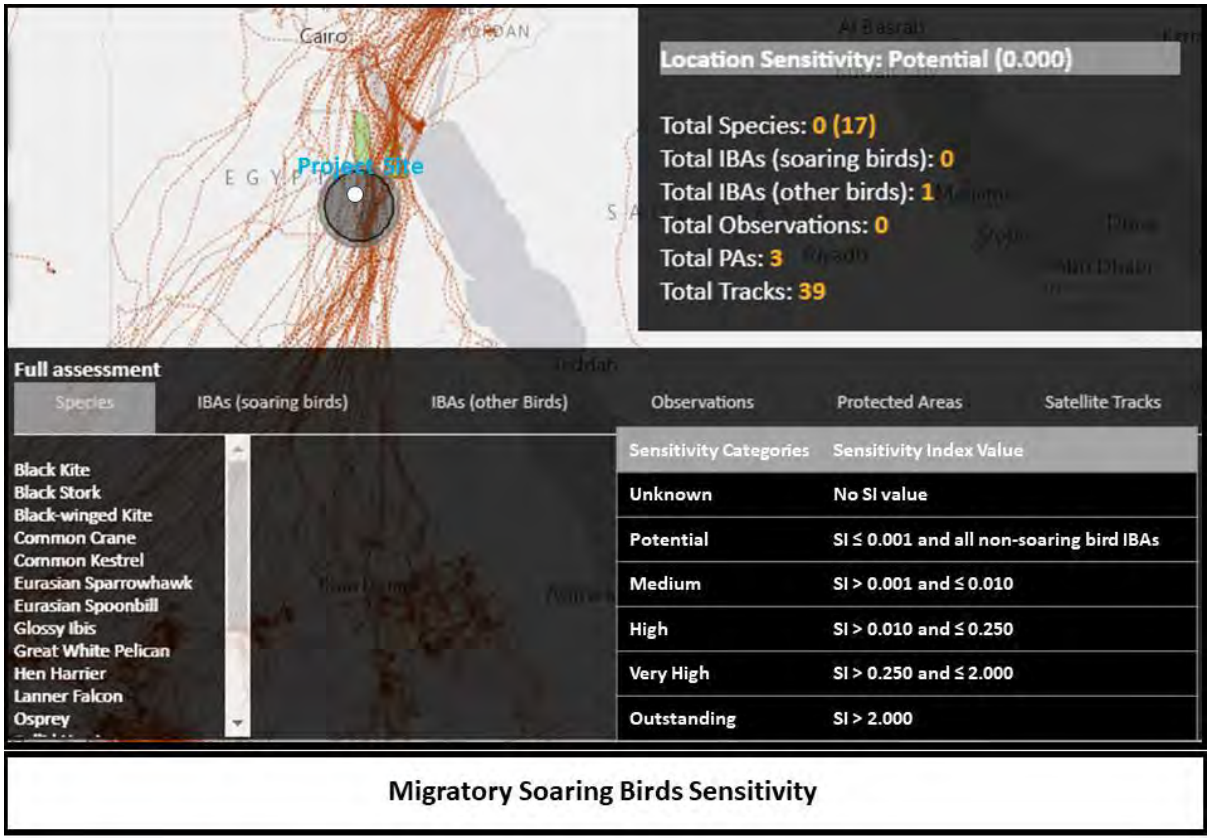



Figure 18: Location sensitivity of the Project Site to migratory soaring birds

### Ecological Value and Significance

The project site does not fall within any Key Biodiversity Areas (KBAs), Protected Areas (PAs), Important Bird Areas (IBAs), or Important Plant Areas (IPAs). The nearest KBA, the Upper Nile IBA, is about 40 km east of the site. The closest PA, Dababia PA, is approximately 50 km southeast but is primarily a geological protectorate, not a biodiversity area. Another proposed PA, Wadi Qena, is located about 80 km northeast, separated from the site by the Nile Valley.

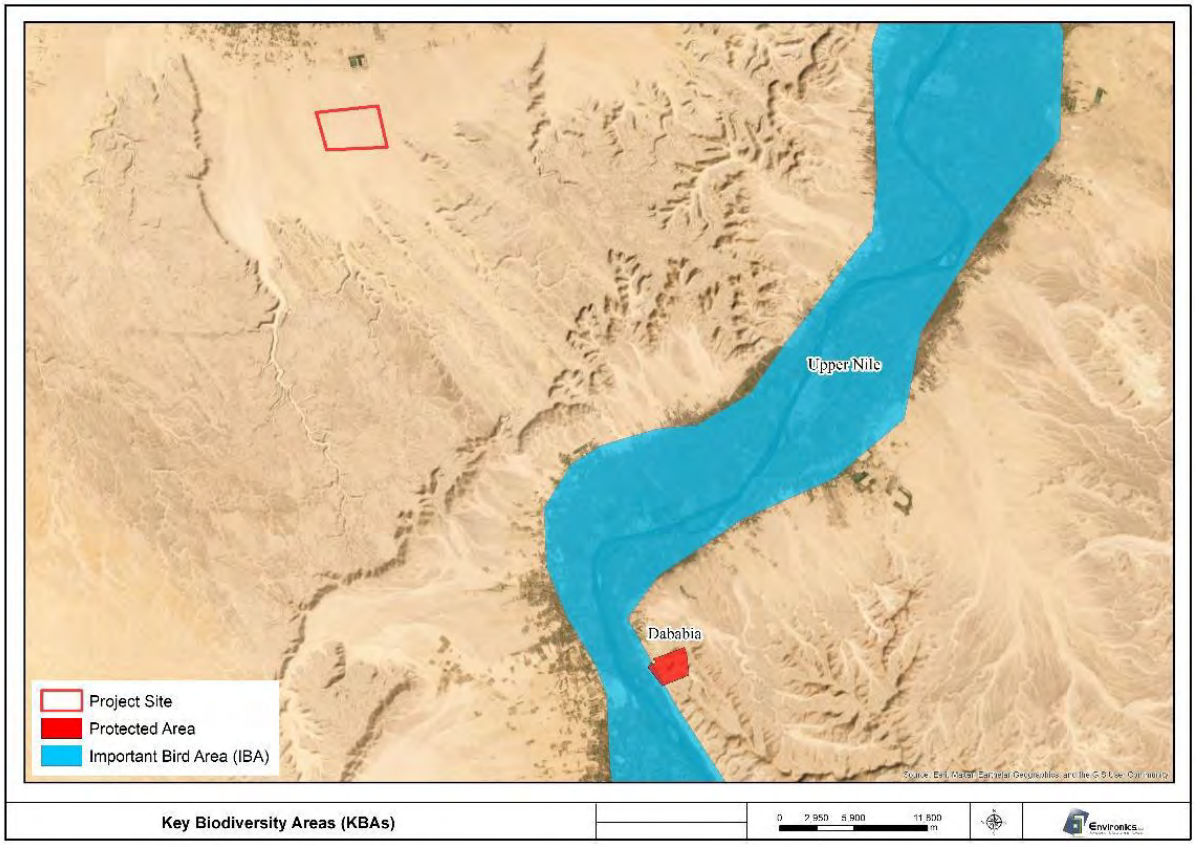



Figure 19: Nearest Key Biodiversity Areas (KBAs) to the Project Site

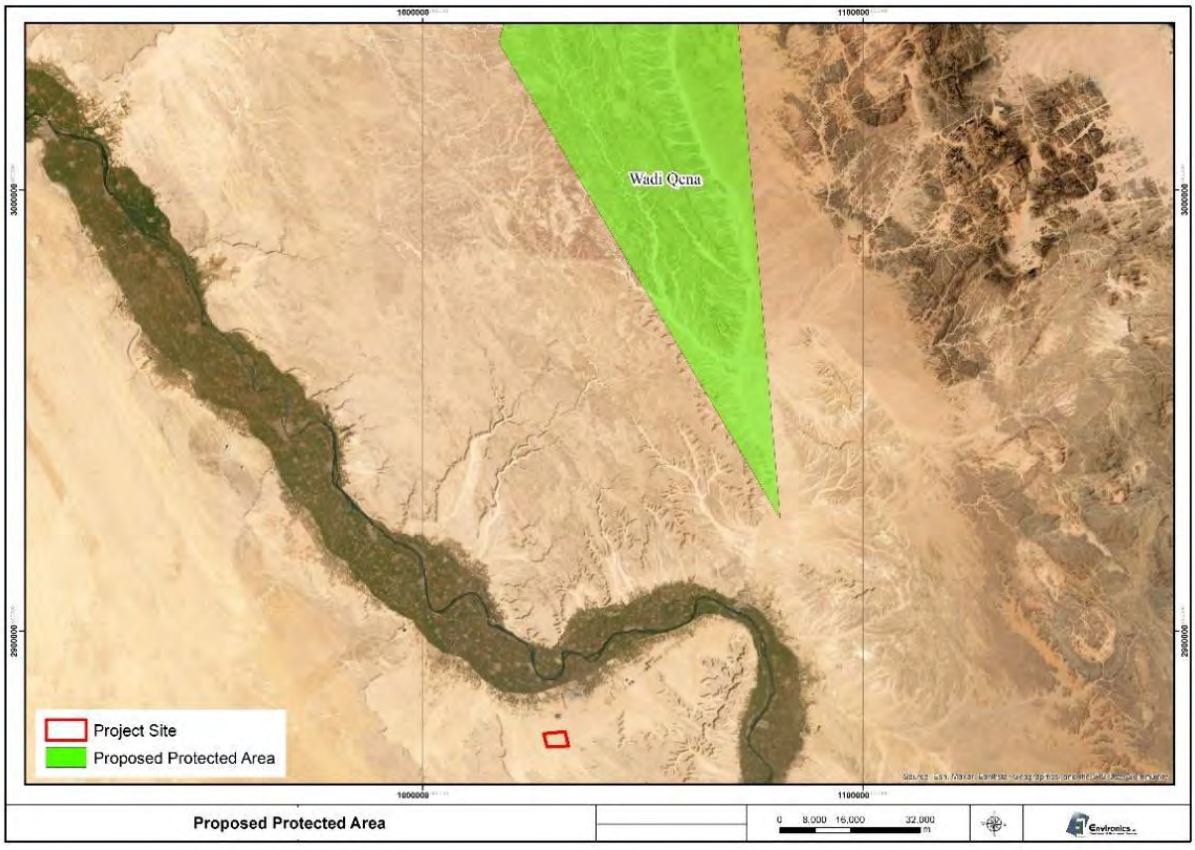



Figure 20 Location of Wadi Qena proposed PA in relation to the location of the Project Site

Ecological Value and Biodiversity:

The project site has low to moderate biodiversity significance. An assessment using international biodiversity databases showed minimal species occurrence in the area. Over a 14-year period, only one bird species, the Osprey, was recorded near the site, and it is not considered a conservation concern. No mammals, reptiles, or amphibians were recorded.

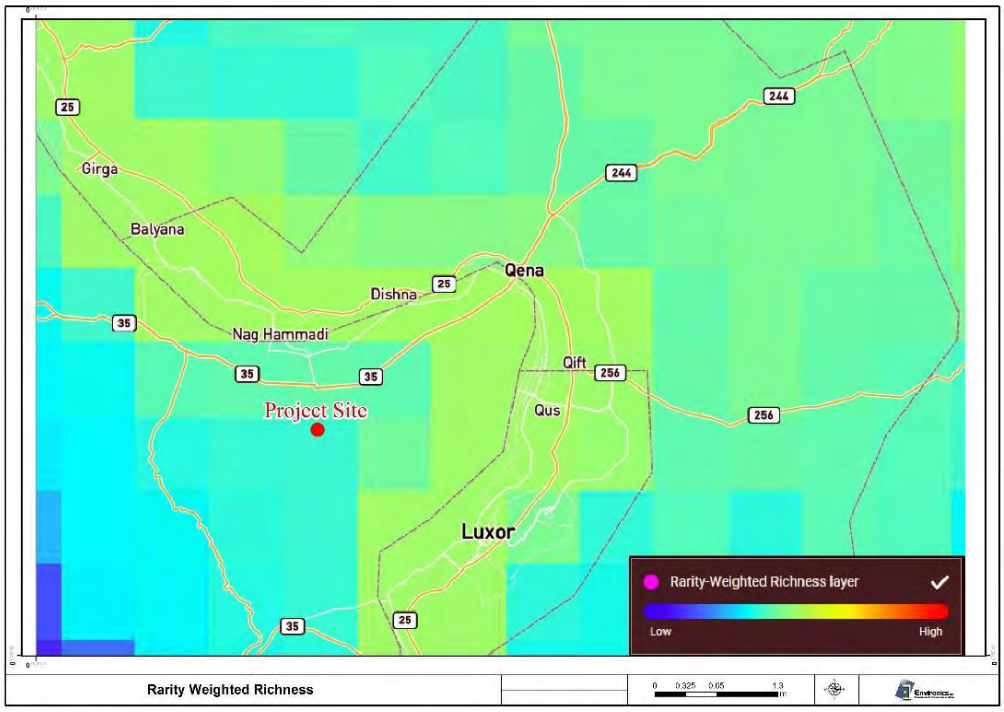



Figure 21: Rarity-weighted richness map of the Project Site

Ecosystem Services:

- Provisioning Services: The land is barren and not currently used by humans.
- Regulating Services: The site has minimal ecological functions, such as pollination or seed dispersion, due to low vegetation cover.
- Cultural Services: The site does not have recreational, aesthetic, or cultural significance.
- Supporting Services: The site contributes slightly to water infiltration, aiding groundwater recharge, but its impact is limited.

Critical Habitat Assessment:

The area does not qualify as a Critical Habitat (CH) under international biodiversity standards. However, four species (Desert Monitor, Egyptian Vulture, Rüppel's Pipistrelle, and Fennec Fox) were identified as Priority Biodiversity Features (PBFs) and may occasionally pass through the area.

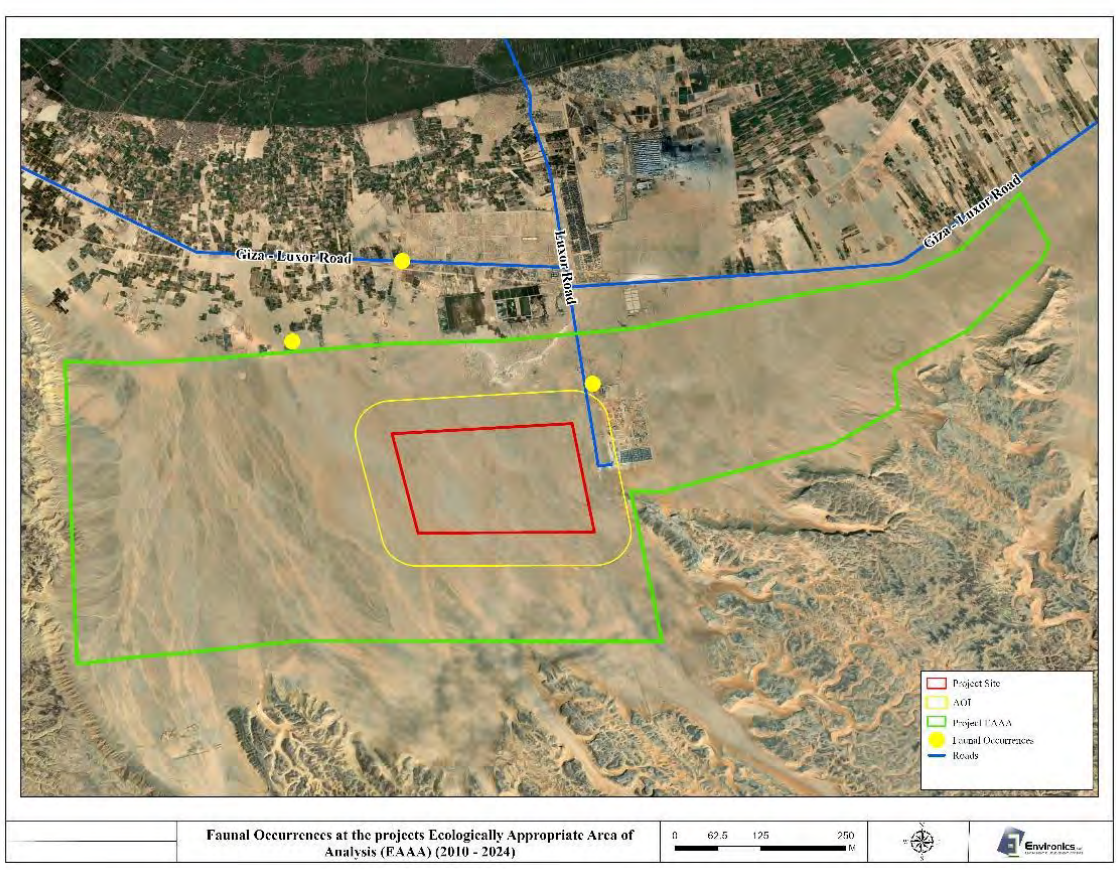



Figure 22: Faunal occurrences within and adjacent to the Project Site's EAAA

## 6.4 Socio-Demographic Overview

Qena Governorate, located in Upper Egypt, is a key agricultural and industrial hub, producing the majority of Egypt's sugarcane, tomatoes, bananas, sesame, and hibiscus. The governorate covers an area of 10,798 km², with 16% of this being inhabited land.

### Population & Settlements

Qena has a population of approximately 3.16 million people, with a nearly equal gender distribution. The majority (81%) reside in rural areas, while only 19% live in urban areas. The governorate is divided into multiple districts, villages, and hamlets, including Markaz Nagaa Hammadi, where the project is located, with a population of around 578,000.

### Labour Force & Economy

Qena's workforce consists of about 927,000 people, with men making up 75% and women 25%. In Markaz Nagaa Hammadi, the labor force is around 182,000. Key economic activities include manufacturing, construction, food services, transportation, and retail trade.

### Occupations & Education

Most male workers are engaged in skilled trades, agricultural work, and machine operations, while women predominantly work in service, sales, and clerical roles. Education levels vary, with a significant number of workers having technical education, while others have university degrees or no formal education.

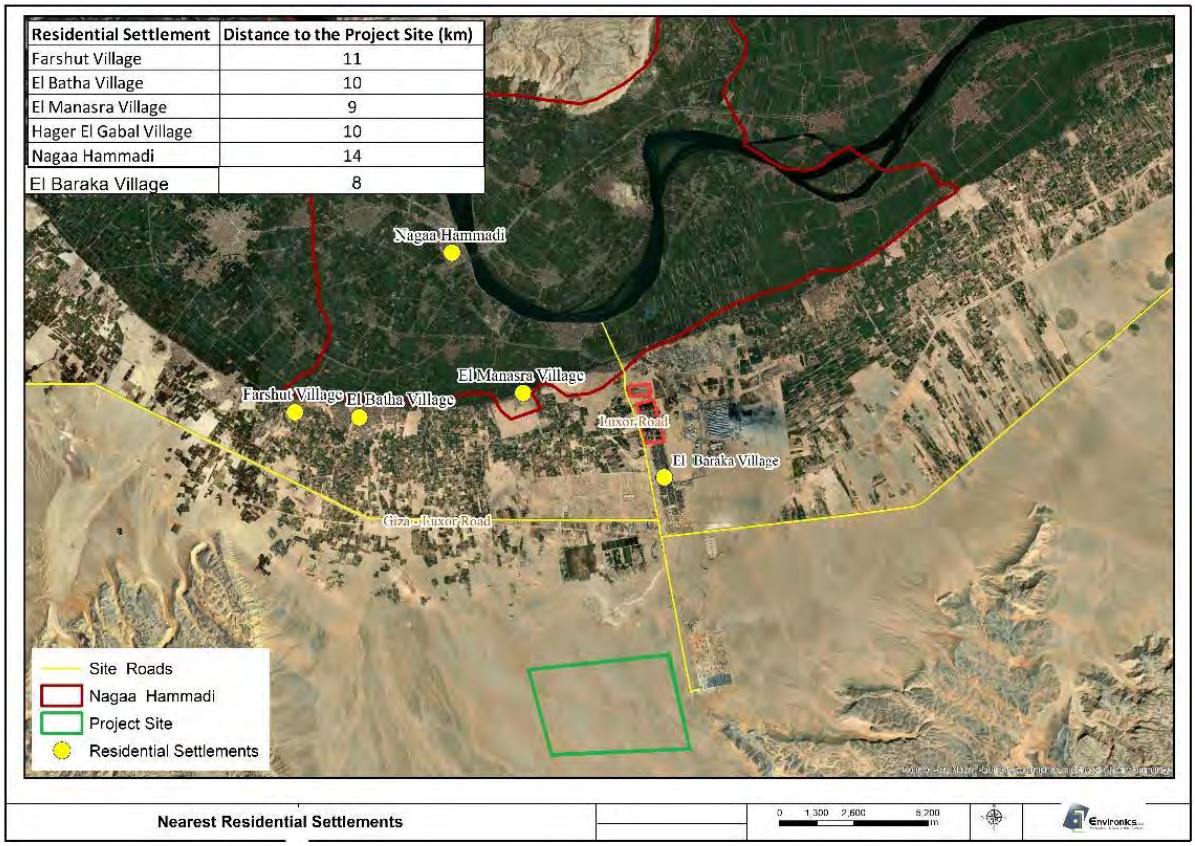



Figure 23: Location of residential settlements in close proximity to the Project Site

## 6.5 Land Use Types

The Project Site is currently undeveloped, consisting of bare ground with minimal vegetation. Nearby land uses include:

- Nagaa Hammadi Industrial Zone (0.5 km east)
- Reclaimed Agricultural Lands (5.5 km north)
- Wastewater Treatment Plant (3 km north)
- Giza–Luxor Road (5 km north)
- Residential Area (5.6 km northeast)
- Local Communities (9–10 km north)

### Infrastructure, Utilities, and Services

### Health Facilities

Qena Governorate has 52 hospitals, 46 ICUs, 241 health units, and 92 ambulances. Nearest health facilities:

- El-Baraka Village Health Unit (6.4 km north)
- Aluminum City Hospital (11 km northeast)
- How Village Health Unit (12 km north)
- An ambulance point is available in El-Baraka.

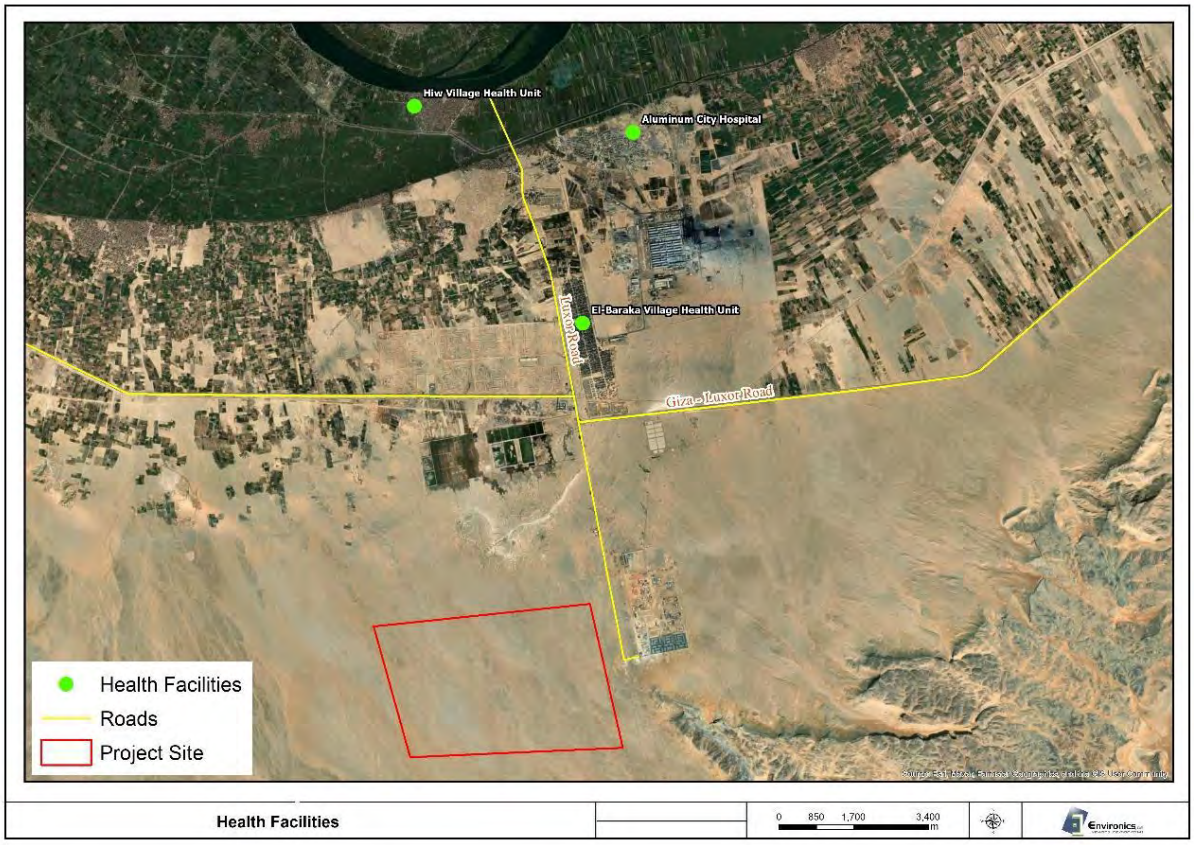



Figure 24: Healthcare facilities in close proximity to the Project Site

### Potable Water

99.58% of urban households and 95.92% of rural households are connected to the public water supply. Remaining households rely on wells, pumps, or bottled water.

### Sewage Facilities

15.47% of households are connected to public sewage networks. And 82.14% rely on cesspits, while a small percentage use private systems or open drains. 9 sewage treatment plants process 48.1 million m³ of sewage per year, with 207,000 m³/day capacity. Recent government initiatives (e.g., *Hayah Karima*) have improved sewage infrastructure.

### Transport Infrastructure

- **Giza–Luxor Road** (5 km north) connects Qena and Nagaa Hammadi.
- **Industrial access road** (0.5 km east).
- **Two bridges** link the east of the Nile to the Project Site:
- **Qena–Nagaa Hammadi Bridge** (50 km east)
- **Nagaa Hammadi–Deshna Bridge** (19 km north)

## 6.6 Cultural Heritage

### Tangible Cultural Heritage

The Egyptian Archaeological Map (2022) and UNESCO confirm that no registered antiquities or cultural heritage sites exist within the Project Site. However, six notable sites are nearby:

- **Abu Amuri** (9 km north): An unexcavated archaeological mound.
- **Hur** (9.5 km north): Recently excavated mud-brick tombs from the Old Kingdom.

- **Hiw** (11.5 km north): A significant site from the Predynastic and Middle Kingdom periods, featuring cemeteries, settlements, and Ptolemaic temples.
- **Gebel El-Arqi** (14 km northwest): Known for an ancient knife now in the Louvre.
- **El-Halfaya Qibli** (15 km northeast): Includes a prehistoric village and a large Predynastic cemetery.
- **Ancient Thebes** (33 km north): A UNESCO World Heritage Site with the Karnak and Luxor temples and the Valley of the Kings and Queens.

### Intangible Cultural Heritage

While no elements of UNESCO's List of Intangible Cultural Heritage (ICH) are directly present in the Project Site, some traditions are practiced nearby:

- **Handmade Weaving in Upper Egypt**: A traditional craft at risk due to declining economic viability.
- **Tahteeb (Stick Game)**: A martial-art-turned-folk-dance performed with sticks, symbolizing strength and cultural identity.
- **Al-Sirah Al-Hilaliyyah Epic**: A rare surviving Arabic oral epic narrating the migration of the Bani Hilal tribe.
- **Date Palm Knowledge & Traditions**: Cultural practices related to date palm cultivation, vital to the region's heritage.

### Project Impact

No major impacts on cultural heritage are expected due to local hiring, limited worker-community interaction, and the temporary nature of construction activities.

# 7. SUMMARY OF KEY ENVIRONMENTAL AND SOCIAL IMPACTS

| Environmental Aspect and Impact | Expected Impacts Significance | Mitigation Measures Summary | Residual Impacts Significance |
|---|---|---|---|
| **Construction Phase** | | | |
| o **Air Quality** | | | |
| Air Quality: Impacts from levelling, excavation and backfilling activities from construction vehicles machinery as well as use of transportation vehicles to transport the PV panels and other components equipment and construction materials. | MINOR | Implement policies to reduce idling, maintain machinery, impose site speed restrictions, ensure worker awareness of safe practices, and conduct periodic generator compliance measurements. | INSIGNIFICANT |
| o **Ambient Noise** | | | |
| o Equipment and machinery<br>o Vehicles Movement<br>o Power Generators<br>Potential impacts during construction. Noise and vibration during construction might be a source of annoyance to the neighboring industrial area. It is noted that there are no residential communities near the project site. the closest | MINOR | Ensure regular maintenance, use low-noise machinery where possible, avoid simultaneous high-noise activities, and provide hearing protection for workers exposed to high noise levels. | INSIGNIFICANT |

| Environmental Aspect and Impact | Expected Impacts Significance | Mitigation Measures Summary | Residual Impacts Significance |
|---|---|---|---|
| communities is the industrial area east of the site. | | | |
| o Impacts on Soil | | | |
| o Domestic wastewater tanks, material and wastes storage, and accidental spills.<br>Sanitary water from workers, gray water from accommodations and kitchens, Improper management may cause impact on soil<br>However, the depth of the groundwater would make it highly unlikely to be impacted. | MINOR | Conduct off-site maintenance, dispose of hazardous waste properly, and maintain good housekeeping. Ensure proper wastewater disposal and protect local wildlife. Use licensed contractors for waste management. | INSIGNIFICANT |
| o Impacts on the Biological Environment | | | |
| o Habitat disruption, flora, fauna, and avifauna<br>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 | MINOR | Mitigation measures will focus on avoiding the degradation of offsite habitats:<br>• Ensure proper housekeeping onsite and offsite to avoid the degradation of surrounding areas;<br>• Avoid offsite areas with vegetation cover to prevent further degradation of surrounding areas;<br>• Ensure proper speed limits onsite and offsite; and<br>• Provide awareness to the workers on the negative impacts of affecting flora and disturbing wild fauna.<br><br>To reduce the impacts of habitat fragmentation, implement a wildlife | INSIGNIFICANT |

| Environmental Aspect and Impact | Expected Impacts Significance | Mitigation Measures Summary | Residual Impacts Significance |
|---|---|---|---|
| activities | | friendly fence with the following characteristics:<br>• No barbed wire fences should be used as animals and birds get tangled in them while trying to cross over leading to injuries and/or fatalities.<br>• The fence should be highly visible to running and flying fauna.<br>• The highest and the lowest wires should allow wildlife species to either jump over or crawl under them without injury.<br>• A line of bright white cloth flags should be hung from the topmost wire for visibility (though this may not work for bats and nocturnal birds).<br>• A distance of 25-30 cm between the ground and the lower wire is deemed appropriate, given that potential biodiversity occurring in the area is composed of species of small dimensions. | |
| o Impacts on the Social Environment | | | |
| o Water Resources<br>Water requirements for the construction phase is about 80-100m3/day and could be met by the existing water treatment capacity. | INSIGNIFICANT | A comprehensive water management plan will be developed | No residual impact |
| o Worker Influx<br>A number of workers may put pressure the resources of the nearest communities. In | MODERATE | Prioritize hiring local workers, implement and maintain a community grievance mechanism, and select labor accommodation away from existing communities, considering establishing a labor camp on-site. | MINOR |

| Environmental Aspect and Impact | Expected Impacts Significance | Mitigation Measures Summary | Residual Impacts Significance |
|---|---|---|---|
| addition inadequate temporary accommodation may have impacts on the workers' welfare. | | | |
| o Infrastructure | | | |
| o Land use | INSIGNIFICANT | 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 with regards to potential.<br><br>Note: The upgrade of EETC's already exiting OHTL within privately held land may impact landowner crops as a result of equipment and machinery use. | No residual impact |
| o Traffic<br>Trucks of various sizes will be required for transportation of the project's components distributed throughout its construction period, of about 17 months, with varying intensities. Increased traffic increases the risk of road accidents onsite and offsite | MODERATE | Obelisk has developed Transportation Management Procedures for projects, operations, contractors, and subcontractors. These procedures define the minimum safety requirements for transportation activities, supplementing national regulations and project specifications. | MINOR |
| o Occupational Health and Safety | | | |
| o Impacts on workforce health and safety<br>Construction activities pose a | MODERATE | Occupational health and safety issues will be managed in accordance with the project construction H&S management plans. The EHS management plans would address but not limited to the following topics: excavation sites, continuous supervision of workers, | MINOR |

| Environmental Aspect and Impact | Expected Impacts Significance | Mitigation Measures Summary | Residual Impacts Significance |
|---|---|---|---|
| wide range of health and safety risks for workers ranging from electrocution, falling from height, | | proper training, regular maintenance, hydration, shaded breaks, and enforce speed limits. Use PPE, inspect equipment, control noise, offer lifting training, and implement fire prevention measures | |
| **Operation Phase** | | | |
| o **Air Quality** | | | |
| o Emissions from emergency generator | MINOR | Optimize the operation of backup generators to reduce usage and emissions. | INSIGNIFICANT |
| o **Ambient Noise & Vibration** | | | |
| Operation of Transformers, BESS<br>Use of backup generators during power outages | MINOR | Noise-generating machines and equipment will comply with statutory regulations, and workers will be provided with appropriate PPE. A grievance mechanism will be established to handle complaints. | INSIGNIFICANT |
| o **Impact on the Social Environment** | | | |
| o Wastewater | INSIGNIFICANT | Wastewater generated during the operation phase is minimal and will be collected by an approved contractor and discharged to designated treatment plants. | No residual impact |
| o **Impacts on Occupational Health and Safety** | | | |
| o Impacts on workplace health and safety<br>Workers performing maintenance activities can be exposed to risks such as electrocution and heat stress. | INSIGNIFICANT | Occupational health and safety issues will be managed in accordance with the project construction H&S management plans. A health and safety policy will be implemented, ensuring the provision of appropriate personal protective equipment (PPE) and an adequate supply of drinking water. | No residual impact |

| Environmental Aspect and Impact | Expected Impacts Significance | Mitigation Measures Summary | Residual Impacts Significance |
|---|---|---|---|
| o Impact on Avifauna | | | |
| o Bird collision and electrocution with overhead transmission line<br>Transmission lines present physical barriers to bird movement potentially resulting in collision risks especially in low-visibility conditions. Collison mostly takes place with the thinner and less visible ground wires. Larger, heavier species are more prone to collisions as a result of limited maneuverability. Electrocution may occur by contact between a conductor and an earthed metallic structure (either the crossarm or an earth wire) but can also occur by contact between two conductors. Large birds with extensive wingspans are more vulnerable as they have a higher likelihood of making contact with conductors when perched and opening wings. | MODERATE | Measures to reduce the risk of collision include:<br>• Install bird deterrents on the transmission lines at specific intervals along the transmission line<br>• Periodic carcass recording would take place to assess the effectiveness of the proposed mitigation measures.<br>Measures to reduce the risk of electrocution are either to increase the distance between earthed structures (pylons, crossarms) and points of contact with conductors, or to deter birds from using these structures as perches or nest sites.<br>The following mitigation measures are recommended for this Project:<br>• Increase the number of insulators where conductors connect to each tower, using insulators that prevent birds from landing on them.<br>• o Cover the crossarms with insulating materials such as PVC strips to ensure that birds are not earthed when perched. | MINOR |
| Decommissioning Phase | | | |

| Environmental Aspect and Impact | Expected Impacts Significance | Mitigation Measures Summary | Residual Impacts Significance |
|---|---|---|---|
| Anticipated impacts are similar to the construction phase, particularly in:<br>• Soil and groundwater (due to potential improper waste management).<br>• Air quality and noise (from dismantling activities).<br>• Occupational health and safety (due to handling of equipment and waste).<br><br>Mitigation Measures:<br>o Proper management and disposal of non-hazardous and hazardous waste.<br>o Implementation of construction-phase mitigation measures to minimize environmental and safety risks.<br><br>Residual Impacts: No additional mitigation measures are required beyond those applied during construction. And with proper waste management and safety protocols, impacts are expected to be insignificant. | | | |

# 8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The project will develop and implement an Environmental and Social Management Plan (ESMP) outlining specific mitigation and monitoring measures to ensure compliance with all applicable legal and institutional requirements, as well as EBRD Performance Requirements.

The ESMP encompasses the following key components:

- Summary of Impacts and Mitigation Measures
- Health, Safety and Environment (HSE) Plan
- Transportation Management Plan
- Noise Management plan
- Hazardous and Non-hazardous Waste Management Plan
- Water and Wastewater Management
- Chance Find Procedure
- Preventive and Corrective Maintenance
- Wastewater Management Plan
- Biodiversity Management Plan
- Housekeeping and Cleanliness
- Social Management Plan includes Obelisk's SEAH and GBV Management Plan
- Institutional Arrangements: Defined roles and responsibilities for implementing the ESMP, involving the project proponent, contractors, and relevant government agencies to ensure accountability and effective coordination among stakeholders.
- Capacity Building: Provisions for training and capacity building for project staff and contractors on best practices in environmental and social management, enhancing their ability to effectively implement the ESMP.

### Environmental and Social Monitoring Plan

Ensuring compliance with regulatory standards and the effectiveness of mitigation measures through regular checks of air quality and noise levels in workplace. Also, the project will regularly monitor community satisfaction, local needs (healthcare, water, etc.), understanding of the grievance mechanism, and unresolved grievances.

# 9. STAKEHOLDER CONSULTATION AND ENGAGEMENT

## 9.1 Stakeholder Identification and Analysis

This section outlines the stakeholder groups identified for the project, with ongoing reviews and updates. Stakeholders were determined based on the Project's Area of Influence (AoI) and potential impacts.

### Stakeholder Groups:

**Primary stakeholders**: Directly affected groups, including marginalized communities and local organizations.

**Secondary stakeholders**: Entities with influence, such as government agencies, experts, media, and academic institutions. Secondary stakeholders provide valuable data and insights for project planning and development.

A preliminary stakeholder analysis was conducted to assess their importance, roles, and engagement approach.

Stakeholders have been identified considering the following factors:

- Project's nature and activities;
- Geographical extension and location of the project; and
- Environmental and Social aspects and potential impacts of the project

Accordingly, the following preliminary key stakeholder groups have been identified in Table (3) below:

Table 3: Stakeholders Groups

| Stakeholder Category | Stakeholders | Impact, Influence and Interests |
|---|---|---|
| *Primary Stakeholders* | | |
| Local Businesses & Industry | Small business owners in the nearest cities and towns | Economic interest in the project (providers of goods and services). |
| Interested organizations | NGOs | National and local, which can provide social context and effective contacts to concerned communities |
| Local Communities/ residents | Nearest communities to the project site | Provision of workforce, may include key leadership figures of community stakeholders |
| Workers | Employees of developers and their contractors | Exposure to occupational health and safety risks<br>Economic benefits |
| **Vulnerable groups (specific vulnerable groups will be identified as the Project development proceeds)** | women<br>groups, disabled groups, elderly groups, etc.. | such groups have a vested interest in the project due to mainly potential for job opportunities. In addition, such groups could be impacted by other potential negative impacts (e.g., worker influx, Gender Based Violence and Harassment (GBVH), etc.). |
| *Secondary Stakeholders* | | |
| National Regulators/ agencies<br>& Permitting Authorities | NREA<br>EEAA EIA, | Includes authorities and agencies responsible for project permitting approvals. |

| Stakeholder Category | Stakeholders | Impact, Influence and Interests |
|---|---|---|
| Other relevant agencies | Egyptian Electricity Transmission Company<br>Ministry of Transport (roads and bridges Authority)<br>Ministry of Water Resources and Irrigation | Mostly related to associated facilities without which the project would not exist or properly function, such as transmission lines, roads, water and wastewater treatment facilities |
| Local Government | Qena Governorates and Nagaa Hammdi city. | The Governorate is of political importance and are home to the primary stakeholder and therefore could have a role in maximizing benefits and/or controlling adverse impacts. They also have a key role in issuing project construction permits as well as supplying utility services and security. |
| Healthcare Providers and emergency services | Main hospitals and healthcare | Would need to cater to the large workforce attracted by the project |
| Media | National and local mass media and newspapers | Channel to disseminate information; key public opinion influencers. |
| Private Landowners | Landowners along existing EETC OHTL (i.e., associated facility) | Will be impacted by EETC upgrades to existing OHTL within their lands. Crops may be damaged by EETC activities and draw negative attention to project associated facility. |

## 9.2 Stakeholder Engagement Process and Previous Consultation during the Scoping and ESIA stages

As stakeholder engagement is an ongoing process, future engagement activities during the pre-construction and mobilization, construction and operations will ensure that information disclosure and consultation activities are effective and meaningful for all stakeholders over the lifetime of the project. Initial stakeholder consultation activities were initiated at the scoping and ESIA stage. The following table presents a brief summary of the stakeholders' consultation activities to date:

Table 4: Summary of the stakeholder's consultation activities to date

| Stakeholders | Key Issues Discussed |
|---|---|
| 1st October 2024 | |

| | |
|---|---|
| Qena Governorate | Support for renewable energy projects, land ownership confirmed as state-owned, security requirements assured, no sensitive receptors nearby, transportation considerations, maximizing local hiring, female leadership opportunity welcomed. |
| Hiw Industrial Area Manager | Labour sourcing potential, accommodation options, availability of utilities, no history of flash floods, additional stakeholders suggested, female leadership initiative supported. |
| Local Farmers (North of Site) | Local crops, support for the project, groundwater depth, proposed labour sources, no history of flash floods. |
| Egypt Aluminum Company | Wastewater treatment using settling basins, sewage collection via trucks. |
| Water Pumping Station Workers | Pumping power and capacity, community labour availability, accommodation options. |
| Farmland Owner (Near Naga Hammadi Substation) | Transmission lines established before farming, limited crop variety due to saline groundwater. |
| Sewage Treatment Facility Guard | Facility serves Egypt Aluminum and El Baraka city. |
| 23rd October 2024 | |
| Light Industrial Area | Security recommendations, seasonal dusty winds mitigation, local job interests, concerns over rising living costs, availability of police and fire services, lack of an ambulance. |
| Meeting with Farmers | Interest in job opportunities and supply provision, no expected negative impact from the project. |
| 24th October 2024 | |
| Meeting with Local Women | Held at Hesset-El-Kheir NGO, 42 women participated, expectations for community investment and employment, NGOs suggested for worker recruitment. |
| Baraka Family Health Unit & Charity Organization | Availability of rental apartments, nearby ambulance service, employment expectations, support for workers with special needs, potential project role in improving waste management, transportation needs for workers. |

## 9.3 Stakeholders Engagement Plan

The project will deploy an E&S manager based in Cairo with frequent site visits and a local Community Liaison Officer (CLO) responsible for implementing the Stakeholder Engagement Plan (SEP). Engagement activities will focus on:

- Sharing project information.
- Addressing potential impacts and risks.
- Gathering stakeholder views and concerns.
- Building trust with communities.
- Establishing feedback and grievance mechanisms.

Stakeholder Engagement Channels:

1. **Social Media** – Updates via Qena Governorate and Nagaa Hammadi city Facebook pages.
2. **Project Website** – Key information available online.
3. **Flyers (Factsheets)** – Distributed at local labor offices, NGOs, and social media.

4. **Face-to-Face Meetings** – Arranged via NGOs, particularly for women.
5. **Focus Group Discussions (FGDs)** – Annual meetings with vulnerable groups, including the elderly, women, illiterate individuals, and people with special needs.

Contact information for the Project CLO is provided below:

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## 9.4 ESIA Disclosure

The below documents are to be disclosed on the Developer's website to allow any stakeholder to review the studies and comment on the scope of work undertaken, key issues identified and any other issues of concern they might have. At the end of the disclosure period, all received comments will be addressed and taken into account and an updated as appropriate.

- Environmental and Social Impact Assessment (ESIA)
- Addendum to the ESIA
- Non-Technical Summary (NTS)
- Stakeholder Engagement Plan (SEP)
- Environmental and Social Action Plan (ESAP)

The above documents will be disclosed on the developer's website at www. https://scatec.com/2024/09/12/scatec-signs-ppa-for-1-gw-solar-and-100-mw-200-mwh-battery-storage-project-in-egypt/.com. The documentation above will remain on the website for the life of the project.

Hard copies of the disclosure package will be available at the following locations:

Qena Governorate
Basin 10, Downtown, Qena

Scatec Cairo Office
Building 44, The Northern 90 th street, banks center, New Cairo, Cairo.