Environmental & Social Impact Assessment (ESIA)

AMEA Power 1GW "Abydos for Renewable Energy" Solar Plant Project in Egypt

REV-5

March 2025

ECO Consult

Issue and Revision Record:

Template Code		**QF-PM-01-15**	**Template Revision No.**	**REV-5**
Version	**Date**	**Description**	**Prepared By**	**Approved by**
REV 0	03 Nov 2024	Draft ESIA Report	1. ECO Consult 2. EcoConServ 3. Turnstone Ecology	Ibrahim Masri / Project Manager
REV 1	13 Nov 2024	Draft ESIA Report	1. ECO Consult 2. EcoConServ 3. Turnstone Ecology	Ibrahim Masri / Project Manager
REV 2	28 Nov 2024	Draft ESIA Report	1. ECO Consult 2. EcoConServ 3. Turnstone Ecology	Ibrahim Masri / Project Manager
REV 3	03 Dec 2024	Draft ESIA Report	1. ECO Consult 2. EcoConServ 3. Turnstone Ecology	Ibrahim Masri / Project Manager
REV 4	27 Feb 2025	Draft ESIA Report	1. ECO Consult 2. EcoConServ 3. Turnstone Ecology	Ibrahim Masri / Project Manager
REV 5	24 Mar 2025	Draft ESIA Report	1. ECO Consult 2. EcoConServ 3. Turnstone Ecology	Ibrahim Masri / Project Manager

Disclaimer:

This report should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of AMEA Power being obtained. ECO Consult accepts no responsibility or liability for the consequence of this document being used for a purpose other than the purposes for which it was commissioned.

This report is confidential to AMEA Power, and the Consultant accepts no responsibility of whatsoever nature to third parties whom this Report, or any part thereof, is made known. Any such party relies upon this report at their own risk.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABREVIATION AND ACRONYMS

Acronym	Definition
AC	Alternating Current
AoI	Area of Influence
AOO	Area of Occupancy
ARC	Anti-Reflective Coating
BAP	Biodiversity Action Plan
BCM	Billion Cubic Meters
BESS	Battery Energy Storage System
BMP	Biodiversity Management Plan
BOO	Build, Own, Operate
BSDA	Benban Solar Developer Association
CAA	Competent Administrative Authorities
CAPMAS	Central Agency for Public Mobilization and Statistics
CBOs	Community Based Organizations
CCKP	Climate Change Knowledge Portal
CCRA	Climate Change Risk Assessment
CCTV	Closed Circuit Television
CDC	Centers for Disease Control and Prevention
CDM	Clean Development Mechanism
CHA	Critical Habitat Assessment
CLO	Community Liaison Officer
CO	Carbon Monoxide
CO2	Carbon Dioxide
COD	Commercial Operation Date
CSP	Concentrated Solar Panels
CSR	Corporate Social Responsibility
DC	Direct Current
DEM	Digital Elevation Model
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
EEAA	Egyptian Environmental Affairs Agency
EEHC	Egyptian Electric Holding Company
EETC	Egyptian Electric Transmission Company
EGP	Egyptian Pound
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
ENSA	Egyptian National Security Agency
EOO	Extent of Occurrence
EP	Equator Principle
EPAP	Equator Principle Action Plan
EPC	Engineering, Procurement, and Construction
EPFIs	Equator Principle Financing Institutions
EPR	Emergency Preparedness and Response

EPRP	Emergency Preparedness and Response
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EU	European Union
FGD	Focus Group Discussion
FMC	Facilities Management Company
FPIC	Free, Prior, and Informed Consent
GARBLT	General Authority for Roads, Bridges and Land Transport
GBVH	Gender-Based Violence and Harassment
GCMs	Global Climate Models
GDP	Gross Domestic Product
GERICS	German Climate Service Center
GFDRR	Global Facility for Disaster Reduction and Recovery
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GIP	Good International Practice
GoE	Government of Egypt
GoS	Gulf of Suez
GPN	Good Practice Note
GRM	Grievance Redress Mechanism
GW	Gigawatt
GWh	Gigawatt Hour
HDI	Human Development Index
HSE	Health, Safety, and Environment
IBA	Important Birds Area
IBAT	International Biodiversity Assessment Tool
IFC	International Finance Corporation
IFIs	International Financing Institutions
ILO	International Labor Organization
IP	Indigenous Peoples
ISES	Integrated Sustainable Energy Strategy
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
KPI	Key Performance Indicators
LOTO	Lock Out/Tag Out
LWCMP	Labor and Working Conditions Management Plan
MSB	Migratory Soaring Birds
MSDS	Material Safety Data Sheet
MW	Mega Watt
MWRI	Ministry of Water Resources and Irrigation
NAWWCo	National Water and Wastewater Company
NCE	Nature Conservation Egypt
NCs	National Communications

NDC	Nationally Determined Contributions
NGO	Non-Governmental Organizations
NPL	Noise Pressure Levels
NREA	New and Renewable Energy Authority
NTS	Non-Technical Summary
O&M	Operation and Maintenance
OE	Owner's Engineer
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
OHSP	Occupational Health and Safety Plan
OHTL	Overhead Transmission Line
OSH	Occupational Health and Safety
OSHA	Occupational Safety and Health Administration
PM	Particulate Matter
PPA	Power Purchase Agreement
PPE	Personal Protective Equipment
PTW	Permit to Work
PV	Photovoltaic
RCP	Representative Concentration Pathway
SDGs	Sustainable Development Goals
SEAH	Sexual Exploitation, Abuse and Harassment
SEBH	Sexual Exploitation, Abuse, and Harassment
SEP	Stakeholder Engagement Plan
SESA	Strategic Environmental and Social Impact Assessment
SKP	Saint Katharine Protectorate
SLR	Sea Level Rise
SPEI	Standardized Precipitation Evapotranspiration Index
SRA	Security Risk Assessment
TBT	Toolbox Talks
TSP	Total Suspended Particles
TVET	Technical and Vocational Education and Training
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children's Emergency Fund
USD	United States Dollar
WAP	Accommodation Management Plan
WDPA	World Database on Protected Areas
WWTP	Wastewater Treatment Plan

1. INTRODUCTION

1.1 Background

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

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

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

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

To this extent, in 2013, the Arab Republic of Egypt (through the Ministry of Electricity and Renewable Energy) had developed and adopted the Integrated Sustainable Energy Strategy (ISES) 2015 – 2035, which provides an ambitious plan to increase the contribution of renewable energy to 42% of the electricity generated by the year 2035.

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

Through the BOO mechanism, a direct proposal was submitted by AMEA Power Ltd. to EETC for the development of a 1-Gigawatt (GW) Solar Photovoltaic (PV) facility in Aswan Governorate (hereafter referred to as 'the Project'). Following this, a Power Purchase Agreement (PPA) was signed with EETC on September 12th, 2024. AMEA Power Ltd. established the Abydos for Renewable Energy (hereafter referred to as 'the Developer'), a wholly owned AMEA Power Ltd., responsible for the development, execution, and ownership of the Project.

1.2 The Environmental and Social Impact Assessment (ESIA) Report

AMEA Power appointed ECO Consult to prepare the Environmental and Social Impact Assessment (ESIA) for the Project. ECO Consult managed the entire ESIA process to include management of subcontractors and overall development and compilation of ESIA. ECO Consult in turn subcontracted the following entities:

- EcoConServ Environmental Solutions (a locally registered Egyptian Environmental and Social (E&S) consulting company). Responsible for undertaking stakeholder consultation and engagement

activities, E&S baseline surveys, and data collection from governmental and non-governmental entities; and

- Turnstone Ecology (an international consulting company specializing in ecological assessments and studies). Responsible for undertaking the biodiversity assessment for the Project.

ECO Consult, EcoConServ and Turnstone referred to as the '**E&S Team'**.

Egyptian Environmental Law "Law No. 4 of 1994 and its subsequent amendments, the Law on the Protection of the Environment", along with its executive regulations, requires the preparation of Environmental and Social Impact Assessment[1] (ESIA) to evaluate the potential environmental impacts of new projects, including renewable energy developments in particular. More specifically, solar PV projects, are classified under the Law as "Category B" requiring a "Scoped EIA Study." Further details regarding the Egyptian legal framework and the specific requirements for the Scoped EIA study is provided in "Section 5.1".

In addition, the Developer will be seeking financing from International Financing Institutions (IFIs). Therefore, the Developer requires that the ESIA is developed in accordance with international E&S standards and requirements – such as the International Finance Corporation (IFC) Performance Standards (PS).

This report is the ESIA that has been prepared in accordance with "Law No. 4 of 1994" and international E&S standards and requirements.

1.3 Project Setup and Responsibilities

Different entities are involved in the planning and implementation of the Project. Responsibilities of each entity are listed in the text below along with a general description of their roles.

- *Abydos for Renewable Energy*: The owner and developer of the Project (hereafter referred to as 'the Developer');
- *Egyptian Environmental Affairs Agency (EEAA)*: the official governmental entity responsible for the protection of the environment in Egypt. The EEAA is responsible for approval of the ESIA and making sure it complies with the "Environmental Protection Law No. 4 of 1994" and granting the environmental clearance for the Project.
- *International Financing Institutions (IFIs):* entities that will provide financing to the Developer for the development of the Project. Such IFIs will ensure that the Project is developed in accordance with international E&S standards and requirements. At this stage, the IFIs have not been selected or appointed yet.
- *CEEC Consortium (Engineering, Procurement, and Construction (EPC) Contractor):* the consortium of China Energy Engineering Corporation (CEEC), China Energy International Group Co. Limited (CEIG), Southwest Electric Power Design Institute Co., Ltd (SWEPDI), and Zhejiang Thermal Power Construction (ZTPC) will be responsible for preparing the detailed design and layout of the Project; supply of the material and equipment (e.g. solar panels); construction of the Project and its various components (PV foundations, internal roads, building infrastructure, access road, etc.).

[1] Within the local context, the study is referred to as Environmental Impact Assessment (EIA) and not ESIA.

- *Project Company: Project Operator:* responsible for Operation and Maintenance (O&M) of the Project. CEEC Consortium has been assigned as the Project Operator for the first two (2) years of operation. However, the Project Operator for the remainder of the Project's operation has not been assigned at this stage;
- *Det Norske Veritas (DNV) (Owner's Engineer (OE))*: engineering company appointed by the Developer to ensure EPC Contractor develops the Project with the required technical specifications. Owner's Engineer is also responsible for supporting the Developer in ensuring EPC Contractor adheres to E&S requirements and obligations;
- *National Renewable Energy Authority (NREA):* is the entity responsible for the allocation of the land for the development of the Project;
- *Egyptian Electricity Transmission Company (EETC):* off taker of electricity and is the entity that signed the Power Purchase Agreement (PPA) with the Developer. In addition, they will also be responsible for designing, building and operating the associated interconnection facilities – i.e. the Overhead Transmission Line (OHTL) that will connect the Project site to the existing national grid; and.
- *E&S Team (ECO Consult, EcoConServ Environmental Solutions and Turnstone Ecology):* is the ESIA Practitioner and the consultant commissioned by the Developer to prepare the ESIA for the Project in accordance with local requirements as well as international E&S standards and requirements.

1.4 Document Structure

The following table provides an overview of the sections within this ESIA document. In addition, the ESIA includes a standalone Non-Technical Summary (NTS) and a Stakeholder Engagement Plan (SEP).

Table 1: Overall ESIA Structure

Chapter	Description of Content
Section 2 – Project Description	Provides a detailed description of the Project in relation to its location, the key project components and an overview of the proposed activities that are to take place during the various Project phases.
Section 3 – ESIA Approach and Methodology	Presents the methodology and approach that was adopted for the ESIA study.
Section 4 – Analysis of Alternatives	Investigates several alternatives to the Project development and the reasons for the preferred choice. This includes alternatives in relation to the Project site, selected technology, Project design, and finally investigates the 'no action alternative' – which assumes that the Project development does not take place.
Section 5 – Regulatory & Policy Framework	Provides an overview of the environmental and social regulatory and policy framework applicable to the Project.
Section 6 – Stakeholder Consultation and Engagement	Discusses in detail the stakeholder consultation and engagement plan which were undertaken as part of the ESIA process for the Project and provides an overview of the findings. In addition, this Section also discusses the future stakeholder engagement and consultation plans which are to take place at a later stage of the Project development.
Section 7 – Overview of Strategic Environmental and Economic Impacts	Provides an overview of the significant positive environmental and economic impacts that will result from the Project development on the strategic and national level. The Section also highlights the site specific negative environmental and social impacts anticipated from the Project throughout its various phases – each of which is discussed in detail in the subsequent chapters.
Section 8 – Section 17	These sections first present the baseline conditions within the Project site and surroundings, and then assess the anticipated impacts from the Project throughout its various phases on

	such a receptor. Finally, for each identified impact a set of mitigation and monitoring requirements have been identified which aim to eliminate the impact and/or reduce it to acceptable levels. This includes the following: Landscape and Visual (Section 8), Land Use (Section 9), Geology, Hydrology and Hydrogeology (Section 10), Biodiversity (Section 11), Archeology and Cultural Heritage (Chapter 12), Air Quality and Noise (Section 13), Infrastructure and Utilities (Section 14), Worker Welfare, Health and Safety (Section 15), Community Health, Safety and Security (Section 16) Socio-economics (Chapter 17), Subcontractor and Supplier Management (Chapter 18).
Section 19 – Human Rights and Gender Assessment	Presents a standalone human rights and gender risk assessment for the Project.
Section 20 – Climate Change Risk Assessment	Presents a standalone climate change risk assessment for the Project.
Section 21 – Assessment of Cumulative Impacts	Investigates the cumulative impacts which could result from incremental impacts from other known existing and/or planned developments in the area based on currently available information.
Section 22 – Environmental and Social Management Plan (ESMP)	Presents the Environmental and Social Management Plan (ESMP) for the Project; which mainly summaries the impacts identified as well as the mitigation measures and monitoring requirements to be implemented throughout the various Project phases. In addition, this section describes the institutional framework and procedural arrangement for the ESMP implementation as well as the implementation of an Environmental and Social Management System (ESMS).

2. PROJECT DESCRIPTION

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

2.1 Administrative Setup and Project Location

Administratively, Egypt is divided into 27 Governorates. Governorates are then divided into Marakez[2] (or Districts) which are then subdivided into local units, which are finally divided into cities, villages and hamlets.

The Project site is located in Aswan Governorate around 650 km southeast of the capital city of Cairo. Aswan Governorate is divided into 7 Marakez (Aswan, Daraw, Kom Ombo, Nasr Al Nuba, Edfu, Abu Simbel, and New Toshka), 12 cities, and 33 rural local units with 72 affiliated villages[3].

The Project site is located within the Daraw District, where the closest village is Al Raqaba Local Unit, located at a distance of around 6.5 km, while Daraw city (the capital city of Daraw District) is located around 11 km from the Project site.

Administratively, Al Raqaba Local Unit is under Daraw District and is divided into two villages: (i) Al Raqaba Foaniyeh (Upper Al Raqaba); and (ii) Al Raqaba Tahtaniyeh (Lower Al Raqaba).

- Al Raqaba Foaniyeh is further subdivided into several hamlets, including El Aliqat (El Bahri and El Qabli), Nagaa Al Arab, Abu Shoura, Hegaziyeh, Sheikh Zayed, El Harbiat El Gadida, El Bashab, Garagos, and Sheikh Fadl.
- Al Raqaba Tahtaniyeh is subdivided into several hamlets, including El Gama'ab, El Bayaidh, and El Hanawi, El Wansab, El Ganib, and El Rahmab; El Gharibah, El Hamidat, El Amin, and El Hassan; El Salwawiyah Bahriyyah, El Qibliyyah, and El Ezbah; El Awsar and El Mu'ayrab; El Mansi, El Zamrab, El Awnab, El Gabrab, and El Sararif.

In addition, the Project site is located within a vacant desert land around 1 km east of the Luxor-Aswan Highway and about 8.5 km west of the River Nile.

The Project site has an area of around 20 km^2. The following table shows the site coordinates, and the following figures show the location of the site.

Table 2: The Project Site Coordinates

	WGS Coordinates	
	Latitude	**Longitude**
P1	24.355336°	32.778411°
P2	24.318678°	32.783750°

[2] Markaz. In the administrative division of Egypt, the Markaz is the main city or village followed by a group of villages in agricultural areas (not urban), and often the most important city is a Markaz for a total of villages. The Markaz has more commercial markets than villages, and there may also be branches of government service institutions and agencies serving villages. Each Governorate of the Delta and Upper Egypt includes a number of Markaz, Cities and villages.

[3] Urban Planning Authority, future vision and projects supporting the development of Aswan Governorate, 2017.

P3	24.360031°	32.816431°
P4	24.359183°	32.825825°
P5	24.319150°	32.827106°

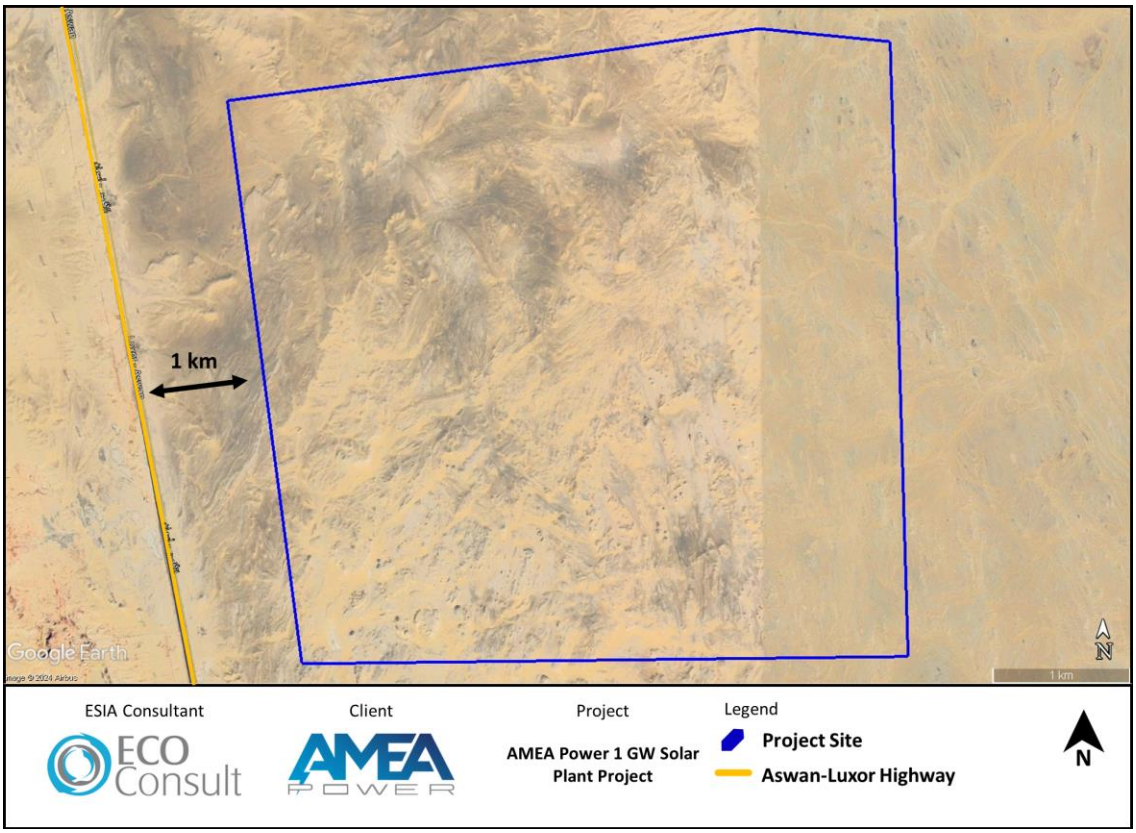

Figure 1: The Project Site in Relation to the Aswan – Luxor Highway

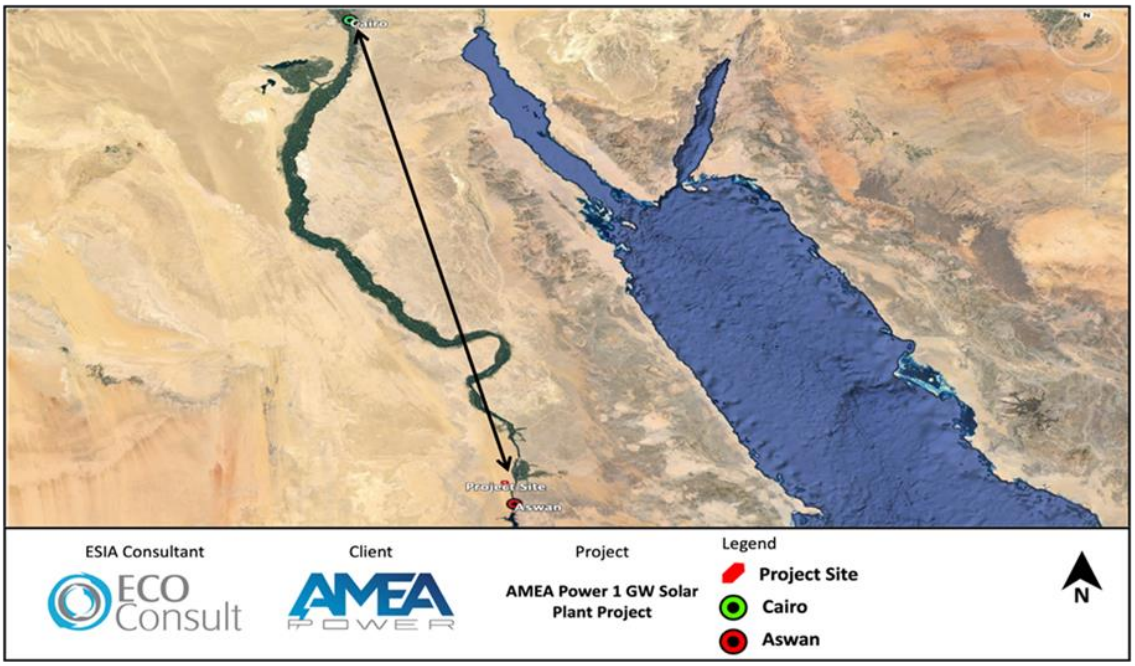

Figure 2: The Project Location in Egypt

2.2 Local Communities

Throughout the ESIA report, the term local communities will be used. This will refer to the Al Raqaba Local Unit entirely including all of its affiliated Villages and Hamlets. The figure below presents the Project site and the location of Al Raqaba Local Unit long with its administrative borders.

The Al Raqaba Local Unit has been selected as affected communities based on the following rationale:

- Administrative Setup: the Project site as explained earlier is located entirely within Daraw District. Therefore, communities to be selected were to be located within the same District.
- Proximity to Site: the closest settlements were considered as local communities. Although located at distance of 6.5 km from the Project site, Al Raqaba Local Unit is considered the closest to the Project site and it is these communities that are most likely to be impacted (positivity or negatively) in some way by the Project, as explained in further details throughout the ESIA.
- The decision to include Al Raqaba Local Unit entirely (including all of its villages and hamlets) as the local community was also based on the process for the consultation sessions and was in agreement with the Mayor as well as other key governmental entities – this issue is discussed in further details in "Section 6.3.2".

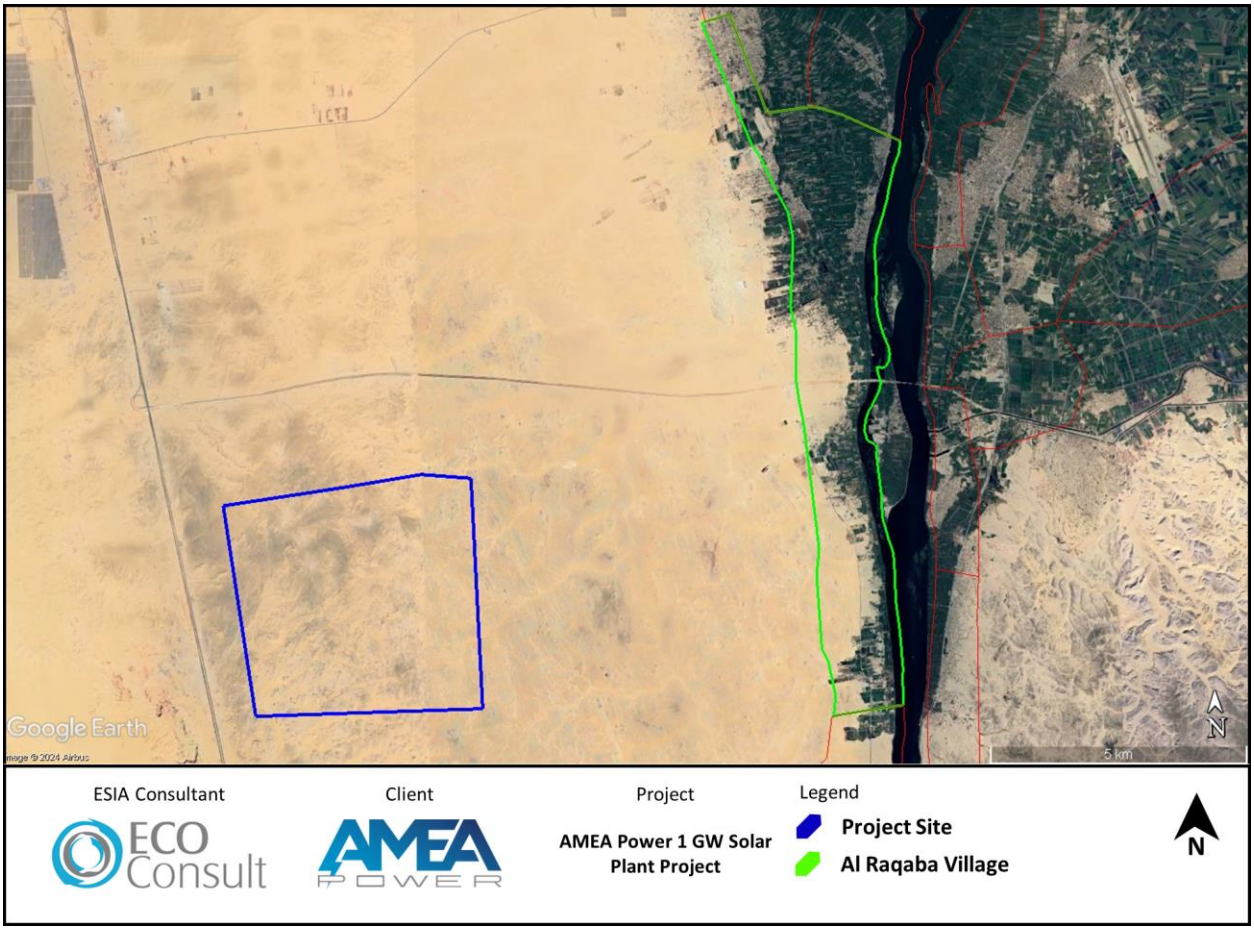

Figure 3: Project Site and Closest Communities

2.3 Project Components

2.3.1 Outline of Solar PV Technology

An explanation of PV technology functionality is as follows. PV is a method of generating electricity through solar panels which are composed of a number of solar cells. Such cells convert solar energy (radiation from the sun) into electricity using semiconductors (photovoltaic material that exhibit the photovoltaic effect); following the exposure of the PV panel to light, voltage is created in the material as photons from sunlight excite electrons in those materials into a higher state of energy, allowing them to act as charge carrier for an electric current.

Solar cells produce Direct Current (DC) electricity from sun light, which can be used for grid connected power generation. However, electricity at the grid is usually in a different form (known as Alternating Current (AC)) and thus inverters are used to convert the DC current to AC current. In addition, cells produce electricity at a certain voltage which must be matched to the grid it connects to. Therefore, transformers are used to convert the output from the panels to a higher voltage that matches the grid.

The table below provides a summary of the key project components for the 1 GW Project, along with a detailed description of each of those components to follow. It is important to note that following information is based on preliminary data and design details provided by the Developer at this stage.

Table 3: Summary of the Key Project Components

Component	Description
Project Generation Capacity	1 GW
Technology Type	Photovoltaic (PV)
Project area	20 km^2
PV Panels	Bi-facial –MONO TopCON crystalline Solar Module Technology
Infrastructure and Utilities	Underground cables, central inverter stations, substation, warehouse and office, water reservoirs, access road.
Associated facilities	Grid connection will be developed by EETC to connect the substation onsite with the National Grid. No details are available at this stage from EETC on the connection (e.g. route, length, etc.).

2.3.2 PV Arrays

According to the preliminary design details available, the Project will be divided into blocks, where each block will be composed of PV Power arrays (typical structure of power arrays is presented in the figure below).

a) PV Arrays: each array is made of PV panels. For this Project each panel will have a capacity of 610 to 620Wp. Each panel is of 2,465mm length, 1,134mm width, 35mm thickness, and weighs around 33.4kg. The panel requires protection from the environment and is usually packaged tightly behind a 2mm glass sheet which has an Anti-Reflective Coating (ARC) layer to capture maximum sunlight and to minimize reflections. The panel is a mono-crystalline solar module technology which utilizes silicon as a semiconductor material for generation of electricity. Silicon is considered a non-hazardous material

b) Each array is equipped with a mounting structure (single axis horizontal tracker) which carries the array and orients it towards the sun throughout the day to maximize the amount of energy produced.

Figure 4: Typical Power Arrays composed of PV Panels

2.3.3 Infrastructure and Utilities

The following highlights the key infrastructure and utility elements that will be required for the Project.

- Each block within which the PV arrays are located, will include a central inverter station (for a total of 144 within the Project site). The inverter station converts the electricity produced from the panels from Direct Current (DC) to Alternating Current (AC).
- The central inverter stations will then connect through underground electrical cables to the onsite substation.
- The substation will then convert the voltage produced from 33kV or 22kV (depending upon final design) to 220kV (i.e. the appropriate voltage for connection with the National Grid).
- Building Infrastructure will mostly include offices for normal daily operational related work, control building including data, control and voice communication system for proper operation and maintenance of the solar farm as well as a warehouse / workshop for storage of equipment and machinery and maintenance and car parking.
- Road network to include: (i) internal road network for ease of access to the modules for operation and maintenance purposes and (ii) security road around the perimeter of the Project site for security patrolling; and (iii) access road from the main highway to the site.
- Fencing around the entire facility and security along with remote cameras, and automatic night lighting to ensure safety from criminal activity and trespassing of unauthorized personnel.
- Monitoring System: provides information of the plant equipment performance for operation and maintenance.
- On-site water reservoirs are most likely to be utilized for the water requirements of the Project. Water will be used mainly for potable purposes as well as for the scheduled cleaning of the panels to prevent dust build-up as this would affect their performance.

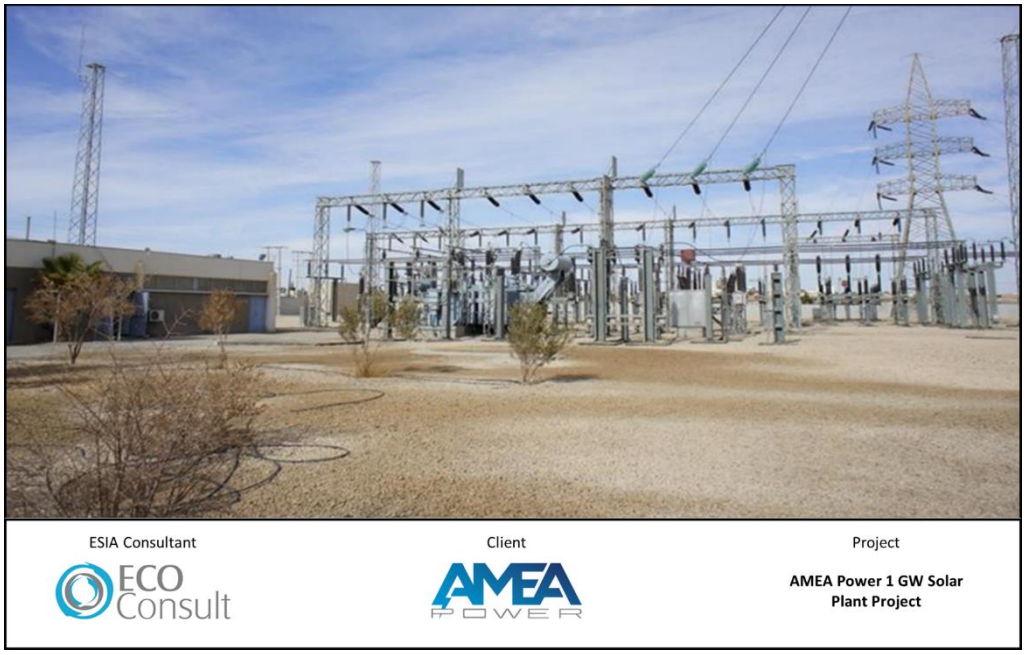

Figure 5: Typical Substation

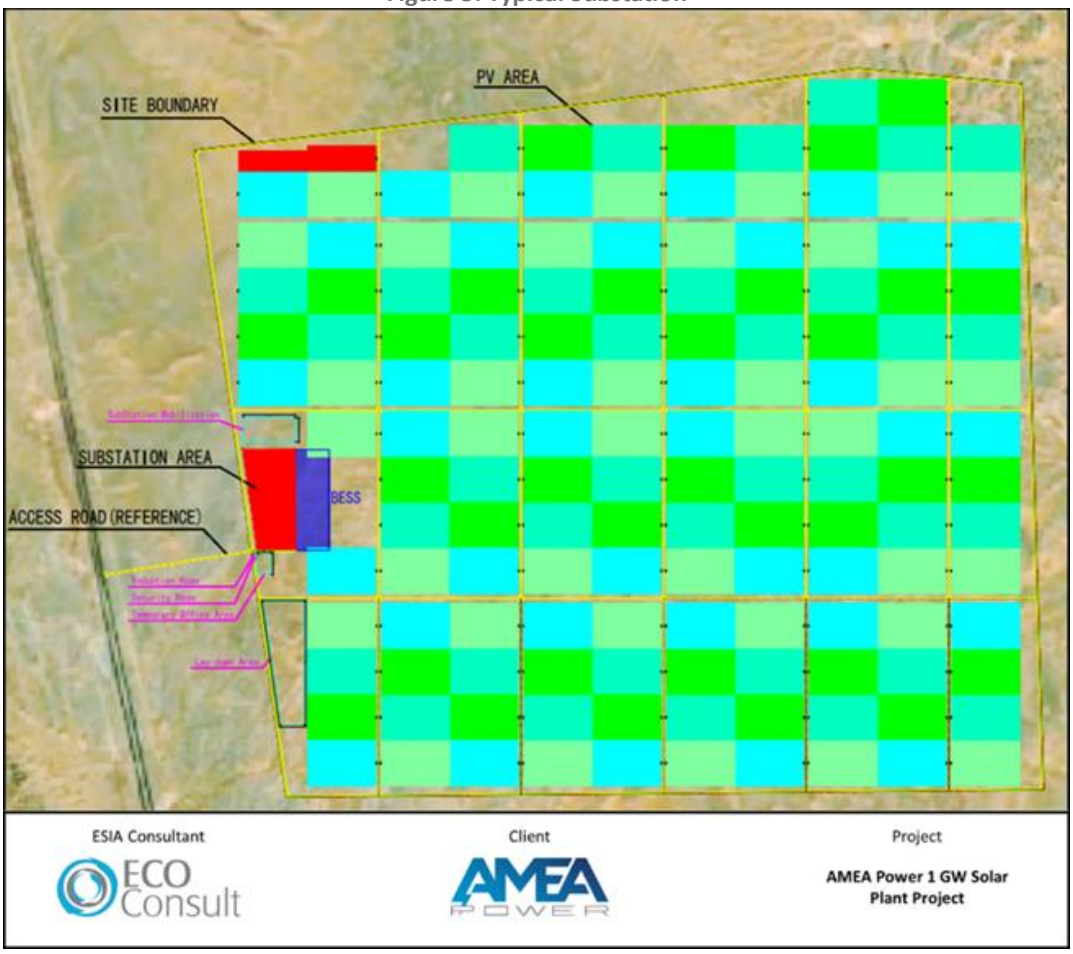

Figure 6: Preliminary Project Layout

2.3.4 BESS

There will be a 600 MW BESS component that is located next to the internal substation as shown in the figure above. The figure below presents a typical BESS. Based on preliminary information available at this stage, the technology will be Lithium Ion. The BESS will be used to store excess energy from the solar PV project.

Figure 7: Typical BESS

2.3.5 Other Temporary Components

There are additional Project components that will be required on a temporary basis throughout the construction phase of the Project in particular. Those are identified below. The location of such components in particular will not be available at this point, nor is it expected to be available during the ESIA preparation phase. Those will be identified once the EPC Contractor is appointed and a detailed design is completed.

- Site Offices: temporary offices that will be used by Developer and EPC Contractor staff during the construction phase. It is expected that this will be within the Project footprint.
- Laydown areas: this is a temporary storage area where tools, materials, equipment and vehicles are stored when not in use. It is expected that this will be within the Project footprint.
- Batching Plant: a mobile concrete batching plant could be established within the Project footprint for preparation of the concrete to be used for foundation installation and other infrastructure requirements (e.g. substation, buildings, etc.). This will reduce transportation requirements compared to an off-site plant. A typical batching plant is provided in the figure below. It is expected that this will be within the Project footprint.

- Generators: generators will be used for supplying electricity throughout the construction phase of the Project for various power supply requirements. There will be no temporary power supply lines erected before or during the construction period.

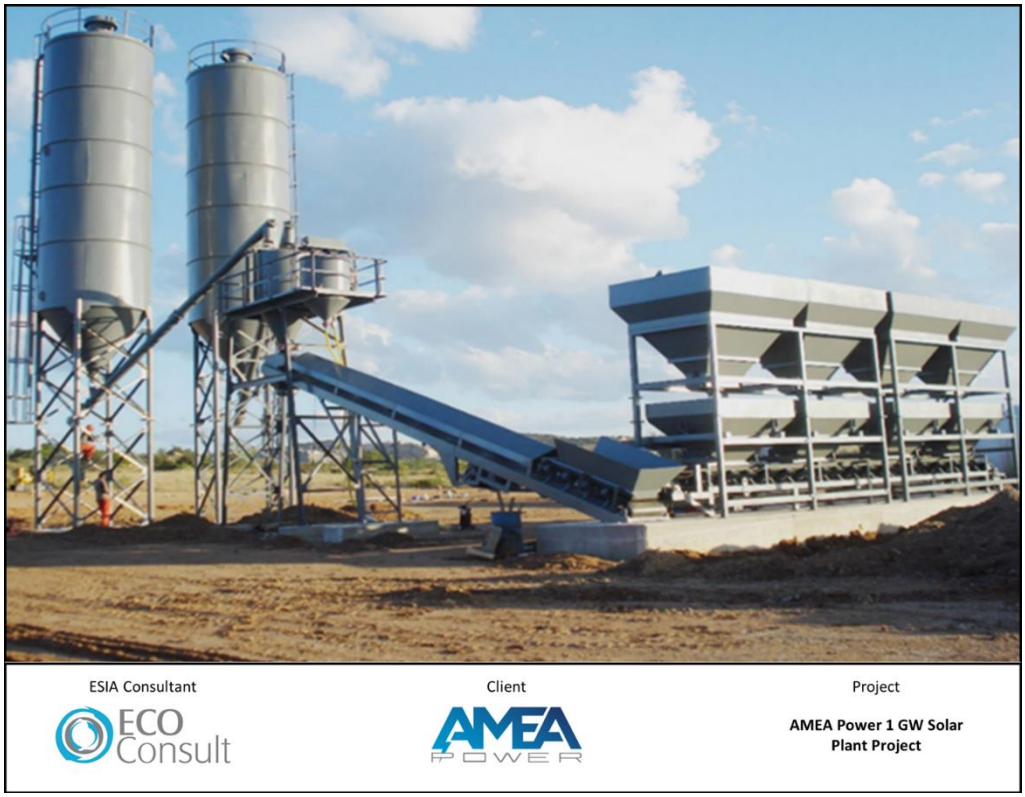

Figure 8: Typical Mobile Batching Plant

2.3.6 Associated Facilities

As discussed earlier, EETC will be responsible for offsite connection works from the onsite substation to the National Grid. This is likely to be through an Overhead Transmission Line (OHTL). EETC will be responsible for preparing the detailed design (including identification of the OHTL route), construction activities as well operation and maintenance activities. *It is important to note that at this stage there are no details available by EETC on the OHTL specifications (route, height, number of electrical towers, etc.).*

2.4 Overview of Project Phases

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

2.4.1 Planning and Design Phase

This phase will involve the following:

- Completion of all required studies for the Project development. This will include but not limited to ESIA, topography study, geotechnical study, etc.;

- Obtaining and finalizing required financing from IFIs;
- Obtaining required permits;
- Appointment of EPC Contractor; and
- Preparation of detailed design and layout requirements.

2.4.2 Construction Phase

The typical activities that will take place during the planning and construction phase for solar PV plants include the following:

- Mobilization of Project team and equipment to the site and recruitment of workers;
- Undertake mobilization works for temporary facilities which will involve deployment of site offices, worker facilities, laydown areas, and batching plant;
- Transportation of Project components to the Project site. All PV panels, electrical and structural equipment is planned to be shipped through sea to a Port and then trucked to site via road in containers.
- Site preparation of the solar PV plant foundation. The Project requires a flat land for installation of the PV arrays and the various Project components. Such activities could include excavations, grading and land clearing activities;
- Drilling and/or piling elements for the foundations on which the mounting structures for the PV panels will be installed;
- In addition to the installation of the arrays, there is additional construction work that must be conducted to connect each panel to the power grid. This could include the installation and laying of underground cales, central inverter stations, substation, etc.
- Civil works for construction and development of the access road and internal road network;
- Construction works to include civil works, electrical works and mechanical works for the development of the substation and building infrastructure, etc.; and
- Decommissioning of temporary facilities.

2.4.3 Operation Phase

PV plants generally require limited operational activities which mainly includes the following:

- Commissioning tests of the solar PV plant which usually involves standard electrical tests for the electrical infrastructure, and inspection of routine civil engineering quality records. Careful testing at this stage is vital if a good quality solar PV plant is to be delivered and maintained.
- Operation and Maintenance (O&M) of the PV farm. This includes the normal daily operation of the PV plant including its maintenance to optimize the energy yield and the life of the system. Maintenance can be divided into the preventive and corrective maintenance. The preventive maintenance follows

a routine service schedule aimed at preventing faults from occurring and keeping the plant operating at its optimum level. The frequency of the preventive maintenance depends on a number of factors such as the technology selected, environmental conditions of the site, warranty terms and seasonal variances. It contains for example activities like PV module cleaning, inverter servicing or checks on structural integrity of the mounting structure. The corrective maintenance is carried out in response to failures for example the repair/ exchange of damaged equipment or inverter faults.

- It is important to note that the PV modules will be cleaned on a regular basis to prevent dust build-up which could affect their performance. The cleaning method depends on the Operator's approach and on the Project size. However, the priority will be for the use of dry cleaning of the panels as a standard practice which does not entail the use of water. This involves the use of cleaning robots mounted on module rows or dry mobile cleaning equipment. It is expected that there would still be situations where water will be required to clean the panels (e.g. when dust becomes adhesive/ or the presence of dust deposits on the modules) which are expected to occur once or twice a year.

2.4.4 Decommissioning Phase

According to the PPA agreement, the Project is expected to be operational for 25 years. In the case of the complete decommissioning of the PV farm, decommissioning activities could include the disconnection of the various Project components (PV array, central inverter stations, substation, etc.) for final disposal. In addition, internal road network will be restored, and gates and fences will be removed.

2.5 Project Schedule

Discussed below is the preliminary and tentative schedule for the overall Project development that is available at this point, as provided by the Developer.

- Planning and Design phase: this phase is currently ongoing; concept design and planning is expected to continue until Q4 2024, with detailed design undertaken with the EPC Contractor up to the start of construction.
- Construction phase: this will involve undertaking of all construction activities as identified earlier for the Project development. This is expected to require around one (1) year starting from Q1 of 2025.
- Operation phase: commercial operation is expected to start in Q4 2025 / Q1 2026, around one (1) year from start date of the construction. The project should be operational according to the signed PPA which is as discussed earlier is set for 25 years.

2.6 Workforce Requirements

According to information provided by the Developer, the Project will require the following workforce throughout the construction and operation phase:

- Around 4,000 job opportunity at peak during the construction phase. The duration of the construction phase will be approximately 17 months. This will mainly include 2,120 skilled job opportunities (to include engineers, technicians, consultants, surveyors, etc.) and 1,880 unskilled job opportunities (such as laborers, security personnel, housekeeping, etc.).

- Around 90 job opportunities during the operation phase for a duration of 25 years. This will include around 30 skilled job opportunities (such as engineers, technicians, administrative employees, etc.) and 60 unskilled job opportunities (such as security personnel, drivers, etc.).

The Developer is committed to adhering to fair and transparent recruitment procedures which include local community members. In addition, the Developer aims to provide opportunities for local community members to be considered for skilled and unskilled positions during the construction and operation phases, where their skills and qualifications align with the job requirements. All employees will be subject to normal human resource practices and will have to conduct themselves in accordance with the Developer's disciplinary code. No discrimination, on ethnic, gender, race or other such demographic factor will be allowed during recruitment. The only preferential factor shall be the fact those that are directly affected, subject to meeting all the prerequisites for recruitment of the specific job.

2.7 Other Solar PV Developments within the Aswan Governorate

Within Aswan Governorate, there are several solar PV Development Projects, all of which are operational. These include the Benban Solar PV Development Project, the Abydos 500MW PV Solar Development Project, the ACWA Power Kom Ombo 200MW Solar PV Development Project, and the NREA 26MW Solar PV Development Project.

The figure below presents the boundaries of these projects, as well as the Project boundary.

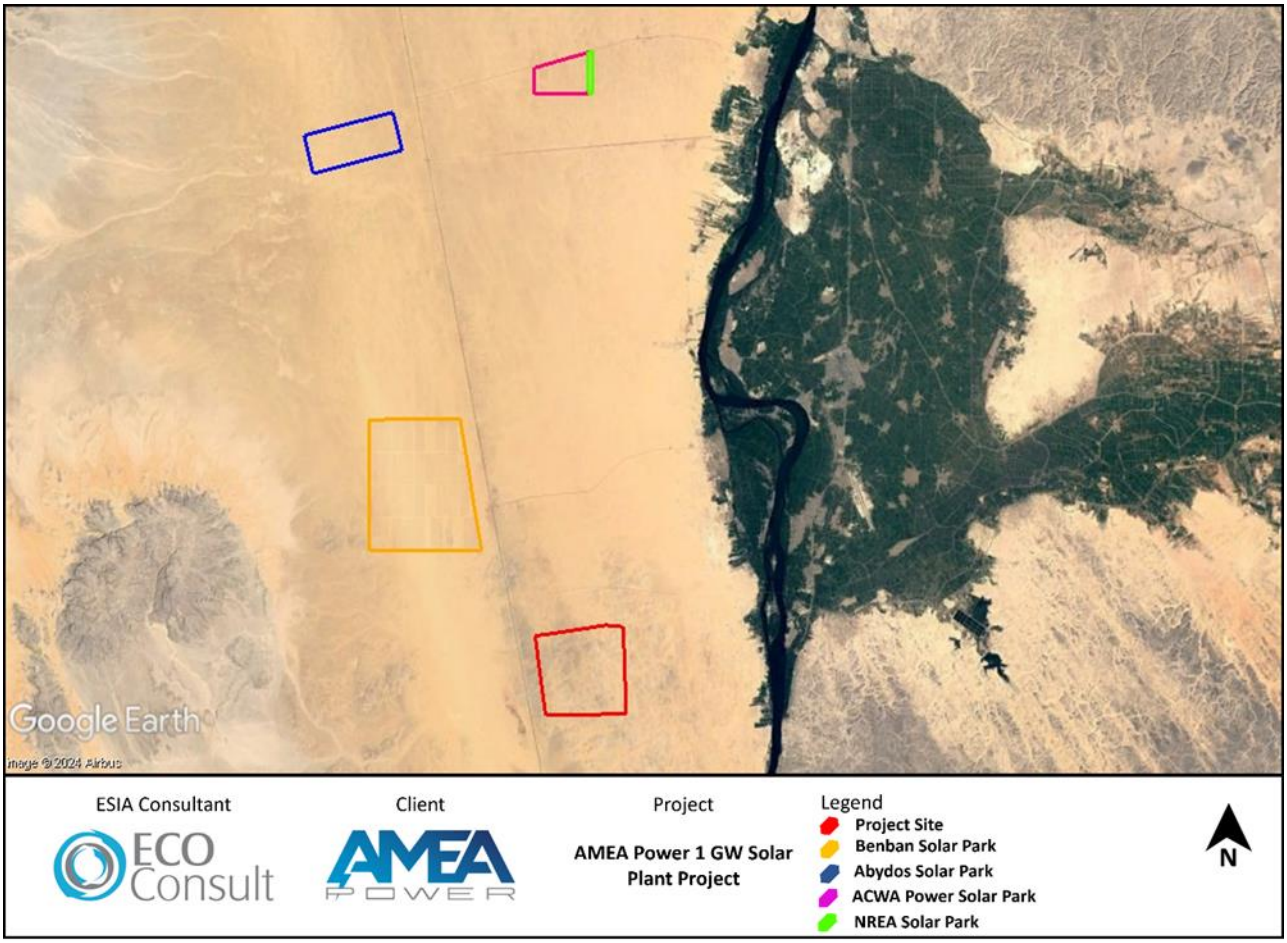

Figure 9: Other Solar PV Development Projects in the Area

Benban Solar PV Development

The Benban Solar PV Development is located around 5.5 km northwest of the Project site. The development is an operational 1.8 GW Solar PV Park. This solar PV development has an area of around 37.2 km² and comprises 41 separate plots, each developed by various companies undertaking solar PV projects. The Benban Solar Park is currently managed by a Facilities Management Company (FMC).

A Strategic Environmental and Social Impact Assessment (SESA) was undertaken by NREA in 2016 through funding from the European Bank for Reconstruction and Development (EBRD) for the Benban Solar Park[4].

Abydos 500MW PV Solar Development Project

Through the BOO mechanism, a direct proposal was submitted by AMEA Power Ltd. to EETC for the development of a 500 MW Solar PV facility in Aswan Governorate[5], more specifically within the Kom Ombo area, the PPA was signed accordingly. The Project is currently in the final construction stage and is expected to be operational by November 2025.

The Abydos 500MW Solar PV Development Project is located approximately 26 km northwest of the Project site. This development project has an area of around 10 km². The closest villages to the project include: (i) Fares Village which is administratively under Kom Ombo District; and (ii) Al-Mansourieh Village which is administratively under Daraw.

ACWA Power Solar PV Development

Under the BOO mechanism, and similar to Abydos Solar PV Project, a direct proposal was submitted ACWA Power to EETC for the development of a 200 MW Solar PV facility in Aswan Governorate[6] and within the Kom Ombo area, and a PPA was signed accordingly. The Project is currently in the operation phase.

The Project site is located around 27 km to the north of the Project site, to be developed on area of around 5 km². Similar to the Project site, this project is located within Kom Ombo District and the closest village is Fares located around 8km to the east. The project is currently operational.

NREA Solar PV Development

NREA has a 26 MW Solar PV development Project[7] that is currently operational and that is located around 27.5 km to the north of the Project site.

[4] Strategic Environmental & Social Impact assessment Benban 1.8 GW Photovoltaic solar Park (NREA), Egypt
[5] Abydos 500MW Solar Power Project Environmental and Social Impact Assessment (ESIA)
[6] 200 MW Photovoltaic Power Project Kom Ombo – Aswan Arab Republic of Egypt
[7] Kom Ombo 26 MW Solar PV Project

3. ESIA APPROACH AND METHODOLOGY

This Chapter presents the approach and methodology that was undertaken for the ESIA study in accordance with the Egyptian Environmental Affairs Agency's (EEAA) requirements as stipulated by the "Law No. 4 of 1994". In addition, the methodology for the ESIA takes into account international E&S standards and requirements – this mainly includes the IFC Policy on E&S Sustainability (2012), IFC Performance Standards (2012), and applicable IFC EHS Guidelines.

3.1 Analysis of Alternatives

The Egyptian Regulations to include the "Guidelines of Principles and Procedures for Environmental Impact Assessment" (EEAA, 2009) requires that the ESIA identify and analyze alternatives and present the main reason for the preferred choice. The examination of alternatives is also considered to be a key element of the ESIA process under good international practice, including the IFC PS 1.

The analysis of alternatives is presented in "Section 4". The section discusses and compares several alternatives to the Project development in relation to: (i) the Project site, (ii) the chosen technology, (iii) the Project design, and finally investigated the 'no action alternative' - which assumes that the Project development does not take place.

3.2 Stakeholder Consultations and Engagement

Stakeholder consultation and engagement is an essential part of the ESIA process and has been carried out in accordance with the regulatory requirements in Egypt and the international E&S standards and requirements. The previous and future stakeholder consultation and engagement for the Project are summarized below and discussed in detail in "Section 6".

The Project to date has included extensive stakeholder consultation and engagement with various stakeholder groups such as national governmental entities, regional and local governmental entities, Non-Governmental Organizations (NGOs), local communities, and other as appropriate. This has been undertaken through bi-lateral meetings, Focus Group Discussions (FGD), e-mail communication, phone communication, formal letters, and other.

"Section 6.4" also discusses future stakeholder engagement and consultations which are to take place at a later stage. This mainly includes: (i) public disclosure session with stakeholders to present the findings and recommendations proposed within the ESIA; and (ii) implementation of the Stakeholder Engagement Plan (SEP) by the Developer which describes the planned stakeholder consultation activities and engagement process' to take place after the ESIA approval.

3.3 Delineation of Study Boundaries and Scope Assessment

3.3.1 Definition of Spatial Study Area or Area of Influence (AoI)

The overall study area (or AoI) for the ESIA represents the potential Area of Influence (AoI) of the Project. This is 'the area over which significant effects of the Project could reasonably occur, either on their own, or in combination with those of other developments and projects'.

In general terms, the study area for the Project ESIA includes the footprint of Project disturbance as demarcated in red in the figure below. This includes the solar PV Plant Project Site with a total area of 20 km^2.

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

In identifying these thematic Study Areas, the type and degree of the potential direct and indirect effects will be taken into consideration. The core area where direct effects are likely to occur will be determined, as well as the wider area of influence where indirect, combined and cumulative effects are likely to occur on the surrounding areas and communities.

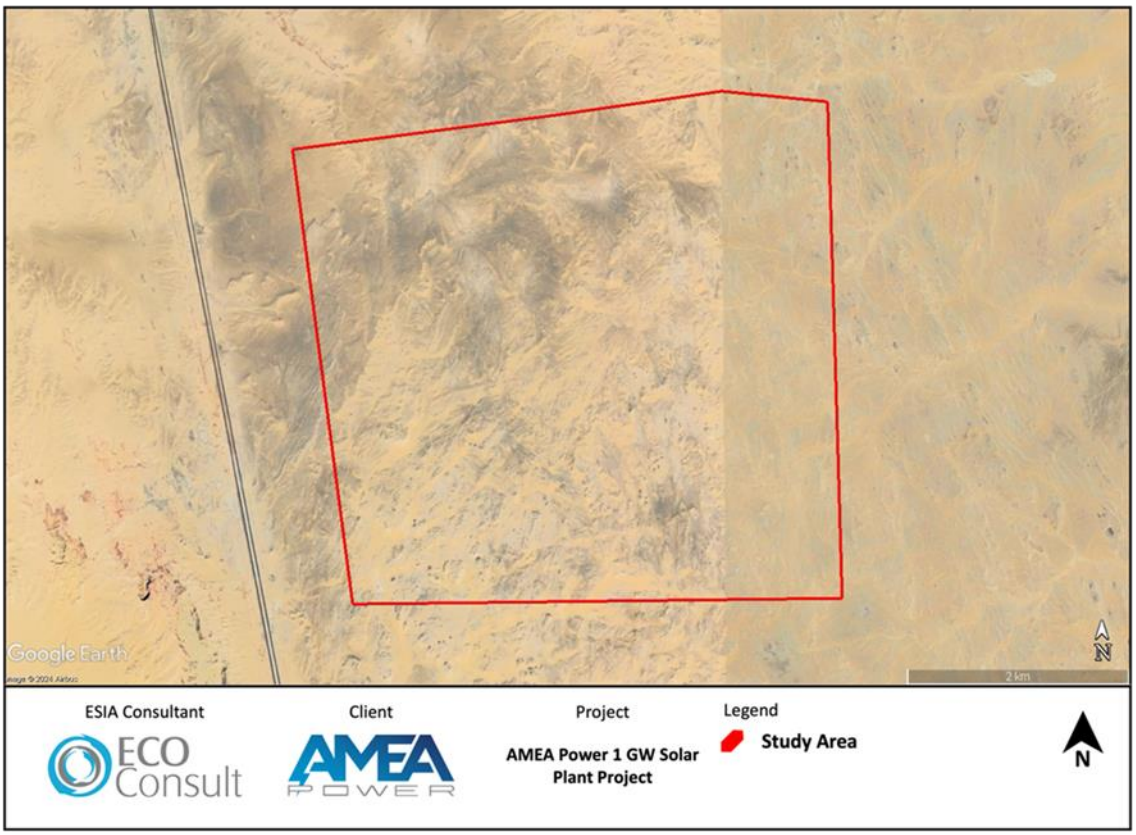

Figure 10: Study Area

3.3.2 Temporal Scope of the Assessment

The main phases that characterize the lifetime of a project from its start date until its end date and for which the potential impacts will be assessed are as follows:

- Planning Phase
- Construction Phase
- Operation Phase

- Decommissioning Phase

(i) Planning Phase

This includes the phase within which the studies are undertaken (e.g. ESIA, geotechnical, etc.), permits are obtained (e.g. environmental permit) and designs and layouts are prepared (e.g. preliminary design and/or detailed design).

(ii) Construction Phase

This includes onsite construction activities which will be undertaken by the EPC Contractors under the guidance of the Developer. This mainly includes transportation of Project components onsite, as well as site preparation and construction activities for installation of PV modules, inverter stations, substation, internal access roads, office and warehouse, etc.

(iii) Operation Phase

This includes activities to be undertaken by the Project Operator. Activities expected to take place mainly include the normal daily operation of the PV Plant and the routine maintenance activities (e.g. PV module cleaning, inverter servicing, checks on structural integrity, etc.).

(iv) Decommissioning Phase

This mainly includes activities undertaken after PPA period is completed. This includes dismantling of all components for final disposal.

Generally, the anticipated impacts throughout the decommissioning phase are similar in nature to impacts assessed during the construction phase – and specifically in impacts related to soil and groundwater (from improper management of waste streams), air quality, and occupational health and safety. Therefore, the assessment of impacts for those receptors and mitigation identified during the construction phase is assumed to apply to this phase in particular.

3.3.3 Environmental and Social Baseline Conditions

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

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

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

These studies covered all the E&S aspects related to the Project. The baseline conditions are treated as those conditions which would prevail in the absence of the Project.

Studies of the environment and social baseline are described in "Section 8" – "Section 17" to include the following: landscape and visual; land use; geology/hydrology/hydrogeology; biodiversity; archaeology and cultural heritage; air quality and noise; infrastructure and utilities; socio-economic conditions; and climate and meteorology. Within each section, the methodology which was undertaken for assessment of each of those baseline conditions is described in detail.

3.4 Impacts Assessment Methodology

Given the scale and type of the Project, the ESIA commences with an assessment of the positive environmental and economic impacts on the strategic and national level given the current challenges the energy sector in Egypt faces – as highlighted in "Section 7.4".

It then moves forward into the main body of the ESIA undertaking the assessment of impacts on environmental and social parameters for each receptor under the relevant chapter, from ""Section 8" – "Section 17". The following section provides a description of the approach, methodology and process adopted for the impact assessment presented within this ESIA.

3.4.1 Approach to Assessment of Impacts

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

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

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

- The sensitivity of the E&S receiving parameter, as determined during the assessment of baseline conditions; and
- Magnitude and Nature of the impact.

3.4.2 Sensitivity of the Receiving Parameter

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

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

3.4.3 Magnitude and Nature of the Impact

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

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

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

Type of Impact

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

Type of Effect

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

Duration (how long the stressor or its effect last)

- Short Term: applies to impacts whose effects on the E&S attributes will disappear within a 1-year period;
- Medium Term: applies to impacts whose effects on E&S attributes will disappear within 5-years; and

- Long Term: applies to impacts whose effects on E&S attributes will disappear in more than 5 years.

Reversibility

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

Likelihood

- Low: applies to impacts that are unlikely to occur for several reasons either related to onsite conditions, nature of construction activities or other factors;
- Medium: applies to impacts that are likely to occur; and
- High: applies to impacts that are almost certain to occur.

Extent

- Low: applies to impacts that will occur within the actual footprint of project component / impact area.
- Medium: applies to impacts that will occur up to 5km from the footprint of project component / impact area. For example, dust from construction activities can impact the exact footprint area where activities are undertaken and up to 2km radius within the surrounding area due to wind; and
- High: applies to impacts that will occur more than 10km from the footprint of project component / impact area.

3.4.4 Assessing the Significance of the Impacts

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

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

While the above matrix provides a framework for the determination of significance, and enables comparison across E&S parameters, a degree of professional judgement must be used and some parameter-specific factors to be considered in making the determination of significance. Below provides additional guidance to the degrees of significance used in this ESIA. Note that positive impacts are defined but are not rated for significance.

- *Major significance*: Based on the above methodology such impacts result in high magnitude and affect receptors that are highly sensitive. Those are impacts that are considered to have potentially significant and adverse risks and will be a key factor in the overall decision-making process of the

Project. In addition, they will also require detailed considerations for mitigation and monitoring measures;

- *Moderate significance*: Based on the above methodology such impacts either (i) result in medium magnitude and affects receptors that are of medium or high sensitivity; or (ii) result in high magnitude and affect receptors that are of medium sensitivity. Those are impacts that are considered to have potentially limited adverse risks and are unlikely to have a significant effect on the overall decision-making process. In addition, mitigation and monitoring measures require some consideration;
- *Minor significance*: Based on the above methodology such impacts either: (i) result in low magnitude and affects receptors that are of medium or high sensitivity; or (ii) result in medium magnitude and affects receptors that are of low sensitivity; or (iii) result in high magnitude and affects receptors that are of low sensitivity. Those are impacts that are considered to have minimal risks and unlikely to be of importance for the overall decision-making process. In addition, mitigation and monitoring measures are readily available to address such risks; and
- *Not significant*: Based on the above methodology such impacts result in low magnitude and affect receptors that are of low sensitivity. Such impacts are beneath the level of perception and do not require any mitigation or monitoring measures.

3.4.5 Management Measures

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

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

  Some negative impacts can be easily mitigated, whilst others cannot or are too difficult and costly to mitigate. The various potential impacts are described in this ESIA, along with the provision of 'feasible mitigation measures' that can be implemented; and
- *Recommendations*: for positive impacts it is not possible to identify mitigation measures, but rather recommendations have been identified which aim to enhance the positive impact.

3.4.6 Assessment of Residual Significance

If there are mitigation measures it is then necessary to make an assessment of the 'residual significance' after mitigation has been taken into account. A re-assessment of Project impacts is then made, taking into account the effect of the proposed mitigation measures in order to determine the significance of the residual effects. Residual effects are discussed for each E&S theme in the ESIA chapters, and their significance determined and summarized in an Impact Assessment Table in "Section 7.4".

3.4.7 Assessment of Cumulative Impacts

For each of the impacts assessed, the ESIA investigates the cumulative impacts which could result from incremental impacts from other known existing and/or planned developments in the area and based on currently available information on such existing/planned developments. Assessment of cumulative impacts is presented in "Section 21".

3.4.8 Assessment of Associated Facilities

As discussed earlier, for the purpose of this Project, the key associated facility is the offsite connection works from the onsite substation to the national grid, through an OHTL, that will be the responsibility of EETC. The EETC will be responsible for preparing the detailed design (including identification of the OHTL route), construction activities as well operation and maintenance activities. *It is important to note that at this stage there are no details available by EETC on the OHTL specifications (route, height, number of electrical towers, etc.).*

3.5 Development of a Framework Environmental and Social Management Plan (ESMP)

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

The ESIA is considered a key document in assessing and managing environmental and social risks related to the Project. The key output of the ESIA is the ESMP which aims to provide high level mitigations and requirements for managing the environmental and social risks anticipated from the Project.

Throughout the Project's construction and operation phase an Environmental and Social Management System (ESMS) must be implemented by all relevant parties (i.e. Developer, EPC Contractor and Project Operator). The ESMS must be project and site specific and must build on and take into account the requirements of the ESMP.

"Section 22" includes the framework ESMP. In addition, the section also includes an overall framework, structure and key requirements for the ESMS for the key entities involved in the Project – this is further elaborated in an ESMS Manuel that is provided as a standalone document.

4. ANALYSIS OF ALTERNATIVES

This section presents the alternatives that were considered for the Project development to date. This includes site, design, and technological alternatives, and finally a 'no-Project' alternative.

4.1 Site Alternatives

The GoE has allocated to NREA through Prime Ministerial Decree No. 37/4/15/14 of 2015 land for development of renewable energy projects through usufruct rights. The area was proposed by the National Centre for Land-use Planning and was approved by the Council of Ministers. In line with the decree, the government assigned about 7,600 km^2 in the GoS, east and west of the Nile, Benban and Kom Ombo regions, of which about 5,700 km^2 are for wind projects (75% share) and about 1,900 km^2 for solar energy projects (25% share). These projects are being developed through usufruct rights, which grant the government the right to use the land while retaining ownership.[8]

During consultations with NREA, it was indicated that the Project site itself is allocated for clean energy production projects and is state-owned and allocated through an official contract between the investor and the state, represented by the Ministry of Electricity. NREA has a dedicated department responsible for land allocation for energy investments, which coordinates with various government bodies, including the Ministry of Antiquities, Urban Planning, and the military, among others.

Similarly, consultations with the General Administration of Urban Planning in Aswan Governorate confirmed that the land allocated for the proposed Project is not designated for other development projects, such as housing or agricultural reclamation.

In general, the key factors considered by the GoE and NREA for selection of such areas included the following:

- Areas to be under governmental ownership and therefore do not require any land acquisition measures;
- Areas to be mostly free from competing uses such as agricultural or housing developments to avoid resettlement and livelihood restoration requirements;
- Areas to be located with the highest wind and solar power potential based on technical studies undertaken;
- The geomorphology of the areas to be favorable for renewable energy development and requiring limited construction and landscape modification measures; and
- The access to the areas should be easy requiring only limited road construction measures.

Taking the above into account, it is important to note that the Developer had no influence or authority in any way possible in the site selection process. The land has been fully selected and identified by GoE and NREA and handed over to the Developer for the development of the Project.

However, the Developer, instructed the "E&S Team" at the scoping stage to undertake an *initial and high-level E&S analysis* on the site to determine if there are any key E&S issues to be considered for the site allocation or siting. The outcomes of such analysis are presented below and then in further details

[8] Renewable Energy Incentives (IRENA, 2018)

throughout the ESIA. As noted throughout the section below, no key E&S considerations were identified at that stage, however additional verification and assessments were completed as part of the ESIA study.

4.1.1 Biodiversity

Initial analysis was undertaken by the "E&S Team" and based on desktop research it was indicated that the Project site does not intersect or overlap with any Key Biodiversity Areas (KBAs), Important Birds Area (IBA) and Protected Areas. The closest KBA to the Project site is Lake Nasser IBA that is located more than 30 km to the south, while the Upper Nile IBA is located around 56 km to the north, and the closest protected area is Kor Kor and Dongol Protected Area and is located around 45 km to the southwest as shown in the Figure below.

In addition, consultations were undertaken in September 2024 with EEAA and Nature Conservation Egypt (NCE)[9]. Consultations confirmed that the Project site is not located within or near any Key Biodiversity Areas (KBAs) and is in fact located within an area of low biodiversity sensitivity and is not located in a known bird migration route. "Section 6.3" provides additional details on the outcomes of these consultations.

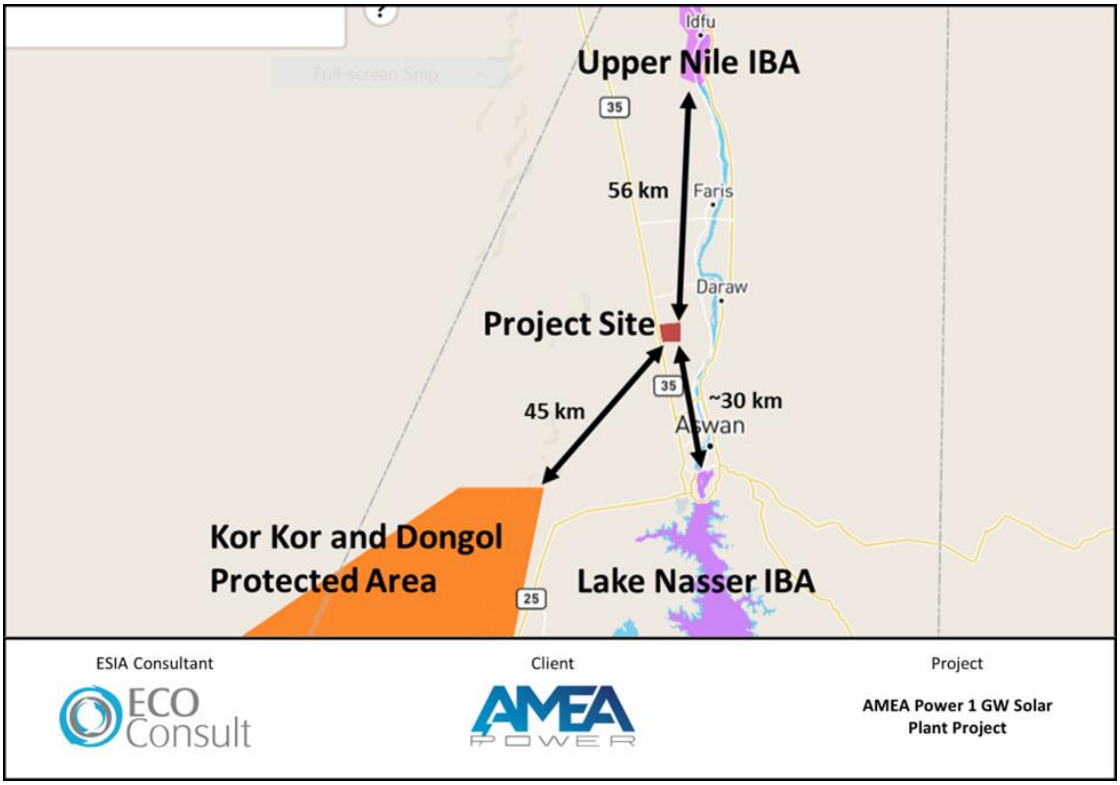

Figure 11: The Project Site in Relation to KBAs

4.1.2 Archaeology and Cultural Heritage

Consultations were undertaken in September 2024 with the Supreme Council of Antiquities – Egyptian Antiquities Sector and Directorate of Antiquities of Aswan Governorate to identify any possible archeology

[9] NCE is the Birdlife International partner in Egypt, and is a member of the International Union for the Conservation of Nature (IUCN).

and/or cultural heritage sites within the Project site. Additional details on the outcomes of consultation are provided in "Section 6.3.1".

Such entities indicated that there are no known archaeological or cultural heritage sites within the Project site, and no significant findings are expected to be uncovered due to its location.

4.1.3 Land Use

Consultations were undertaken in September 2024 with the General Administration of Urban Planning in Aswan Governorate and NREA in order to identify land tenure of the Project site and therefore avoid to the extent possible any acquisition process as well as physical and/or economical displacement impacts. Additional details on the outcomes of consultation are provided in "Section 6.3.1".

Data indicated that the entire Project site area is under governmental ownership and is not allocated for any specific developments such as housing or agriculture. In addition, a satellite image review and a site visit were undertaken to the Project specific area in order to verify any possible land use activities onsite so that they are taken into account. None were recorded. Therefore, based on this, no restrictions on land use were identified at that stage.

4.1.4 Community Settlements

Data was obtained on all potential community settlements within the area to ensure that the Project site is sited away from such areas to the extent possible. The closest settlement is Al Raqaba Local Unit and is located around 6.5 km to the east of the Project site. Therefore, based on this, no restrictions on community settlements were considered for the Project boundary at that stage.

4.2 Technology Alternatives

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

4.2.1 Renewable Energy Developments

As discussed earlier, the Government of Egypt (GoE) has made significant strides in adopting an energy diversification strategy, with a focused scope on expanding renewable energy development and enhancing energy efficiency, including comprehensive rehabilitation and maintenance programs within the power sector (IRENA, 2023).

In 2013, the Arab Republic of Egypt, through the Ministry of Electricity and Renewable Energy, developed and adopted the Integrated Sustainable Energy Strategy (ISES) 2015–2035. This strategy sets ambitious goals, including increasing the contribution of renewable energy sources—hydro, wind, and solar—to 42% of total electricity generation by the year 2035. Today, Egypt continues to make substantial progress toward this target, ongoing efforts continue to further advance renewable energy capacity in line with the long-term objectives of the ISES.

Egypt benefits from abundant wind resources, creating significant opportunities for the development of economically viable wind power generation projects. These projects may be executed through

mechanisms such as Build-Own-Operate (BOO) and other (such as Feed-In Tariff). Key areas identified for their optimal wind energy potential include the Gulf of Suez, as well as regions located to the west and east of the Nile. Several wind farm development initiatives are currently in progress in these regions, leveraging favorable conditions to contribute to the expansion of Egypt's renewable energy capacity.

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

Taking the above into account, with regards to the Project site in specific it is best utilized for Solar PV power projects. According to Egypt's Solar Atlas (as presented below), the country is endowed with abundant solar energy resources, and more specifically, the Aswan Governorate area has been identified as an area with optimum solar energy potential. Therefore, as discussed earlier, the GoE has allocated to the NREA through Prime Ministerial areas for solar PV development projects, including those in the Aswan Governorate.

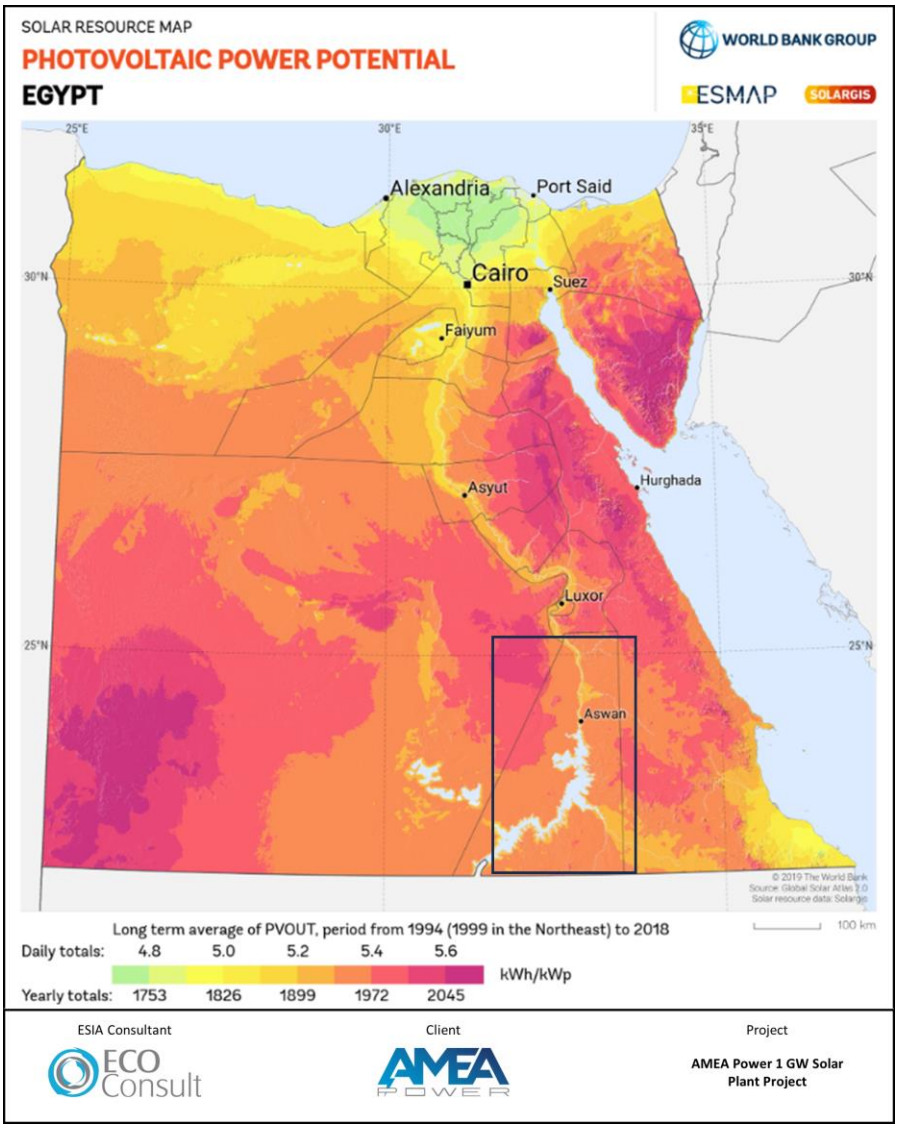

Figure 12: Egypt's Solar Atlas

4.2.2 Thermal Power Plants

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

4.3 Design Alternatives

As noted earlier, the Developer has prepared an initial design and layout for the Project that is being updated on a continuous basis at this point. The Developer is committed to ensuring that all identified E&S constraints identified throughout the ESIA process are considered fully throughout the Project design, specifications and layout.

However, as noted within the ESIA through the subsequent sections, no E&S constraints were identified that have an impact on the Project design. This could include archeology sites, nest for critical bird species, land uses, etc. Therefore, there are no further requirements to be considered for the design purposes of the Project.

4.4 No-Project Alternative

The 'No Project' alternative assumes that the 1 GW Project will not be developed. Should this be the case, then the Project site area would remain the same. The land area would remain with its current characteristics – vast barren desert grounds with very limited vegetation with no particular land use.

Should the Project not move forward, then the Project-related negative E&S impacts discussed throughout this ESIA would be averted. However, as noted throughout the ESIA, generally such impacts do not pose any key issues of concern and can be adequately controlled and mitigated through the implementation of the ESMP discussed in "Section 22". Nevertheless, should the Project not move forward; the significant and crucial positive economic and E&S benefits would not be realized. Such benefits include the following:

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

In conclusion, an ESIA must investigate all potential positive and negative impacts from a project

development. In the case of this Project, it is important to weigh the significant positive economic and E&S impacts incurred from the Project development, against the negative E&S impacts anticipated at the site-specific level – in which generally the ESIA concludes that they can be mitigated, managed and controlled to acceptable levels. The comparison in this chapter clearly concludes that the ‘No Project’ alternative is not a preferable option.

5. REGULATORY AND POLICY FRAMEWORK

This section presents the environmental clearance process in Egypt, the key E&S legislations that are applicable for the Project, and the relevant international E&S standards and requirements.

5.1 Egyptian Environmental Clearance Process

The Environmental and Social Impact Assessment (ESIA) is a key requirement set forth by the Egyptian Environmental Affairs Agency (EEAA) to assess the potential impacts of initiatives, projects, or developmental activities. Its primary aim is to identify and implement measures that minimize adverse effects by enforcing national environmental and conservation policies, overseeing environmental compliance, and integrating environmental management across various sectors. The legal framework for assessing the environmental impacts of projects is established under the Egyptian Environmental Law No. 4 of 1994, as amended by Law No. 9 of 2009.

The Environmental Clearance Process is governed by Law No. 4 of 1994 and its following amendments, which mandates that Competent Administrative Authorities (CAAs) are responsible for screening projects and issuing licenses for construction and operation. For photovoltaic (PV) plants, the New and Renewable Energy Authority (NREA) serves as the relevant CAA. As part of the licensing requirements, an Environmental Impact Assessment (EIA) must be submitted.

The CAA reviews the EIA forms to verify the suitability of the project location, ensuring it aligns with surrounding activities and complies with relevant ministerial decrees. After this initial review, the CAA, in this case NREA, forwards the documents to the Central Environmental Impact Assessment Department of the Egyptian Environmental Affairs Agency (EEAA) for further evaluation. The EEAA reviews the EIA within 30 days and may request revisions or additional mitigation measures before granting approval. The ESIA process is displayed in the figure below.

The Central Environmental Impact Assessment (EIA) Department of the EEAA is responsible for supervising the screening process, managing the review of EIA reports, and making determinations on their acceptability. Additionally, EEAA provides feedback on the development and proposals for mitigation measures, and issues environmental clearances for development projects.

According to the last updated executive regulation and the ministerial decree No. 26 of 2016, the ESIA system classifies the projects into four categories based on different levels of ESIA requirements according to severity of possible impacts and location of the establishment and its proximity to residential settlements. Each category is subject to varying levels of ESIA requirements to ensure appropriate environmental oversight.

Solar PV development projects in general are categorized as "Category B – Scoped study" (i.e. Projects with limited environmental impacts). The key requirements of the "Category B – Scoped Study" include the direct submission of a scoped ESIA study that includes the following key components:

- Project Description
- Analysis of Alternatives
- Legal Review
- Assessment of Environmental and Social baseline conditions (based on the secondary data only and does not require site surveys in specific).

- Assessment of Environmental and Social Impacts
- Development of an Environmental Management Plan

Based on the submitted study, EEAA either approves it and grants an environmental clearance for the Project, or if it is found that the Project results in significant E&S impacts, could require a comprehensive ESIA study to be undertaken to further investigate such issues.

The Scoped Study is targeted to be submitted to EEAA in November 2024 for issuance of the environmental permit of the Project.

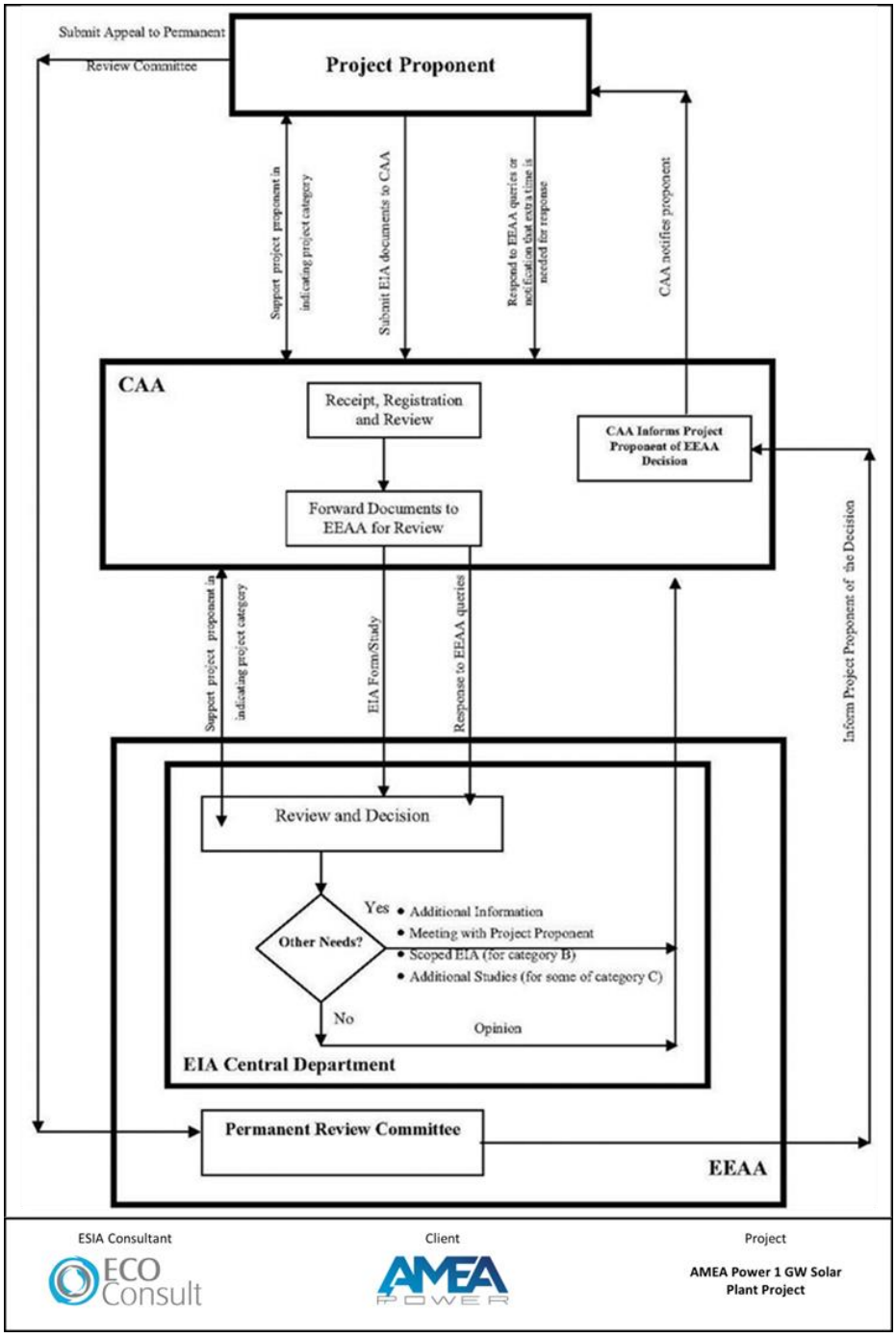

Figure 13: The ESIA Process followed for the Development Projects in Egypt (EEAA EIA Guidelines, 2010)

5.2 Egyptian E&S Regulatory Context

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

The table below lists the key relevant legislation to each of the E&S parameters and attributes being studied and assessed within this ESIA.

Table 4: National Legislation and Guidelines Governing the E&S Compliance for the Project

Legislation
Land Use
Expropriation of Real Estates for Public Interest Law - Law 10/1990
Civil Code 131/1948
Building Law No. 119 of year 2008
Geology, Hydrology, Hydrogeology
Environment Law 4/1994
Biodiversity
Environment Law 4 of 1994
Natural Protectorates is Law 102/1983
Archaeology and Cultural Heritage
Archaeology Law 117/1983
Air Quality and Noise
Environment Law 4/1994 amended by Environment Law 9/2009 and Executive Regulations (ER)710/2012
ERs (amended by Decree 1095/2011 amended by Decree 710/2012) which include maximum limits of ambient air pollutants and noise emissions
Modified ERs (710/2012) of Environment Law 4/1994
Environment Law 4/1994
Environment Law 4/1994 and its modified ERs
Infrastructure and Utilities
Traffic Law 66/1973, amended by Law 121/2008
Electricity Law No 87 of year 2015
Management of Solid Waste, Hazardous Waste and Wastewater
Environment Law 4/1994 amended by Environment Law 9/2009 and ER 1095/2011 amended by Decree 710/2012)
Ministerial Decree 44/2000 The Executive Regulations of Law No. 93/1962 on the Drainage of Liquid Wastes, Decree of Law 93/1962
Solid Waste Management Law - Law 202/2020
Occupational Health and Safety
Environment Law 4/1994
Law 12/2003 on Labor and Workforce Safety
Law 12/2003 on Labor and Workforce Safety and Book V on Occupational Safety and Health (OSH) and assurance of the adequacy of the working environment
Labor Law - Law 137/1981
Decree 458/2007 - defining maximum limits for criteria and requirements necessary for drinking water and domestic use.
Law 73/2021: Occupational Safety and Health Law
Socio-economic
Law 94/2003 on Establishing the National Council for Human Rights
EEAA EIA guidelines

Landscape and Visual
Environmental Law No. 4 of 1994 (amendments in Environmental Law No. 9 of 2009)

5.3 International Agreements

Egypt has signed and ratified a number of international conventions committing the country to the conservation of E&S resources and protection of workers' health & safety and labor rights. The following table lists the key conventions.

Table 5: Relevant International Conventions and Agreements

Name of Multilateral Environmental & Social Agreement	Year
Biodiversity and Natural Resources	
International Plant Protection Convention	1951
Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Near East	1965
Convention on Wetlands of International Importance Especially as Water Fowl Habitat (RAMSAR)	1971
Convention Concerning the Protection of the World Cultural and Natural Heritage	1972
Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	1973
Convention on the Conservation of Migratory Species of Wild Animals	1979
Protocol to Amend the Convention on Wetlands of International Importance Especially as Water Fowl Habitat	1982
Convention on Biological Diversity (CBD)	1992
Agreement for the Establishment of the Near East Plant Protection Organization	1993
United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa	1994
Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean	1995
African Convention on the Conservation of Nature and Natural Resources (revised)	2003
International Tropical Timber Agreement	2006
Hazardous Materials and Chemicals	
Convention Concerning Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents	1974
Convention on the Prohibition of the Development, Production and Stock-Piling of Bacteriological (Biological) and Toxin Weapons, and on their Destruction	1972
Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal	1976
Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques	1976
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	1989
Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa	1991
Amendment to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	1995
Stockholm Convention on Persistent Organic Pollutants (POPs)	2002
Atmosphere, Air Pollution and Climate Change	
Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies	1967
Vienna Convention for the Protection of the Ozone Layer	1985
Montreal Protocol on Substances that Deplete the Ozone Layer	1987
(London) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	1990
United Nations Framework Convention on Climate Change	1992
(Copenhagen) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	1992
Kyoto Protocol	1997

Paris Agreement under the United Nations Framework Convention on Climate Change	2015
Health and Worker Safety	
International Labor Organization Core Labor Standards	1936
Convention Concerning the Protection of Workers Against Ionizing Radiation	1960
Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration	1977
Occupational Safety and Health Convention	1979
Human Rights	
UN Convention on the Elimination of All forms of Discrimination against Women	1981
UN International Covenant on Economic, Social and Cultural Rights	1982
UN Convention on the Rights of a Child	1990
UN Convention on the Rights of Persons with Disabilities	2008
UN International Covenant on Civil and Political Rights	1982

5.4 Requirements for Project Financing

The Project will be seeking financing from International Financing Institutions (IFIs). Therefore, the Developer wishes to design and manage the project in accordance with international E&S standards and requirements. For the ESIA, it will be based on the requirements of the following entities, each of which is discussed in further details below:

- International Finance Corporation (IFC); and
- Equator Principles (EP).

5.4.1 International Finance Corporation (IFC)

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

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

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

Table 6: IFC Performance Standard Requirements

IFC PS	Key Points	Applicability to ESIA
PS1: Assessment and Management	PS1 underscores the importance of managing social and environmental performance throughout the life of a project by using a dynamic social and environmental management system. Specific objectives of this Performance Standard are:	Applicable and considered for this ESIA

IFC PS	Key Points	Applicability to ESIA
of Environmental and Social Risks and Impacts	▪ To identify and assess social and environment impacts, both adverse and beneficial, in the project's area of influence; ▪ To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment; ▪ To ensure that affected communities are appropriately engaged on issues that could potentially affect them; and ▪ To promote improved social and environment performance of companies through the effective use of management systems.	
PS2: Labor and Working Conditions	The requirements set out in this PS have been in part guided by a number of international conventions negotiated through the International Labor Organization (ILO) and the United Nations (UN). Specific objectives of this Performance Standard are: ▪ To establish, maintain and improve the worker-management relationship; ▪ To promote the fair treatment, non-discrimination and equal opportunity of workers and compliance with national labor and employment laws; ▪ To protect the workforce by addressing child labor and forced labor; and ▪ To promote safe and healthy working conditions, and to protect and promote the health of workers.	Applicable and considered for this ESIA
PS 3: Resource Efficiency and Pollution Prevention	This Performance Standard outlines a project approach to pollution prevention and abatement in line with international available technologies and practices. It promotes the private sector's ability to integrate such technologies and practices as far as their use is technically and financially feasible and cost-effective in the context of a project that relies on commercially available skills and resources. Specific objectives of this Performance Standard are: ▪ To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; and ▪ To promote the reduction of emissions that contribute to climate change.	Applicable and considered for this ESIA
PS 4: Community Health, Safety and Security	This PS recognizes that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development. However, projects can also increase risks arising from accidents, releases of hazardous materials, exposure to diseases, and the use of security personnel. While acknowledging the public authorities' role in promoting the health, safety and security of the public, this PS addresses the project sponsor's responsibility in respect of community health, safety and security.	Applicable and considered for this ESIA
PS 5: Land Acquisition and Involuntary Resettlement	Involuntary resettlement refers both to physical and economic displacement as a result of project-related land acquisition. Where involuntary resettlement is unavoidable, appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented.	Not applicable, Refer to "Section 9"
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	This Performance Standard reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the use of renewable natural resources in a sustainable manner. This Performance Standard addresses how project sponsors can avoid or mitigate threats to biodiversity arising from their operations as well as sustainably manage renewable natural resources. Specific objectives of this Performance Standard are: ▪ To protect and conserve biodiversity; and	Applicable and considered for this ESIA

IFC PS	Key Points	Applicability to ESIA
	▪ To promote the sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities.	
PS 7: Indigenous Peoples	Indigenous peoples may be particularly vulnerable to the adverse impacts associated with project development, including risk of impoverishment and loss of identity, culture, and natural resource-based livelihoods. PS7 seeks to ensure that business activities minimize negative impacts, foster respect for human rights, dignity and culture of indigenous populations, and promote development benefits in culturally appropriate ways. Please refer to Section 6.2.2 below.	Not triggered and therefore not applicable, Refer to "Section 6.2.2"
PS 8: Cultural Heritage	Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to protect irreplaceable cultural heritage and to guide project sponsors on protecting cultural heritage in the course of their business operations.	Applicable and considered for this ESIA

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

- IFC General EHS Guidelines (2007): identifies detailed EHS management and technical recommendations which are applicable for all development projects; and
- IFC EHS Guidelines for Electric Power Transmission and Distribution (2007): this in particular could be applicable for the associated facilities of the Project (i.e. transmission line for connection with the grid). The Guideline identifies they key E&S impacts that should be investigated and provides detailed management and technical recommendations with regards to Industry-Best Practice.

5.4.2 Equator Principles 4 (EP4)

The Equator Principles Financing Institutions (EPFIs) have consequently adopted a set of E&S guidelines to ensure that large scale development projects properly determine, assess and manage the associated potential impacts on the natural environment and the affected communities.

The latest principles (EP 4) were issued in July 2020. The EP are summarized below.

Table 7: Summary of Equator Principles

No.	Principle	Discussions	Applicability for ESIA
1	Review & Categorization	Identifies categorization for projects as either Category A, B or C. This is determined by an E&S review and due diligence undertaken by the financial institution (and/or their advisor). Based on review of the project it is likely to be categorized as "B" which are "projects with potential limited adverse E&S risk and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures."	Not relevant for this ESIA study
2	Environmental & Social Assessment	This requires that for Category A and B projects that an Environmental and Social Impact Assessment (ESIA) is undertaken. The Principle provides guidance and illustrative list of issues that the ESIA study should address. This is discussed in further details in the table that follows. In addition, the Principle requires an assessment of potential adverse **human rights impacts** and **climate change risks**.	Applicable and considered for this ESIA

No.	Principle	Discussions	Applicability for ESIA
3	Applicable Environmental and Social Standards	Principle requires that assessment process comply with relevant host country laws. In addition, for projects located in Non-Designated Countries (such as the Egypt) compliance with IFC Performance Standards on Environmental and Social Sustainability (Performance Standards) is required.	Applicable and considered for this ESIA
4	E&S Management System and EP Action Plan	For all category A and category B projects, the financing institution will require that the client develop and/or maintain an Environmental and Social Management System (MS). In addition, an Environmental and Social Management Plan (ESMP) must be prepared by the Client.	Applicable and considered for this ESIA
5	Stakeholder Engagement	Category A and B projects require effective and continuous stakeholder engagement with affected communities, workers and other stakeholders as relevant.	Applicable and considered for this ESIA
6	Grievance Mechanism	Category A and B projects require an effective grievance mechanism for affected communities and workers as appropriate to receive and facilitate resolution of concerns and grievances.	Applicable and considered for this ESIA
7	Independent Review	An independent E&S review will be undertaken for Category A and B projects will on the EIA, ESMP, ESMS, SEP and other as applicable and an Equator Principle Action Plan (EPAP) will be prepared.	Not relevant for the ESIA study
8	Covenants	The Principle requires that the Client covenant and comply with ESMP and EPAP requirements and provide periodic reports to document compliance with ESMP and EPAP and local E&S regulations.	Not relevant for the ESIA study
9	Independent Monitoring and Reporting	After financial close, for category A and B projects, financing institution will require independent monitoring and reporting to asse project compliance with Equator Principles	Not relevant for the ESIA study
10	Reporting and Transparency	Identifies E&S reporting requirements for the client for category A and B projects.	Not relevant for the ESIA study

As discussed in the table above and specifically under Principle 2, the Principle provides guidance and illustrative list of issues that the ESIA study should address. Such issues are identified below. The ESIA ensure that all issued identified below are addressed.

- Assessment of baseline E&S conditions (applicable and considered for ESIA);
- Consideration of feasible E&S preferred alternatives (applicable and considered for ESIA);
- Requirements under host country laws and regulations (applicable and considered for ESIA);
- Protection and conservation of biodiversity and identification of legally protected areas (applicable and considered for ESIA);
- Sustainable management and use of renewable energy sources (applicable and considered for ESIA);
- Use and management of dangerous substances (applicable and considered for ESIA);
- Major hazards assessment and management (applicable and considered for ESIA);
- Efficient production (applicable and considered for ESIA);
- Pollution prevention and waste minimization, pollution control and waste management (applicable and considered for ESIA);

- Greenhouse gas emissions level and emissions intensity (applicable and considered for ESIA);
- Water usage, water intensity water source (applicable and considered for ESIA);
- Land cover and land use practices (applicable and considered for ESIA);
- Consideration of physical climate risks and adaptation opportunities and viability of project operations under changing weather patterns/climatic conditions (applicable and considered for ESIA);
- Cumulative impacts of existing projects, the proposed project and anticipated future projects (applicable and considered for ESIA);
- Consideration of actual or potential adverse human rights impacts (applicable and considered for ESIA);
- Labor issues and occupational health and safety (applicable and considered for ESIA);
- Consultation and participation of affected parties in the design, review and implementation of the project (applicable and considered for ESIA);
- Socio-economic impacts (applicable and considered for ESIA);
- Impacts on affected communities and disadvantaged or vulnerable groups (applicable and considered for ESIA);
- Gender and gender disproportionate gender impacts (applicable and considered for ESIA);
- Land acquisition and involuntary resettlement (not applicable, Refer to "Section 9");
- Impacts on indigenous peoples (not triggered and therefore not applicable, Refer to "Section 6.2.2");
- Protection of cultural property and heritage (applicable and considered for ESIA);
- Protection of community health, safety and security (applicable and considered for ESIA); and
- Fire prevention and life safety (applicable and considered for ESIA).

5.4.3 Other

There are additional international E&S standards and requirements that were considered throughout the ESIA study. Those are identified in the table below along with their applicability.

Table 8: Other International E&S Requirements and Standards

Requirement	Applicability
IFC Good Practice Note – Addressing Grievances from Project-Affected Communities & IFC Good Practice Manual – Doing Better Business Through Effective Public Consultation and Disclosure	Those identify additional requirements that should be considered and taken into account as part of the planned stakeholder engagement activities as well as the SEP that is provided as a standalone document.
IFC Good Practice Note: A Good Practice Handbook for Companies Doing Business in Emerging Markets	The note identifies key concepts and principles of stakeholder engagement and how to integrate stakeholder engagement with the project cycle. This has been considered for the SEP that is provided as a standalone document.

EBRD and IFC Guidance Note on Worker's accommodation	identify key issues of concern that should be addressed as well as best practice requirements to be taken into account in relation to worker accommodation
▪ IFC Good Practice Note on Non-Discrimination and Equal Opportunity ▪ IFC Good Practice Note – Managing Retrenchment ▪ IFC Handbook for Labor and Working Conditions - Measure & Improve Your Labor Standards Performance ▪ Good Practice Note: Managing Risks Associated with Modern Slavery ▪ International Labor Organization (ILO) Conventions. This will include all ILO conventions signed and ratified by the Government of Egypt and at a minimum all ILO conventions covering core labor standards and all ILO conventions covering the basic terms and conditions of employment	Those are related to workforce management as applicable within the ESIA and associated management plans.
Good Practice Note (GPN) IFC's Use of Security Forces: Assessing and Managing Risks and Impacts	The handbook provides practical, project-level guidance for companies to better understand and implement the requirements outlined in PS 4. Chapters focus on risk assessment, managing private security, managing the relationship with public security, preparing a security management plan, and assessing allegations or incidents related to security personnel.
UN Voluntary Principles on Security and Human Rights	Promotes implementation of a set of principles on providing security for their operations in a manner that respects human rights
Addressing Gender-Based Violence and Harassment (GBVH): Emerging Good Practice for the Private Sector	The note prevents the physical, sexual, emotional and financial harm GBVH causes to individuals, as well as the financial, reputational and legal risks it poses to businesses and investors

6. STAKEHOLDER CONSULTATION AND ENGAGEMENT

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

6.1 Objectives

Stakeholder engagement is an integral part of ESIA good practice. The Developer is committed to a technically and culturally-appropriate approach to consultation and engagement with all stakeholders affected either directly or indirectly by the Project The consultation program for the Project is based on informed consultation and participation in line with good international practice requirements with affected people and is designed to be both fair and inclusive. Consultation activities have been underway since the commencement of the ESIA in August 2024.

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

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

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

The specific objectives of this chapter are to:

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

6.2 Stakeholder Identification and Analysis

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

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

1. People and groups who will be directly or indirectly affected by the Project (such as local communities);
2. People and groups who may participate in the implementation of the Project (such as investors and lenders); and
3. People and groups who are not affected by the Project development per se may but have a possibility to influence and make decisions on implementation of the Project (such as Ministries or regulatory agencies).

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

Stakeholder Group	Description	Relevance
Stakeholders who may be directly or indirectly affected by the Project		
Local communities which as identified in "Section 2.2" earlier includes: ▪ Al Raqaba Local Unit		This includes the following groups within the local communities in specific: ▪ Community Members: local community members have a vested interest in the Project due to mainly potential for job opportunities. In addition, local community members could be impacted by other potential negative impacts (e.g. worker influx). Such impacts are discussed and identified within the ESIA. ▪ Community Leaders: They are socially active members and known figureheads for local community members, who may or may not hold government positions. ▪ Business Community (local subcontractors): such groups have a vested interest in the Project due to mainly potential for procurement opportunities such as subcontracting works (e.g. civil works, provision of food and amenities, etc.).
Stakeholders who may Participate in Implementation of the Project		
Investor / lender	Entities that will provide financing for the Project development.	They have interest in ensuring that the Project is developed and implemented in accordance with their E&S requirements and standards and will monitor the compliance of the Project against such requirements.
Stakeholders who may have a possibility to influence and make decisions on implementation of the project and/or may have an interest in the Project		
National Governmental Ministries		
The Egyptian Environmental Affairs Agency (EEAA)	Entity authorized to regulate environmental management issues.	For this Project it will be responsible for reviewing and approving the ESIA study, issuing the environmental permit for the Project, as well as monitoring the implementation of the ESMP and compliance with other conditions of approval as applicable.
Egyptian Electricity Transmission Company (EETC)	Entity that has signed the PPA with the Developer to be the off taker of electricity.	For this Project, they will also be responsible for designing, building and operating the associated interconnection facilities. This will include the Project's

Stakeholder Group	Description	Relevance
		connection to the national grid which includes an Overhead Transmission Line (OHTL) or similar.
Egyptian Electric Holding Company (EEHC)	Entity responsible for the electrical power generation, transmission and distribution of electricity in Egypt.	For this Project, the EEHC oversees electricity generation, transmission, and distribution, coordinates power purchase agreements (PPAs), and facilitates grid connections.
New & Renewable Energy Authority (NREA)	Entity that acts as the national focal point for expanding efforts to develop and introduce renewable energy technologies to Egypt.	For this Project, NREA was the entity responsible for allocation of the land for the development of the Project. Also, they are entrusted to plan and implement renewable energy programs in coordination with national and international institutions.
Ministry of Antiquities	Entity that is responsible for the preservation and protection of the heritage and ancient history of Egypt, under which operates all inspector offices in the governorates.	For this Project, they are the entity that ensure development activities do not negatively impact cultural heritage sites. In areas near archaeological or historically significant locations, the Ministry is responsible for assessing potential risks, granting necessary approvals, and overseeing measures to preserve and protect antiquities during project implementation.
Ministry of Civil Aviation	Official governmental entity responsible for civil aviation management in Egypt.	They are responsible for issuing permits for projects with specific height requirements and warning signs for future connection of overhead transmission line (s)(OHTLs).
Ministry of Transport, Roads and Bridges	Official entity that oversees the development and maintenance of transportation infrastructure that supports project logistics.	They ensure access to project sites for the delivery of materials and equipment, coordinating the use of roads, and facilitating transport routes. Their involvement is crucial to minimizing disruptions and ensuring smooth transportation during construction and operation phases.
Ministry of Interior	Entity that is responsible for national and local security, as well as approving emergency response and firefighting plans for establishments/projects.	The entity ensures security and public safety throughout the project's lifecycle. This includes protecting the project site, safeguarding equipment, and maintaining order during construction and operation.
Local Government Ministries and District Authorities		
Aswan Governorate	The Governorate's main role is supporting the Project in all aspects as required to include providing required permissions.	They key departments of the Governorate that are related to the Project include the following: ▪ Environmental Administration that is responsible for monitoring compliance to environmental requirements along with EEAA; ▪ Labor Office that is responsible for overall management of the labor force in Aswan Governorate, monitoring recruitment by development projects within the Governorate, monitor labor grievances and other; ▪ Roads Directorate: responsible for services and development of external roads in the governorate and issuing permits for any construction work on the external roads;

Stakeholder Group	Description	Relevance
		▪ Public Health Directorate: provide the health services and facilities to the local districts and ensure overall local community health and safety.
Daraw City Council; El Raqaba local unit	The City Council's main role is supporting the Project in all aspects as required to include providing required permissions.	The Council is responsible for administrative oversight as well as supervision and follow-up for monitoring compliance to environmental requirements along with EEAA and Aswan Governorate.
Aswan Governorate Antiquities	Entity representing the Ministry of Antiquities within Aswan Governorate.	They will be responsible for protection and management of archeology and cultural heritage resources in the area as well as implementation of chance find procedures by development projects.
General Administration of Urban Planning in Aswan Governorate	The entity is responsible for overseeing land use, zoning, and urban development.	They assess site suitability and ensures compliance with urban planning regulations. It coordinates land use to prevent conflicts with existing infrastructure and residential areas. Additionally, the administration is instrumental in facilitating necessary permits and approvals, ensuring that the development aligns with regional development goals and sustainable land use practices.
National Aswan Water and Wastewater Company (NAWWCo)	Entity responsible for water and wastewater management within the Governorate.	The party that will be responsible for providing the Project's requirements of water as well as disposal of wastewater.
The Solid Waste Management Department in Aswan	The entity is responsible for overseeing waste collection, disposal, and recycling within Aswan.	It ensures proper waste management during the construction, operation, and decommissioning phases of the solar PV project. This includes handling construction debris, packaging materials, and hazardous waste. While ensuring compliance with local environmental regulations and promoting sustainable practices to minimize environmental impact.
NGOs		
Nature Conservation Egypt (NCE)	NCE is the Birdlife International partner in Egypt, and is a member of the International Union for the Conservation of Nature (IUCN). Nature Conservation Egypt (NCE) is an Egyptian NGO working towards conserving Egypt's natural heritage and the promotion of its sustainable use, for the benefit of present and future generations.	Egypt's leading experts in the field of nature and biodiversity conservation, NCE is specialized scientific research, advocacy, education and outreach to support species, their habitats, and local communities. NCE works in partnership with local experts and governmental bodies, as well as international organizations and partnerships to ensure efficient collaboration for conservation within and across borders.
Aga Khan Foundation / Umm Habiba Foundation	Umm Habiba Foundation operates under the umbrella of the International Aga Khan Foundation.	Um Habiba Foundation is considered the most active NGO in terms of social, economic and civil society development of communities in Aswan Governorate including women groups as well. Umm Habiba collaborated with some developers in Benban Solar Park to implement their social responsibility programs, as well as to train the youth of Aswan on work related to solar energy projects. In addition, they also provided

Stakeholder Group	Description	Relevance
		training seminars for such developer's workforce related to violence against women as well as harassment in the workplace.
Union of Nubian NGOs in Aswan Governorate	They represent various non-governmental organizations focused on the cultural, social, and economic development of Nubian communities.	The Union of Nubian NGOs plays a vital role in fostering community engagement by addressing local interests and concerns while promoting sustainable development practices that honor Nubian heritage and rights. The Union serves as a facilitator for dialogue between project developers and local communities, helping to build support for the project and ensuring that it aligns with the needs and aspirations of the Nubian population.
Other		
Benban Solar Park Representatives (FMC)	The Benban Solar Park (existing and operational solar PV park near the Project site) is operated currently by a Facilities Management Company (FMC) which also takes on E&S responsibilities such as stakeholder and local community grievance management, local community employment and procurement, etc.	
Media (Newspaper, Television, Internet)	Ensuring that Project activities do not impact any of their infrastructure and utility elements within the area.	
Academic and Research Institutions		
Aswan University Arab Academy for Science and Technology, Aswan Branch Technical / Vocational training institutes in Aswan	▪ Could have potential interest to partner with Project to provide graduates within renewable energy sector, biodiversity, etc. ▪ Potential interest to obtain information and updates on potential impacts of the Project on key E&S attributes to include biodiversity, birds, bats, archeology and cultural heritage, environment and other. ▪ Provides knowledge and skills required for various occupations, including renewables and solar power in specific that is delivered through formal, non-formal and informal learning processes. The education curriculum in undergraduate, postgraduate, or Technical and Vocational Education and Training (TVET) could be reviewed and revised to match the market and workforce requirements.	

6.2.1 Vulnerable Groups

A key stakeholder group to which particular attention must be considered during identification are vulnerable groups. Those are groups that due to their socio-economic characteristics may experience impacts more severely and/or disproportionally compared to the rest of the community members.

Vulnerable groups are project specific and depend on a range of issues which must be understood such as project location, socio-economic and demographic context, as well as the nature of the development and type of impacts anticipated. Vulnerable groups may be severely affected by the Project by virtue of their physical disability, social or economic standing, and limited education, lack of employment or access to land.

The key vulnerable groups within the context of the Project and their relevance are summarized in the table below.

Group	Relevance
Women groups	Could be considered vulnerable as cultural norms could limit their participation in the decision-making process in general that is related to the Project.
Disabled groups	Could be considered vulnerable groups mainly due to physical disability which could limit their access to information on the Project as well as participation in the decision-making process in general that is related to the Project.
People living in poverty / underprivileged communities	Could be considered vulnerable as their status could limit their access to information on the Project as well as participation in the decision-making process in general that is related to the Project.
The Aged	Could be considered vulnerable by limitations of access to participate in the Project related community decision-making process.
The Youth	Could be considered vulnerable due to their young adult, unmarried, non-asset owning status, yet likely to be savvier in 21st century technology than their elders, but may be unable to contribute in Project related community decision-making process, which will affect their generation more than most.

6.2.2 Indigenous Peoples

Based on the outcomes of the scoping study, it was concluded that an Indigenous Peoples assessment is to be undertaken for Nubians – as one of the villages within Al Raqaba Local Unit, known as Sheikh Fadl, mainly includes Nubians. The assessment is presented in "Section 17.1.2". The assessment concludes that IFC PS 7 is not triggered for the Project. Please refer to the assessment for additional details.

6.3 Stakeholder Consultation and Engagement to Date

6.3.1 Targeted Consultations

Targeted consultations were undertaken with various stakeholder groups as highlighted below. During such targeted consultations, a handout was provided in advance in local language (mainly in Arabic language) which provides information on Project, its location, components, ESIA process, key impacts, and other.

- National governmental entities;
- Regional governmental entities;
- Non-Governmental Organizations (NGOs); and
- Academic and research institutions.

They detailed minutes of meeting of such consultations along with name/position of person met for each entity is provided in Annex I.

Entity	Date	Key Outcomes
National Governmental Entities in Egypt & Regional Governmental Entities in Aswan Governorate		
The Egyptian Environmental Affairs Agency (EEAA)	27 August 2024	▪ EEAA officials clarified that the Project falls under Category B – Scoped study as per the latest EEAA guidelines, and the survey methodology is considered sufficient. ▪ If the overhead transmission line (OHTL) exceeds 5 km in length, it will be classified as Category C. Details regarding the route, length, and

Entity	Date	Key Outcomes
		connection point of the OHTL are critical and must be clarified. However, as noted earlier, such information is not available at this stage. ▪ Since the Project area is not classified as environmentally sensitive, no previous studies within the area indicate the presence of vulnerable, endangered, or critically endangered species. However, the environmental impact assessment will be reviewed for any findings related to biodiversity, and mitigation measures will be recommended if necessary. ▪ The Project area is not considered environmentally sensitive, according to the EEAA's Nature Conservation Department. ▪ No significant environmental concerns or issues were raised by the EEAA officials regarding the Project area. ▪ The EEAA does not issue a no-objection letter for Project development but grants environmental approval for the ESIA once all environmental requirements are met in accordance with EEAA guidelines.
Egyptian Electric Transmission Company (EETC) & Egyptian Electric Holding Company (EEHC)	29 August 2024	▪ The EETC team members emphasized the importance of addressing the disposal of hazardous waste from batteries and solar panels in detail in the ESIA, with a special focus on battery-related waste. ▪ The specific route and connection station for the overhead transmission line have not yet been finalized and are still under study. Please note that to date, no OHTL route options or grid connection plans have been provided by EETC thus far. ▪ Director of the Environmental Department at EEHC, clarified that neither the EETC nor the EEHC issues a no-objection letter for Project development, which is governed by a contract between the investor and the Ministry under Egyptian law.
New and Renewable Energy Agency (NREA)	29 August 2024	▪ The land allocated for clean energy production Projects is state-owned and assigned through an official contract between the investor and the state, represented by the Ministry of Electricity. ▪ The New and Renewable Energy Authority oversees land allocation for energy investment, coordinating with government bodies such as the Ministry of Antiquities, Urban Planning, and the military. ▪ No concerns were raised regarding the Project or the proposed site, except for assessing the potential impact of the Project on biodiversity, particularly bird migration paths if applicable.
Environmental Affairs Department, the relevant entity responsible for Hazardous Waste in Aswan Governorate	09 September 2024	▪ The proposed Project site is located far from natural reserves in Aswan Governorate and is not near any environmentally sensitive areas. ▪ The Environmental Department of Aswan is responsible for monitoring hazardous waste disposal in the governorate, where there are no certified facilities or landfills for hazardous waste disposal except for autoclaving units used for medical waste. ▪ Hazardous waste from the Project will be disposed of at the Nasreya landfill in Alexandria, and transportation must be handled by a certified company. Entities disposing of hazardous waste must provide receipts and delivery documents from the landfill. ▪ The Nasreya landfill is currently the only certified government hazardous waste landfill in Egypt, and operates according to local standards under Egyptian law, but the Environmental Department does not have the details regarding its compliance with international standards. ▪ The Environmental Department of Aswan oversees the hazardous waste disposal process to ensure compliance with Egyptian law but does not grant approvals for disposal.

Entity	Date	Key Outcomes
		▪ Project management should identify certified contractors for hazardous waste transportation and maintain a logbook documenting disposal methods and quantities for monitoring and inspections before proceeding to the construction phase.
Aswan Solid Waste Management, the relevant entity responsible for Solid Waste in Aswan Governate	09 September 2024	▪ The Solid Waste Management Department in Aswan was established in 2022 following the new waste law and executive regulations for Law No. 202 of 2020. Previously, waste management was handled by the Environmental Affairs Department. ▪ Aswan Governorate has several municipal waste dumps and the El Alaqi sanitary landfill for solid waste. However, it was stated that a new sanitary landfill in Edfu will open in October to meet the governorate's waste disposal needs. ▪ The proposed Project site and neighboring areas currently use the El Alaqi landfill, which accepts solid, demolition, and construction waste, and complies with the waste management law and Egyptian standards. ▪ The Project's solid waste disposal will not strain existing facilities, as the new Edfu landfill will be available soon. Waste from the Project site will be sorted for salvageable materials, with only municipal waste disposed of. ▪ Key Highlights emphasized throughout the consultation were: - Ensure waste does not accumulate on the Project site to prevent environmental and health issues. - Monitor the disposal process, ensuring contractors transport waste to designated areas rather than dumping it in unauthorized locations. - Waste disposal and transportation must be handled by a contractor certified by the Waste Management Department, with a receipt confirming proper disposal as per regulations.
Aswan Governorate	09 September 2024	▪ The Project is considered one of the largest solar energy Projects in Aswan Governorate allocated to a single developer, with many expected positive impacts on the local population. ▪ No concerns were raised, except the importance of ensuring benefits for the local population and prioritizing employment opportunities for local communities and Aswan Governorate residents during construction and operation phases. ▪ Continuous access to Project information for local communities and stakeholders should be ensured through the Local Units of the villages of Benban and Al-Raqaba, as well as the Daraw City Council. Coordination with these entities can be used for disclosure activities and document publication. ▪ Participation of local communities and stakeholders in scoping and disclosure sessions should be facilitated through the head of the Local Unit, who would coordinate with village mayors and heads of families.
General Administration of Urban Planning in Aswan Governorate	10 September 2024	▪ The land allocated for the Project is not designated for other development purposes, such as housing or agricultural reclamation, and there is no conflict with the land designated as the desert hinterland for El Raqaba village and its affiliated villages. ▪ Consideration must be given to the basic infrastructure in the Project area, particularly sewage services, as the region lacks nearby treatment plants and many nearby villages are not connected to a sewage network. ▪ New Projects in the surrounding area include the Daraw Road axis (approximately 2 km from the Project site) and the high-speed rail Project.

Entity	Date	Key Outcomes
Daraw City Council; El Raqaba and Banban local unit	10 September 2024	▪ Administrative setup was provided as mentioned in Section 2. ▪ Local officials welcomed the Project and emphasized its economic benefits, stressing the importance of prioritizing job opportunities for residents of El Raqaba village, followed by nearby villages in Daraw Center, to maximize local community benefits and avoid negative perceptions. ▪ Project management should designate individuals for community engagement early on and develop training programs to enhance local workforce skills for meeting Project labor needs. ▪ Communication with the local community should be done through social media platforms, specifically the local unit's Facebook page, to publicize information and announce job opportunities.
Ministry of Antiquities	25 August 2024	▪ There are no reports or studies indicating the presence of archaeological sites near the Project area. ▪ Additionally, field surveys for the Benban Solar Park did not find any archaeological elements. ▪ The New and Renewable Energy Authority (NREA) is responsible for coordinating field surveys with the Supreme Council of Antiquities for such Projects. ▪ Procedures for handling potential archaeological discoveries should be in place before construction begins, including temporarily closing the site and notifying the local office of the Supreme Council of Antiquities to follow legal procedures for recording and studying the area. ▪ Measures recommended throughout: - Desk-based studies by experts, including the review of literature and historical maps, if necessary. - Conducting an archaeological survey before construction begins.
Directorate of Antiquities of Aswan Governorate	10 September 2024	▪ The proposed Project site is approximately 10 km away from the Nile River, which reduces the likelihood of finding archaeological artifacts. ▪ A field archaeological survey has not been conducted for the Project area, since it is not under the jurisdiction of the Antiquities Authority. ▪ Although there are no archaeological or cultural sites within the Project area, a field survey by a specialist is recommended due to Aswan's historical significance. ▪ The proposed methodology for the ESIA survey is sufficient but should encompass the entire land allocated for the Project. It was recommended that the land should be divided into grids, with survey points established to examine soil layers. ▪ There are currently no ongoing archaeological or cultural surveys at the Project site or nearby, and no plans for future exploratory missions in the area west of Aswan.
National Aswan Water and Wastewater Company (NAWWCo)	10 September 2024	▪ In general, the water supply sources for Aswan governorate in the past five years has been the Nile River. As it serves as the principal water source in Aswan, supplying substantial volumes for domestic, agricultural, and industrial purposes. Water is extracted from the Nile via intake stations, where it undergoes treatment before being distributed for various uses. - The intake volumes vary annually based on the river levels and demand. Generally, however, they are regulated in accordance with Egypt's allocated water quotas/allocations. - Aswan utilizes groundwater from deep wells from the desert regions. - The depth of the wells varies between 100 – 400 meters deep.

Entity	Date	Key Outcomes
		- Groundwater recharge rates primarily occur through limited rainfall and surface runoff. These recharge rates are closely monitored to prevent over-extraction and ensure sustainable use. - Abstraction rates are dictated by the aquifer's recharge capacity, which varies according to natural replenishment processes. ▪ The main challenge in water supply for Aswan is effectively managing the rising demand resulting from agricultural needs, urban expansion, and industrial growth. ▪ Entity will be able to supply water requirements of the Project without impacting the existing resources, but details on water quantities are required for construction and operation to verify this. Therefore, coordination is required to ensure the alignment with regional supply capacities. ▪ No restrictions/ problems were raised however the following comments were given: - The entity will require regular monitoring of the water use to avoid excess consumption. - Implementing water-saving technologies during both the construction and operational phases of the Project. - Paying attention on the water for human consumption, specifically the ice for consumption, to avoid/prevent the occurrence of waterborne diseases.
Ministry of Transport, Roads and Bridges Directorate in Aswan Governorate	10 September 2024	▪ The Luxor-Aswan Desert Road is a key route for transporting goods and equipment. Its current condition based on the latest assessments is classified as "good," with certain sections undergoing maintenance to improve safety and capacity. ▪ The Luxor-Aswan Desert Road typically has two lanes in each direction, with a total width of about 12 meters, suitable for heavy machinery and equipment transit. ▪ The traffic composition and patterns that were provided are: - Heavy transport vehicles make up approximately 60% of the total traffic, particularly during peak agricultural seasons. - Buses and microbuses account for around 20%, while private vehicles make up the remaining 20%. - Peak traffic occurs between 7-9 AM and 4-6 PM. ▪ Current proposals for new highway segments to improve the local road connectivity are underway. However, the specifics on timelines and routes are still under review. Engagement with local authorities is needed to assess potential impacts on current infrastructure. ▪ The Draw axis, located approximately 2 km from the Project site and currently under construction, is expected to improve regional connectivity and may provide alternative access routes, reducing traffic on the Western Desert Road. ▪ Additional requirements: - The transportation of oversized equipment along the Luxor-Aswan Desert Road must following the existing regulations. The Project must coordinate with relevant authorities to secure permits and ensure that transport does not disrupt regular traffic. - The Project must consider environmental impacts from increased traffic during construction, especially in terms of pollution and wear on road infrastructure. - Traffic management measures are needed to ensure the safety of construction vehicles and civilian traffic during peak periods.

Entity	Date	Key Outcomes
		- A traffic management plan should be developed in coordination with local authorities to monitor and respond to traffic incidents swiftly. Due to the history of accidents on the Luxor-Aswan Desert Road, the Project must implement safety measures such as proper signage, speed limits, and clear alerts for construction zones. - Emergency response plan should be developed for incidents involving heavy machinery, with clear communication lines between local authorities and the Project team. - The Project entrance design must consider accommodating to the safety of buses and vehicles transporting workers is essential to ensure safe access to the site. A U-turn Lane near the entrance should facilitate smooth traffic flow, particularly during peak hours when workers arrive or depart. The implementation of safety measures is to reduce the risks of incidents during the construction. - The Project should implement proper signage to warn drivers of construction zones, speed limits, and potential hazards to ensure road safety during construction activities.
Ministry of Interior, Aswan Governorate Security Directorate	10 September 2024	▪ The Security Directorate of Aswan Governorate welcomed the Project but highlighted several important security considerations. ▪ Given the Project's proximity to the Western Desert Road, effective security measures are essential to protect against theft or vandalism during construction and operation, particularly for high-value equipment. ▪ The accessibility of the Project site for emergency services, such as police and fire departments, should be assessed, ensuring clear and secure access routes in case of accidents or emergencies. ▪ Maintaining clear communication channels with local tribes or groups residing near the Project site is crucial to prevent friction during construction and operation. ▪ Additional Security considerations discussed throughout the consultations were; - 24/7 Security Personnel: The Project should employ round-the-clock security, including physical patrols and surveillance systems to monitor the site and key assets. - Coordination with Security Forces: A liaison officer should be appointed to facilitate swift coordination between the Project team and the Aswan Security Directorate for any security-related concerns. - Emergency Response Plan: An emergency response plan should be established in coordination with local security services, including contingency measures for accidents, protests, or natural disasters. - Traffic Management: If construction involves heavy machinery, managing traffic on the Western Desert Road to prevent accidents should be prioritized, with potential coordination with traffic police during certain Project phases.
NGOs		
Umm Habiba Association (affiliated with the Aga Khan Foundation)	10 September 2024	▪ Considerations provided below: - The incorporation of more gender-specific data, ensuring women's perspectives and concerns are adequately represented, especially in rural areas. Suggesting; conducting focus groups to ensure adequate representation, especially for women in rural communities. - The access to Continuous Information; through constant Project updates. Sharing information through local community centers, schools, mosques, and popular digital platforms like WhatsApp and Facebook. Coordination

Entity	Date	Key Outcomes
		with local administrative councils, village elders, community leaders, and NGOs would help reach all stakeholders. - Sessions should be held in accessible and convenient locations like community centers or local government offices. Engagement with local leaders, women's groups, and youth associations is vital to ensure broad community participation. - Announcements about job and procurement opportunities should be made through local radio, noticeboards, social media, and job fairs. Coordination with local labor offices, women's associations, youth centers, and educational institutions can help source skilled local labor. - Providing optional training programs tailored to enhancing women's participation throughout this process, since cultural barriers preventing women's employment in rural areas. - Implementing initiatives to promote community Capacity-Building such as; renewable energy education, vocational training, and gender empowerment to provide long-term community benefits. - Ensuring a Grievance Redress Mechanism (GRM) provided to the community members to voice concerns or report issues throughout the Project's development. - Ensuring the inclusivity of vulnerable groups and that they are included in all Project phases by providing accessible information and tailored employment opportunities. Coordination with disability associations will help address their needs. - Encouraging the community in engaging and participating through local events and training programs to enhance skills and ensure long-term positive impact.
Nature Conservation Egypt (NCE) - Birdlife International's local partner in Egypt	26 August 2024	▪ The proposed methodology for the environmental impact assessment is considered sufficient, but should be monitored and adapted if necessary to address any unforeseen environmental issues over time. ▪ The Project site is not located in a recognized environmentally sensitive zone, including areas for bird migration, as confirmed by its proximity to the Benban Solar Energy site. ▪ The survey methodology that was presented is considered sufficient to NCE. ▪ NCE reviewed and mapped the Project site on their internal system where it showed that the Project site is located within a low biodiversity sensitivity area and away from KBAs. ▪ If the baseline survey undertaken as per the presented and approved methodology indicates any potential issues of concern or sensitivities within the Project site, it is recommended that a rapid assessment is undertaken during birds' migratory seasons. ▪ Since the Project site is not a biodiversity hotspot, environmental monitoring during construction is recommended to detect any disturbances to the local ecosystem. Since, methodology is sufficient, any adjustments to the methodology may be necessary if unexpected species are identified ▪ The Project must implement dust control measures and waste management practices during construction to prevent indirect impacts on surrounding ecosystems. ▪ Environmental safeguards should be in place during both construction and operational phases, with regular environmental monitoring to ensure compliance with national laws and international guidelines for renewable energy Projects.

Entity	Date	Key Outcomes
Union of Nubian NGOs in Aswan Governorate	10 September 2024	▪ The Union of Nubian NGO expressed strong support for the Project, recognizing its alignment with national and global efforts to promote environmentally sustainable energy production. ▪ The Project is not expected to negatively affect Nubian villages, as these are located along the Nile and in areas like West Suhail and Nasr El Nuba, far from the Project site. The closest Nubian village, Sheikh Fadl, will not be impacted as the Project does not intersect with any residential areas. Therefore, no adverse impacts on Nubian villages are anticipated. ▪ An emphasis on the importance of prioritizing local employment during the construction phase to ensure economic benefits for the people of Aswan governorate. ▪ The union expressed willingness to cooperate with the Project team and provide relevant data on Nubian villages and families in Aswan, and to facilitate consultations and Project disclosures to the Nubian community.
Relevant Associations		
Benban Solar Developer Association (BSDA)	10 September 2024	▪ All solar photovoltaic (PV) plants in the Benban Solar Park are fully operational and contributing to the national grid. ▪ The completion of the solar park aligns with Egypt's strategy to diversify energy sources and enhance the use of renewable energy. ▪ As of the current date, no new solar PV plants are under construction within the Benban Solar Park; the majority of Projects were completed by 2019-2020. ▪ The Facility Management Company (FMC), Health and Safety Home, oversees key services at the solar park, which include: - Solar Park coordination - Security and crisis management - Traffic and roads management - Central facilities services - Solid waste management - Wastewater management - Community liaison and communications - Health, safety, and environment (HSE) oversight and governance ▪ Information was provided on water consumption, wastewater, solid and hazardous waste management and disposal, fuel consumption, traffic, and the operational workforce and their accommodation. This information was used for the cumulative analysis later in "Section 21". ▪ Team was asked to provide summary of key E&S challenges during the construction period of Benban. Team indicated that they were not involved in the construction phase and therefore cannot provide such information. ▪ Team was asked to provide summary of key grievances received during the construction period of Benban. Team indicated that they were not involved in the construction phase and therefore cannot provide such information. ▪ It was indicated that the majority of grievances and complaints received during the operation phase are related to labor rights, contractual matters, hiring and termination processes, welfare facilities, and financial entitlements. ▪ They recommended that job opportunities be primarily advertised through Facebook, WhatsApp groups, and the company's website.

6.3.2 Focus Group Discussions (FGD)

Public Scoping Session

A public scoping session was held in Aswan City, Aswan Governorate at the Tulip Hotel (venue) on the 11th of September, 2024. The objectives of the public scoping session included the following:

- Introduce the Project to stakeholders (location, components, activities, etc.);
- Present the methodology for the ESIA study;
- Identify the key anticipated impacts;
- Allow interested stakeholders to comment on the scope of work undertaken, key issues identified and any other issues of concern they might have.

Announcement and Advertisement of the Session

The public scoping session was announced 2-weeks in advance in one of the official daily newspapers as shown in the figure below (the advertisement was published in El Gomhoria newspaper on the 29th of August, 2024). The invitation was an open session for any interested stakeholder to attend.

In addition to the public announcement, invitations were sent to key stakeholders. The invitee list comprised the regional branch of the Egyptian Environmental Affairs Agency (EEAA), the Governorate Environmental Office, relevant government entities involved in the Project, Daraw City Council, the National Council for Women, local community representatives, NGOs, and various community groups. In coordination with the E&S Team, all invitees were notified of the date and location of the public consultation session. Invitations were extended through the following channels:

- Invitations and executive summary sent by the E&S team to stakeholders in the governorate, NGOs and local community representatives by hand mail, fax and email;
- Invitations sent by the Office of the Secretary General of Aswan Governorate;
- Telephone calls by the E&S team;

Figure 14: Newspaper Announcement in El Gomhoria published on 29/08/2024

Participating Parties

The total number of participants was 145, in addition to the consultant's representative. The session was moderated by representatives of the E&S team.

The attendees comprised representatives from various government agencies within Aswan Governorate to include the EEAA branch in Aswan, NGOs, governmental bodies in Daraw City, academics, and local community representatives. A summary of the participating entities is provided in the table below. Additionally, a non-technical executive summary of the ESIA was prepared and distributed to all attendees.

Table 9: The Distribution of Participants in the Public Scoping Session

Attendance	No.
Egyptian Environmental Affairs Agency (EEAA) - Aswan	2
Representative of Aswan Governorate	1
Environment Department in Aswan Governorate	2
Daraw City Council	4
Solid Waste Management Authority in Aswan Governorate	1
Water and Wastewater Company	2
Urban Planning Directorate	1
Directorate of Social Solidarity Aswan	2

General Authority for Roads and Bridges	2
Labor Office	2
Electricity Transmission Company	3
National Council for Women Aswan	3
Members of the local community in Al Raqaba	82
Mayor of the Raqaba village and heads of families	14
Local contracting companies	7
Clergy	2
Civil Society and NGOs	12
Academic	2
Developer	1
Total	**145**

The public scoping session commenced with opening remarks delivered by representatives from Aswan Governorate, the EEAA, and the Mayor of Al Raqaba. The speakers emphasized the significance of the consultation sessions as a platform for community dialogue regarding the Project's potential impacts. Particular attention was given to the importance of energy projects in fostering increased investment and development in the region. The speakers also highlighted the project's role in supporting energy production and creating job opportunities for local communities in proximity to the Project site.

Following that, a representative from the Developer delivered a presentation on the company's background and their energy portfolio in Egypt. Finally, the E&S team provided a detailed presentation on the ESIA study, impacts and methodology, along with a comprehensive description of the project, including its location, key components, and various phases of development.

Following the above presentations, an open discussion was held, during which attendees were given the opportunity to provide comments and express concerns.

Figure 15: Selected Photos from the Session

The table below summarizes the key issues raised during the session along with the corresponding responses.

Table 10: Key Outcomes and Responses of the Public Disclosure Sessions

E&S Attribute	Comment	Response
Air Quality and Noise	Concerns were raised about the potential emission from construction activities during the construction phase, as well as the impact of emissions during the operation phase on the nearby local community.	As part of the ESIA, air quality measurements will be conducted to establish baseline conditions and appropriate mitigation and monitoring measures will be identified for dust and emission control during the construction phase. However, due to the distance between the Project site and the local community (6.5km), it was explained that emissions are highly unlikely to reach the village. In addition, it was explained that there are no air quality and noise emissions

E&S Attribute	Comment	Response
		during the operational phase due to the nature of the Project.
Worker Health and Safety	From previous experience in other solar PV projects in the area, there could be potential health issues, such as an increase in flying insects from excavation activities, which could affect worker health.	This issue will be taken into consideration, and appropriate mitigations will be included in the ESIA to prevent such impacts.
Glare and Glint	Information on the impact of the reflection of the panels that will be used during the Project.	Panel selection was clarified to be done by the Developer, taking into account the locations characteristics and needs. It was explained that with modern panels reflections or glare are not a key issue of concern as they absorb sunlight and are equipped with Anti-Reflective Coating. In addition, the area does not include any key sensitive receptors.
Infrastructure and Utilities	Project requirements could lead to traffic and high demand on main highways and village roads and could also lead to increase in risk of accidents. This should be taken into account during the construction phase of the Project.	As part of the ESIA such issues and impacts will be considered including flow of traffic on key highways, and appropriate mitigation measures will be identified to include appropriate entry/exit mechanisms at the Project site from the highway, timing of transporting equipment and materials, etc. In addition, it was explained that the Project will not use the village's agricultural roads.
Waste Management	A concern was raised about designated storing locations and disposal methods of generated sewage during construction.	It was explained that ESIA will identify proper measures in line with best practice for onsite storage and disposal of waste and wastewater. In addition, it was explained that consultations with relevant entities were undertaken and it was concluded that waste generated by the Project can be accommodated.
Worker Influx	Comments was raised in regards to the impacts of worker influx on the existing resources and facilities.	It was explained that worker influx impacts will be addressed throughout the ESIA and appropriate mitigation and monitoring measures will be included.
Land Use	A concern was raised related to the Project development limiting the possibility of village expansions in the area and potentially hindering the social growth of the community.	It was clarified that according to consultations with the Urban Planning Department of Aswan Governorate that the Project area does not conflict with any future plans for Al Raqaba Local Unit and is not located within any area designated for agriculture or building expansion. In fact, the Project area is officially designated for renewable energy development projects.

E&S Attribute	Comment	Response
Socioeconomic	Several attendees emphasized the importance of offering direct employment and procurement opportunities to local communities near the Project site. It was emphasized that this needs to be through a transparent process to be implemented with a fair opportunity to locals as opposed to external companies. Such processes need to avoid unfair competition, stating that assigning work to one general contractor could disadvantage local contractors. It was further stated that in general, the local community have had unpleasant previous experiences with the employment and procurement processes during other development projects in the area.	it was explained that priority will be for Al Raqaba Local Unit, given that they are the closest community to the Project site within the Daraw District. In addition, it was explained that the Developer will prioritize employment and procurement opportunities for both skilled and unskilled jobs as well as procurement opportunities based on skills and qualification availability in order to maximize community support. Finally, it was explained that a clear mechanism on employment and procurement will be established and developed that will have full details on the mechanism to be implemented and will ensure transparency. Once available the details of this will be provided
	Several suggestions were provided for corporate social responsibility activities by the Developer such as rehabilitating the current health facilities and providing educational facilities within the Al Raqaba Local Unit.	It was explained that the Developer will implement a Social Development Plan, which includes conducting a needs assessment for the local communities to identify and decide on appropriate interventions. All suggestions and concerns will be considered and analyzed, and a structured approach will be developed accordingly. Once additional information is available on this it will be provided accordingly.
	A suggestion was made in regards to establishing a civil society organization by the Developer representing Al Raqaba Local Unit, in order to achieve community participation.	This will be considered and taken into account for the stakeholder engagement activities to be undertaken.
	An attendee suggested that the Developer organize training sessions specifically to local contractors to provide them with the skills needed during the construction phase of Solar PV Projects.	It was explained that this will be considered and recommended as part of the ESIA.
	Information was requested regarding the selection and appointment of a Community Liaison Officer (CLO).	It was explained that the Developer is in the process of assigning and appointing two (2) CLOs. Once available details will be provided.
General	Clarifications in regards to the Project timeline, ESIA Process, and Project environmental categorization were requested.	It was clarified that the ESIA is currently being undertaken. In addition, it was explained that according to EEAA legislations the project is categorized as "Category B – Scoped study". Project timeline was also presented based on latest information provided from the Developer.

Local Communities

Note: Please refer to "Section 2.1" on administrative setup to ensure naming and wordings described below are understood.

Initially, three (3) focus group discussions (FGDs) were planned to engage with the local communities of Al Raqaba Local Unit and its affiliated villages and hamlets. These discussions aimed to ensure that all communities of various demographic groups were included, including both male and female participants, and to particularly to target the distinct cultural communities.

Three (3) key FGDs were planned to be undertaken with the local communities that are relevant to the Project as identified earlier and which are included below. *The setup and organization of these sessions were discussed and agreed in coordination and collaboration of the Mayor of Al Raqaba Local Unit.*

- Session #1: Al Raqaba Local Unit (with one (1) male and one (1) female session to take place at the mayor's headquarters). This session was a general session targeted for all of Al Raqaba Local Unit and its hamlets.
- Session #2: a dedicated session targeted for those hamlets within Al Raqaba Local Unit that are directly facing the Project site to the east (i.e. the closest hamlets within Al Raqaba Local Unit) (with one (1) male and one (1) female session to take place at the Diwan[10]).
- Session #3: Sheikh Fadl Hamlet (a dedicated consultation for the Nubian Community). Note: as discussed previously in "Section 6.3.1", consultations with the Union of Nubian NGOs in Aswan Governorate indicated that within Al Raqaba Local Unit there is one (1) Nubian community known as Sheikh Fadl Hamlet – therefore a dedicated session was undertaken for this hamlet in particular.

All sessions were announced through appropriate local platforms at least 2-week prior to the event. Such platform included announcements at Al Raqaba Local Unit in coordination with the Mayor of Al Raqaba as well as local community social media channels. All sessions were open invitations to be attended by any interested party or individuals.

Table 11: Initial FGD Sessions

Date	Location of Session	Number of Sessions
September 8th 2024	Al Raqaba Local Unit The sessions will be held at the headquarters of the mayor of Raqaba village.	2 sessions will be held with the local communities of Raqaba and affiliated villages near the proposed project site (1 male and 1 female).
September 9th 2024	Villages affiliated with Al Raqaba Local Unit The session will be held at Diwan Al Ashry in Hegaziyeh village	2 sessions will be held with the local communities of the affiliated villages near the proposed project site (1 male and 1 female).
September 10th 2024	Sheikh Fadl Village The session will be held at the Nubian community's village.	2 sessions will be held with the Sheikh Fadl village (1 male and 1 female).

[10] Diwan refers to a reception room; the meeting place for each family is called a Diwan in Egypt, which is a large open square equipped with seats, where family meetings are held, as well as celebrating occasions and receiving guests.

Figure 16: Initial Session Announcements

However, one (1) day after the announcements were published, the “E&S team” was contacted by the Egyptian National Security Agency's (ENSA) office in the Daraw district and required that sessions are cancelled and rearranged based on new discussions with the Mayor to ensure the participation of all Al Raqaba Hamlets.

Based on further discussion with the Mayor, it was indicated that to avoid tensions, sensitivities, and escalations within the various villages and hamlets of Al Raqaba Local Unit, no targeted sessions should be held for specific hamlets within Al Raqaba Local Unit (i.e. similar to approach of Session #2) even if they are the closest to the site. Consultations should be undertaken for the entire Al Raqaba Local Unit, villages and hamlets and they should all be considered as local community for the Project.

Based on the above, a revised methodology for the consultation session was undertaken in coordination with the Mayor. Based on communications with the Mayor, it was decided that the most suitable approach involved holding separate FGDs for each hamlet or family group within their own respective locations.

The updated sessions were announced in several different ways that are tailored to the nature of the local communities in Al Raqaba Local Unit. The methods used are listed below:

- The announcement of the sessions was circulated through multiple channels; including WhatsApp groups for different families, Al Raqaba Local Unit through the local unit, and the Facebook pages for local communities (e.g. Sheikh Fadl Local Community Development Association).
- In addition to these methods, the Mayor of Al Raqaba Local Unit announced the sessions through public announcements.

Therefore, the updated methodology held a total of seventeen (17) sessions; (12 sessions for men, 4 sessions for women and a mixed session bringing together men and women) with the community members in the village of Al Raqaba and its affiliated Hamlets.

Table 12: FGD Sessions

Date	Location of Session	Number of Sessions
September 7th 2024	Al Raqaba Villages and Hamlets of Al Raqaba Lower	FGDs were conducted in the following areas: ▪ Headquarters of the Mayor of Al Raqaba ▪ Hegaziyeh and El Bashab ▪ Sheikh Zayed and El Harbiat El Gadida ▪ El Aliqat (El Bahri and El Qabli) ▪ Separate Session: Sheikh Fadl (Nubian village)
September 8th 2024	Al Raqaba Villages and Hamlets of Al Raqaba Upper	FGDs were conducted in the following areas: ▪ El Gama'ab ▪ El Bayaidh and El Hanawi ▪ El Wansab and El Ganib ▪ El Gharibah, El Hamidat, El Amin and El Hassan ▪ El Salwawiyah Bahriyyah, El Qibliyyah and El Ezbah ▪ El Zamrab and El Awnab ▪ El Gabrab and El Sararif

The sessions were held in the Diwan's and meeting places of the families in the village of Al Raqaba and its affiliated Hamlets, except for one (1) session that was held at the headquarters of the Local Community Development Association in Nagaa Sheikh Fadl (as further discussed below). The sessions were held in coordination with the Mayor of Al Raqaba Local Unit and the heads of the families.

- The sessions were conducted on Saturday and Sunday, September 7 and 8, 2024.
- In attendance was more than 700 people; the attendees were diverse, including community leaders, heads of families, the elderly and young, men and women, in addition, separate sessions were held for women only and were attended by around 113 female participants. In total, the sessions were attended by 650 male participants with a total of 763 attendees.

The table below presents the key outcomes of the Focus Group discussions; the table discusses all comments and concerns raised during the public consultation.

Table 13: Outcomes of FGD

Issues	Key Outcomes
General	▪ None of the community members who participated in the sessions, whether male or female, raised objections on the Project or expressed any dissatisfaction.
Procurement and Employment	▪ Community members across all sessions expressed key anticipation for the job opportunities the project will provide during both the construction and operational phases. While they understand that positions during construction will be temporary and skill-specific, and that for operation will be limited, they emphasized the importance of being considered and prioritized for both. ▪ Women also emphasized their interest in participating in the workforce, seeking roles that align with the community's customs and traditions. Educated women, in particular, expressed aspirations to work on-site during the construction phase. ▪ Concerns raised by the community members included: - Community members raised concerns about potential unfair competition, noting that assigning work to the general contractor may disadvantage local contractors, citing past experiences like the Benban project, they explained that strict safety standards in procurement resulted in lost opportunities for them. The community emphasized the need for a transparent and fair procurement process with support and less stringent regulations to prevent excessive burdens on local contractors. - There was an emphasis for transparency in the procurement process to ensure local companies have an equitable opportunity to participate and benefit from the project. Concerns were raised that larger companies could monopolize available opportunities, limiting local participation. - The community expressed apprehension that major contractors, such as those involved in previous projects, may be rehired again for this project, thereby reducing the chances for smaller local contractors who may struggle to compete on pricing and scale. Therefore, community members sought clarification on the percentage of work that will be allocated to local contractors, emphasizing that priority should be given to them for future job opportunities. Proposing that the Developer organize training sessions or workshops to enhance the skills of local contractors, enabling them to better compete with larger companies. - Some participants feared that during the operational phase, the majority of labor and contracting companies would be sourced from outside the local community, particularly outside of Al Raqaba Local Unit, potentially reducing employment opportunities for local residents. - Concerns were raised about the selection criteria for subcontractors and how the local contractors can engage with the project contractor in the future. - Concerns were expressed regarding the payment terms for the local contractors, specifically the possibility of contracts being issued in foreign currency (USD). The use of Egyptian pounds presents a risk of financial losses due to the currency exchange fluctuations. - It was explained that such information above is not available at this point but all of the above will be taken into account including developing a detailed, transparent, and fair procurement and recruitment procedure that will prioritize Al Raqaba Local Unit and will be developed in coordination with the local community. In addition, it was sufficiently explained in details and emphasized in all of the sessions that although priority for employment and procurement will be for local communities, it will however need to consider that: (i) there are certain international standards that the project must comply and commit to in terms of contracting and procurement; (ii) for employment opportunities there will be positions which require specific qualifications and experiences and that employment opportunities in general for construction are temporary while those for operation are limited due to nature of the Project. The local community understood the above requirements during the sessions but emphasized that they need to be

Issues	Key Outcomes
	realistic and take into account current capabilities available in the local community so that they can benefit to the extent possible from such employment and procurement opportunities. ▪ Questions were asked about the methods of communication with the Project, as well as the availability of a grievance mechanism as the project progresses; the process of filing the complaints in cases if dissatisfaction. It was stated that this will be developed and announced at a later stage and there will also be a dedicated Community Liaison Officer (CLO).
Community Needs and Corporate Social Responsibility	Throughout the session, the local communities required that the Developer establish a Corporate Social Responsibility (CSR) program targeted for the local communities. Suggestions for such CSR activities were provided below by the local communities. Infrastructure: ▪ Roads: The current road infrastructure, particularly the roads leading to the village, is inadequate. The community has requested improvements or the construction of alternative roads to ensure the safety of residents. ▪ Electricity supply: Community members raised concerns regarding high electricity bills despite the insufficient power supply, which is inadequate for operating appliances such as air conditioners. They hope the project will help establish a small unit or substation to improve the electricity supply. Facilities and Services: ▪ Transportation services: The community, and women groups in particular, highlighted the scarcity of reliable transportation services between the villages and the Daraw center, as they often spend hours waiting for transport without success due to small number of public transportation services available at the main road. ▪ Education services: The lack of educational facilities in the community forces residents to attend schools in neighboring villages, leading to increased transportation costs and daily challenges. Social Organization and Participation: ▪ Community representation: There was a suggestion for the Developer to assist in establishing a civil society organization that would represent the local community, facilitating more effective communication and community engagement activities. Support for Women: ▪ The community emphasized the need for support for women who are the primary breadwinners, including widows and divorced women. It was explained that the Developer will implement a Social Development Plan, which includes conducting a needs assessment for the local communities to identify and decide on appropriate interventions. All suggestions and concerns will be considered and analyzed, and a structured approach will be developed accordingly. Once additional information is available on this it will be provided accordingly.
Environmental Concerns	▪ Community members expressed significant concern regarding the potential emissions during the operational phase of the project, particularly their impact on the local population in Al Raqaba, the village closest to the project site. It was explained that due to the nature of the project being a solar PV project, there will be no emissions.

Issues	Key Outcomes
	▪ Additionally, there is uncertainty about whether the local health unit is adequately equipped to manage emergencies arising from health or environmental conditions related to the project. Upgrading health facilities to address potential risks, particularly during the construction phase, is a community priority. It was explained that emergency preparedness and response plan will be developed that will need to take into account local services and facilities availability. ▪ The community raised concerns about waste management practices for the workforce, particularly the disposal of waste and sewage. They requested a designated location for proper waste and sewage disposal generated by the project. It was explained that ESIA will identify proper measures in line with best practice for onsite storage and disposal of waste and wastewater. In addition, it was explained that consultations with relevant entities were undertaken and it was concluded that waste generated by the Project can be accommodated.

Nubian Communities

As discussed previously in "Section 6.2.2", consultations with the Union of Nubian NGOs in Aswan Governorate indicated that within Al Raqaba Local Unit there is one (1) Nubian community known as Sheikh Fadl Hamlet – therefore a dedicated session was undertaken for this hamlet in particular.

As mentioned in "Section 6.3.2" above, a separate consultation session was undertaken for the Nubian Community in Sheikh Fadl Village that administratively belongs to Al Raqaba Local Unit. The session was announced through the Sheikh Fadl Association for Community Development, where the association had shared the announcement through their social media channels as well as through the Mayor of Al Raqaba Local Unit.

The table below presents the outcomes of the consultation with the Nubian Community.

Table 14: Outcome of Nubian Community Consultations

Questions	Consultation Outcomes from the Nubian Community
Engagement and Participation	
How would you like to be involved in the decision-making process for this project?	The community expresses a strong desire for active involvement in the project through regular meetings and open discussions, where they can directly provide input. They emphasize the importance of having a local representative in any decision-making body to ensure that their needs are considered. Transparent communication regarding job opportunities and contracting work is critical, particularly for local families, including those in Sheikh Fadl. This transparency, along with access to relevant information on how the project might support community development, is essential.
What methods of communication and consultation would work best for your community?	Face-to-face communication is preferred, as it fosters personal interaction and clarity. Community gatherings focused on sharing information about job openings or contracting opportunities are suggested as effective means of engagement. Additionally, written announcements or phone calls could reach those unable to attend meetings. The community requests that all job and development opportunities be communicated in advance, in clear and accessible language.
How can it be ensured that all voices in your community are heard, including women, youth, and elders?	To ensure inclusive participation, consultations should be organized to cater to specific groups, such as women, youth, and elders, allowing each group to express concerns relevant to them. Young people are likely to prioritize job opportunities, while elders may provide insights into contracting work. Women's active participation should be encouraged, particularly in discussions about community development. The involvement of elders, who are highly respected, in decision-making is important, but younger generations should also have opportunities to contribute their ideas.
What would make you feel that your input and concerns are being taken seriously?	The community seeks reassurance that their input is valued by seeing tangible outcomes based on their feedback. Regular updates on the project's progress, particularly regarding job creation and contracting opportunities for local families, will demonstrate that their concerns are being addressed. Additionally, keeping the community informed about any local development initiatives, such as infrastructure improvements or educational support, will build trust. Involving community representatives in decision-making and providing explanations for why certain suggestions are implemented or not will further ensure that their voices are heard and respected.
Employment Opportunities	
How would you like to be involved in the Project?	The community is eager to be actively involved in the project, particularly through employment opportunities in various roles. Many are interested in contributing to the construction of the solar energy facility and supporting tasks. A number of young people from Sheikh Fadl have prior experience working on solar energy projects, both in construction and operations, and they are keen to apply their skills once again. Additionally, there is a strong interest in training programs to enhance skills, with women particularly interested in learning handicrafts, marketing, and other specialized roles.

What skills do you possess that could be useful for the Project?	Community members possess a range of practical skills, including working with equipment, performing physical labor, and assisting with organizational tasks related to materials and tools through contracting work. Those with prior experience in solar energy projects are prepared to take on more responsibility in the new project. Women with educational qualifications are also eager to contribute in areas such as administrative support or through training for more specialized tasks (to include skilled and unskilled).
What level of your education do you have?	Education levels within the community vary. Some have completed secondary school or vocational training, such as in electrical work, while others, both men and women, have attained higher education and are seeking job opportunities that align with their skills. Training programs are viewed as essential for enabling the community to qualify for various roles in the project and to improve their chances for long-term employment.
What type of benefits do you envision from the Project?	Beyond employment, the community hopes that the project will bring broader benefits, such as job creation, skill development, and improved local services. These include enhancing educational and healthcare services and addressing pressing infrastructure needs, such as sanitation, roads, and transportation, which present daily challenges for residents.
Nubi Identity and Community: An Understanding	
Can you tell us about your community's history and cultural traditions in relation to this region?	The Nubian community has a rich and deep history closely tied to the Nile and the surrounding region. For centuries, Nubians have lived along the riverbanks, maintaining strong connections to the Nile as a source of life, livelihood, and culture. Known for their skills in agriculture, pottery, and boat-making, these traditions have been passed down through generations. Vibrant music, dance, storytelling, and the creation of traditional jewelry and clothing play a crucial role in preserving Nubian heritage. Although many Nubian families have migrated to Cairo, Alexandria, and other parts of Egypt, with younger generations seeking work opportunities in Gulf countries, pride in their unique customs, language, and heritage continues to shape their identity.
What aspects of your culture and heritage are most important to you and your community?	One of the most significant aspects of Nubian culture is the language, which is still spoken, particularly by elders. This language is deeply connected to their history and identity. The community also places high value on strong family bonds, respect for elders, and the transmission of traditions from one generation to the next. Music, traditional dances, and celebrations such as weddings remain central cultural expressions that unify the community. While Nubians are now integrated into various levels of society in Aswan and across Egypt, they continue to cherish their heritage and strive to maintain their customs.
How does your community define itself? What makes your identity unique?	The Nubian community is characterized by a strong sense of unity, respect for cultural traditions, and efforts to preserve the Nubian language, despite the fact that younger generations are less likely to use it in daily life. What sets Nubians apart is their ability to blend ancient traditions with modern influences, while still holding on to their distinct identity. Today, they occupy roles across various sectors in society, demonstrating adaptability while remaining rooted in their heritage. Their traditional livelihoods, including agriculture and crafts, along with a deep connection to the Nile, continue to be defining features, even as many have moved to larger cities or sought opportunities abroad.
How do you feel your community has changed over time, particularly in relation to land, culture, and livelihood?	Over time, the community has experienced significant changes in both lifestyle and work. While cultural traditions remain central, many have adapted to modern ways of living. The younger generation, more educated, is increasingly pursuing opportunities beyond traditional livelihoods like agriculture. Some have gained experience working on modern projects, such as solar energy, while others have sought employment abroad, particularly in the Gulf. Despite these transformations, the community's sense of identity and pride in its cultural heritage remains strong, as they continue to celebrate their traditions while adapting to contemporary realities.
Monitoring, Evaluation and Feedback	
How would you like to be informed	The community expresses a desire for regular updates on the project's progress through organized meetings and gatherings, which would provide an opportunity for everyone to

about the project's progress and any changes that might occur?	receive information and ask questions. Utilizing local leaders or representatives to disseminate updates is preferred, as they can communicate in a manner that resonates with the community. Additionally, visual reminders such as flyers or posters in communal areas would help keep residents informed of developments, particularly regarding job opportunities.
What mechanisms would you prefer for providing feedback during the project's implementation?	Opportunities for open dialogue during these community meetings are essential for addressing concerns and gathering feedback. Establishing a suggestion box in a central location would allow individuals to provide input anonymously, creating a more comfortable environment for sharing opinions. Appointing a dedicated community liaison or representative to relay feedback directly to the project managers would further ensure that community voices are acknowledged and considered.
How can we work together to monitor the project's impacts on your community throughout the Project lifecycle?	To monitor the project's impacts effectively, the formation of a community committee is proposed, consisting of representatives from various demographic groups, including women, youth, and elders. This committee would collaborate with project representatives to assess the project's effects on the community. Regular check-ins or workshops could be held to review progress, discuss findings, and maintain transparency. By working closely together, the community and project team can address challenges promptly and celebrate achievements as they arise.
Potential Impacts of the Project on the Nubi	
What are your main concerns about the solar project and how it might affect your community?	While there is general optimism regarding the solar project, a key concern is ensuring that its benefits are effectively realized by the community. Given the project's distance from local villages, it is important that community members are kept informed of developments and that opportunities remain accessible. Active engagement from the project team in addressing any community questions or concerns will be essential.
How do you think the project could impact your access to land, resources, and traditional practices?	Since the project site and activities do not intersect with the settlement areas or critical community facilities, such as land or roads, no direct negative impacts on access to resources are anticipated. The village is at a reasonable distance from the site. However, as mentioned earlier, continued involvement in discussions on future developments or changes is desired.
Are there any sacred sites or culturally significant areas that we should be aware of in planning the project?	Although the project site is not in close proximity to the villages, it remains important that cultural and sacred sites are respected. While no direct overlap is expected, maintaining open communication will ensure that the community's cultural heritage is considered and preserved throughout the project's implementation.
How do you foresee the project affecting your community's way of life, both positively and negatively?	The project is expected to have a positive impact on the community, particularly through job creation and the enhancement of local services. The potential for training programs and infrastructure improvements would be especially beneficial for youth and women, providing them with valuable skills and access to new opportunities. Overall, the project is seen as an opportunity to support local development while preserving cultural traditions.
Nubi's: A regional understanding	
Do you have customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture?	The community maintains traditional cultural and social institutions that are integral to its identity. These include gatherings, celebrations, and community councils where elders often lead important decision-making. Additionally, the community engages in distinct economic activities, such as traditional crafts and agriculture, which differ from mainstream practices. Non-governmental organizations (NGOs) actively support these initiatives, contributing to the preservation of Nubian culture. The Nubian Union plays a significant role in connecting Nubian NGOs to each other, fostering collaboration.
Do you have any specific attachment	Although the project site is distant from the villages, the community retains a strong connection to the surrounding areas that are part of the broader Nubian heritage. The Nile

to the project site itself? Which areas/lands do you have specific attachment to?	River and the ancestral landscapes are important to this heritage. While the project site itself does not hold direct cultural or religious significance, and the community does not use the land, there is a hope that the project planning and implementation will respect the cultural landscape.
Do you have distinct language or dialect?	The Nubian language, with its distinct dialects, remains a vital part of the community's identity and cultural heritage. It plays a crucial role in preserving history and traditional expressions, especially among older generations. However, due to modernization and generational shifts, many younger members no longer speak or understand the Nubian language. While Arabic is widely spoken, the Nubian language remains central to interactions among the elderly. NGOs are involved in initiatives to promote and preserve the language, which, along with traditional costumes and ceremonial dances, forms a key element of the Nubian cultural identity.

6.4 Future Stakeholder Engagement and Consultation

Future stakeholder engagement and consultations will mainly include the following, each of which is discussed in further detail.

6.4.1 Undertake a Disclosure Sessions

Similar to the scoping FGDs undertaken, disclosure FGDs will be undertaken with the key stakeholders. Three (3) key FGDs will be planned to be undertaken with the local communities that are relevant to the Project as identified earlier and which are included below. *The setup and organization of these sessions will be discussed and agreed in coordination and collaboration of the Mayor of Al Raqaba Local Unit.* A fourth session will be undertaken in Aswan city similar to the scoping methodology.

- Session #1 targeted for Al Raqaba villages and hamlets of Al Raqaba Lower
- Session #2 targeted for Al Raqaba villages and hamlets of Al Raqaba Upper
- Session #3 targeted for Sheik Fadl Hamlet (dedicated consultation for Nubian community)
- Session #4: a public disclosure session to be held in Aswan City, Aswan Governorate

The objective of the session included the following:

- Introduce the Project to stakeholders;
- Present the results, outcomes and conclusions of the ESIA study
- Allow stakeholders to raise any comments or issues of concern in relation to ESIA study to include but not limited to the baseline results, impacts, mitigation, monitoring measures, etc.
- Discuss any question, inquiries, or issues of concern raised by stakeholders
- Present and discuss the SEP and community grievance mechanism

All sessions will be open invitation sessions that will be announced to local communities through the following avenues at least two (2) weeks in advance of the session.

- Announcement in Arabic Language with the date, venue and time of the disclosure session in a popular daily newspaper in Aswan Governorate.

- Announcement published on online platforms (key Facebook pages related to Aswan Governorate, specifically platform included announcements at local units in Al Raqaba Local Unit) in coordination with the Mayor of Al Raqaba as well as local community Social Media Channels.
- All sessions were open invitations to be attended by any interested party or individuals.

6.4.2 Disclosure of Documentation

The below documents will 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 updated as appropriate.

- Environmental and Social Impact Assessment (ESIA);
- Non-Technical Summary (NTS);
- Stakeholder Engagement Plan (SEP);

The above will be disclosed in two (2) main languages to include English and Arabic language.

All disclosed documentation will be available at the following locations:

- Al Raqaba Local Unit Office
- Daraw District Office
- Aswan Governorate office

6.4.3 Implementation of the Stakeholder Engagement Plan (SEP)

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

- The SEP for the Project describes the planned stakeholder consultation activities and engagement process and includes the following:
- Define the Project's approach to future stakeholder engagement;
- Identify stakeholders within the area influenced by the Project;
- Profile identified stakeholders to understand their priorities;
- Propose an action plan for future engagement with identified stakeholders; and
- Set out the grievance/project complaints mechanism.

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

7. OVERVIEW OF STRATEGIC ENVIRONMENTAL AND ECONOMIC IMPACTS

7.1 Governmental Vision for the Energy Sector

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

To this extent, in 2013, the Arab Republic of Egypt (through the Supreme Council of Energy) had developed and adopted the ISES 2015 – 2035, which provides an ambitious plan to increase the contribution of renewable energy to 42% of the electricity generated by the year 2035.

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

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

7.2 Energy Security

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

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

In line with the above, the Project in specific will contribute to increasing energy security through reliance on an indigenous, inexhaustible and mostly import-independent energy resource. The estimated electricity generation from the Project is 3,100-Gigawatt hours (GWh) per year, on average; which will serve the annual electricity needs of around 515,000 local households.

7.3 Environmental Benefits

The negative environmental impacts from generating electricity through conventional fossil fuel burning at thermal power plants are very well known. This most importantly includes air pollutant emissions such as ozone, Sulphur Dioxide, Nitrogen Dioxide, Particulate Matter, and other gases which are the cause of some serious environmental concerns such as smog, acid rain, health effects, and many others.

In addition, the burning of fossil fuels results in carbon dioxide emissions; a primary greenhouse gas emitted through human activities which contributes to global warming. The main human activity that

emits CO_2 is the combustion of fossil fuels for electricity production and transportation. Concurrently, global climate change has become an issue of concern and so reducing greenhouse gas emissions have also emerged as primary issues to be addressed as the world searches for a sustainable energy future.

Generating electricity through solar PV power is rather pollution-free during operation. Compared with the current conventional way of producing electricity in Egypt through thermal power, the clean energy produced from renewable energy resources is expected to reduce consumption of fossil fuels, and will thus help in reducing GHG emissions, as well as air pollutant emissions. The Project will likely displace more than 1,565,000 metric tons of CO_2 annually.

The above has been calculated based on recognized standards outlined by the Institute for Global Environmental Strategies (IGES)[11]. This data analysis utilizes project information listed on the IGES CDM Project Database. The information of relevant items is extracted from the publicly available sources on the UNFCCC website. The Grid Emission Factors presented in the IGE's List have been calculated using the CDM 'Methodological Tool to calculate the emission factor for an electricity system'[12] (the Grid Tool). An emission factor is utilized to gauge the amount of carbon dioxide (CO_2) emissions typically associated with the generation of one megawatt-hour of electricity. However, solar panels inherently contribute to emissions and to account for this reduction, it's necessary to consider a reduction factor which is equal to 0.05 metric tons of CO_2 per megawatt-hour (tCO_2/MWh) produced by the Project. The anticipated generation capacity of the Project is estimated at 3,100 GWh per year.

Other environmental benefits include reduction in water consumption per kWh from PV generation when compared to other conventional technologies such as thermal power plants which are considered the dominant technologies within the Egyptian energy mix.

7.4 Overview of Project Specific E&S Impacts

Nevertheless, the Project will result in negative E&S impacts on various E&S attributes throughout its overall development process. The table below presents an overview of the key impacts during the planning, construction, and operation phases of the Project.

The below is based on the outcomes of the detailed assessment process undertaken throughout the subsequent sections of the ESIA.

It is also important to note that the table below presents the worst-case scenario for the impacts. As included in further details within the relevant sections, some impacts have a range of significance (e.g. moderate to major) however the table below presents the worst-case scenario.

[11] IGES CDM Project Database

[12] Methodological Tool to calculate the emission factor for an electricity system

Table 15: Summary of Anticipated Impacts during the Construction Phase

Environmental Attribute	Likely Impact – Planning and Construction Phase	Impact Assessment									
		Nature	Duration	Reversibility	Magnitude	Sensitivity	Likelihood	Extent	Significance	Management Action	Residual Significance
Landscape and Visual	Visual and landscape impacts due to presence of elements typical of a construction site such as equipment and machinery.	Negative	Short term	Reversible	Medium	Low	High	Low	Minor	Mitigation available	Not significant
Land Use	Project could result in land use impacts related to economic and/or physical displacement as it could provide land use value to locals for activities.	No anticipated impacts								N/A	N/A
Geology, Hydrology and Hydrogeology	Project site which could entail flood risks which could entail impacts on the various Project components.	No anticipated impacts.								N/A	N/A
	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities, spillage of hazardous material, random discharge of waste and wastewater.	Negative	Short term	Reversible	Medium	Low	Medium	Medium	Minor	Mitigation available	Not significant
	Construction activities could disturb soil, and result in erosion and runoff could result in siltation of surface water (during rain events)	Negative	Short term	Irreversible	Medium	Low	Medium	Low	Minor	Mitigation available	Not significant
Biodiversity	Construction activities could disturb existing habitats (flora, fauna, avi-fauna) and any threatened or endangered species which might be present within the Project site. In addition, other impacts could be from improper management of the site (e.g. improper conduct and housekeeping practices).	Negative	Long term	Irreversible	Medium	Medium	High	Low	Moderate	Mitigation available	Not significant
Archaeology	Construction activities could damage/disturb potential archaeological remains, as well as potential archaeological remains which could be buried in the ground (if any).	Negative	Short term	Irreversible	Medium	Low	Low	Low	Minor	Mitigation available	Not significant
Air Quality and Noise	Construction activities will likely result in an increased level of dust and particulate matter emissions which in turn will directly impact ambient air quality.	Negative	Short term	Reversible	Medium	Low	High	Medium	Minor	Mitigation available	Not significant
	Possible noise emissions to the environment from the construction activities which will likely include the use of machinery and equipment such as generators, hammers and compressors and other activities.	Negative	Short term	Reversible	Medium	Low	High	Medium	Minor	Mitigation available	Not significant
Infrastructure and Utilities	Water requirements – water requirements of the Project could entail constraints on the local community.	Negative	Short term	Reversible	Medium	Low	High	Medium	Minor	Additional requirements	Not significant
	Waste utilities – it is important to ensure that existing utilities would be able to handle the amount of solid waste, wastewater and hazardous waste generated from the Project.	Negative	Short term	Reversible	Low	Low	High	Medium	Not significant	Additional requirements	Not significant
	Road network – transportation activities of the Project could affect level of service and capacity of existing highways as well as potential safety risks to users on the road.	Negative	Short term	Reversible	Low	Low	High	High	Not significant	Additional requirements	Not significant
	Road Network – inappropriate management of traffic and transportation activities could entail public health and safety risks from accidents and similar activities.	Negative	Short term	Reversible	Low	Medium	Medium	Low	Minor	Additional requirements	Not significant
	Improper management of construction activities could damage or disturb the various nearby infrastructure and utility elements (electricity line, gas pipeline and telecom tower).	Negative	Short term	Reversible	Low	Medium	Low	Medium	Minor	Mitigation available	Not significant
Worker Welfare, Health and Safety	Generic occupational health and safety risks to workers, as working onsite increases the risk of injury or death due to accidents	Negative	Short term	Irreversible	Medium	Medium	Medium	Low	Moderate	Mitigation available	Not significant
	Inappropriate accommodation facilities for workers will entail impacts on worker welfare as well as their overall health and safety.	Negative	Short term	Reversible	Medium	Medium	Medium	Medium	Moderate	Mitigation available	Not significant
	Inappropriate management of the workforce could entail human rights violations (e.g. engaging child workers, confiscation of passports of foreign workers, unacceptable working hours, and others).	Negative	Short term	Reversible	Medium	Medium	High	Low	Major	Mitigation available	Not significant
	Inappropriate management of the workforce (which could be from the local community) as well as inappropriate conduct of workers within local community areas could entail gender related risk and impacts such as Gender based violence, and harassment (GBVH) or Sexual Exploitation, abuse, and harassment (SEBH)	Negative	Short term	Irreversible	Medium	Medium	Medium	Low	Moderate	Mitigation available	Not significant
Community Health and Safety	Trespassing of unauthorized personnel into construction active areas could result in health and safety impacts.	Negative	Short term	Irreversible	Medium	Medium	Low	Low	Moderate	Mitigation available	Not significant
	Influx of workers to the area could result in community impacts such as pressure on infrastructure elements, increase in social vices, risk of spread of disease, and other.	Negative	Short term	Reversible	Low	Medium	Medium	Medium	Minor	Mitigation available	Not significant
	Inappropriate management of security issues (e.g. conduct of security personnel) could result in health and safety issues for local communities.	Negative	Short term	Irreversible	Medium	Medium	Low	Low	Moderate	Mitigation available	Not significant
Socio-economic	The Project is expected at a minimum to provide job opportunities as well as procurement opportunities for local communities. This, to some extent, could contribute to enhancing the living environment for its inhabitants, elevate their standard of living, and bring social economic prosperity to the local community.	Positive	Not applicable.								
	However, it is important to note that if local community engagement is not implemented properly and if expectations are not properly managed and addressed, this could result in genitive impacts on local community members. This could lead to distrust and resentment with the Developer and might eventually lead to other potential escalated events.	Negative	Short Term	Reversible	High	High	Medium	Medium	Major	Recommendations	Not significant
Subcontractor and Supplier Management	Improper management of subcontractors and supplier poses risks of major environmental impacts, human right abuses, criminal abuses or other	Negative	Short term	Reversible	Medium	Medium	High	Low	Moderate	Mitigation available	Not significant

Table 16: Summary of Anticipated Impacts during the Operation Phase

Environmental Attribute	Likely Impact – Planning and Construction Phase	Impact Assessment									
		Nature	Duration	Reversibility	Magnitude	Sensitivity	Likelihood	Extent	Significance	Management Action	Residual Significance

Landscape and Visual	The Project is expected to be visible within the immediate vicinity and up to some kilometers around the Project site only and thus is likely to create visual impacts related to interaction with surrounding landscape.	Negative or Positive	Long term	Reversible	Medium	Low	High	Medium	Minor	Not applicable	Minor
	Potential glare caused by minimal sunlight reflected off the PV panel modules which in turn could affect nearby receptors.	Negative	Long term	Reversible	Low	Medium	Low	Medium	Minor	Additional requirements	Not significant
Geology, Hydrology and Hydrogeology	Risk of soil and groundwater contamination during the various operation activities from improper housekeeping activities, spillage of hazardous material, random discharge of waste and wastewater.	Negative	Long term	Reversible	Medium	Low	Medium	Medium	Minor	Mitigation available	Not significant
Biodiversity	Potential impacts could be from improper management of the site (e.g. improper conduct and housekeeping practices).	Negative	Long term	Irreversible	Medium	Low	High	Low	Minor	Mitigation available	Not significant
	Potential impacts related to the 'Lake Effect' in which the PV panels could appear to be a lake to biodiversity due to its reflection	Negative	Long term	Reversible	Medium	Low	Low	High	Minor	Mitigation available	Not significant
	Potential impacts on the microclimate that area affected by PV panels whether around or beneath the panels.	Positive	Not applicable								
Infrastructure and Utilities	Water requirements – water requirements of the Project could entail constraints on the local community.	Negative	Long term	Reversible	Low	Low	High	Medium	Not significant	Additional requirements	Not significant
	Waste utilities – it is important to ensure that existing utilities would be able to handle the amount of solid waste, wastewater and hazardous waste generated from the Project.	Negative	Long term	Reversible	Low	Low	High	Medium	Not significant	Additional requirements	Not significant
Worker Welfare, Health and Safety	Generic occupational health and safety risks to workers, as working onsite increases the risk of injury or death due to accidents	Negative	Long term	Could be irreversible	Medium	Medium	Medium	Low	Moderate	Mitigation available	Not significant
	Inappropriate accommodation facilities for workers will entail impacts on worker welfare as well as their overall health and safety.	Negative	Long term	Reversible	Medium	Medium	Medium	Medium	Moderate	Mitigation available	Not significant
	Inappropriate management of the workforce could entail human rights violations (e.g. engaging child workers, confiscation of passports of foreign workers, unacceptable working hours, and others).	Negative	Long term	Reversible	Medium	Medium	High	Low	Major	Mitigation available	Not significant
	Inappropriate management of the workforce (which could be from the local community) as well as inappropriate conduct of workers within local community areas could entail gender related risk and impacts such as Gender based violence, and harassment (GBVH) or Sexual Exploitation, abuse, and harassment (SEBH)	Negative	Long term	Irreversible	Medium	Medium	Medium	Low	Moderate	Mitigation available	Not significant
Community Health and Safety	Trespassing of unauthorized personnel into construction active areas could result in health and safety impacts.	Negative	Long term	Irreversible	Medium	Medium	Low	Low	Moderate	Mitigation available	Not significant
	Inappropriate management of security issues (e.g. conduct of security personnel) could result in health and safety issues for local communities.	Negative	Long term	Irreversible	Medium	Medium	Low	Low	Moderate	Mitigation available	Not significant
Socio-economic	The Project is expected at a minimum to provide job opportunities as well as procurement opportunities for local communities. This, to some extent, could contribute to enhancing the living environment for its inhabitants, elevate their standard of living, and bring social economic prosperity to the local community.	Positive	Not applicable								
	However, it is important to note that if local community engagement is not implemented properly and if expectations are not properly managed and addressed, this could result in genitive impacts on local community members. This could lead to distrust and resentment with the Developer and might eventually lead to other potential escalated events.	Negative	Long term	Reversible	High	High	Medium	Medium	Major	Recommendations	Not significant
Subcontractor and Supplier Management	Improper management of subcontractors and supplier poses risks of major environmental impacts, human right abuses, criminal abuses or other	Negative	Long term	Reversible	Medium	Medium	High	Low	Moderate	Mitigation available	Not significant

8. LANDSCAPE AND VISUAL

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to landscape and visual. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

8.1 Assessment of Baseline Conditions

8.1.1 Methodology for Assessment

The baseline assessment of the Project site was based on secondary data review and a field survey, each of which is discussed in further detail below.

A. Secondary Data Review

Prior to the undertaking of any site-related surveys, a full and detailed review of up-to-date high-quality satellite images for the Project area was undertaken. The objective was to aim to understand site topography and landscape character, and more importantly identify any potential visual receptors within the entire Project footprint and boundary so that it can be inspected during the site survey.

B. Site Survey

A detailed site survey for the Project area was undertaken in September and October 2024. The survey aimed to characterize the general topography and landscape characteristics of the Project area as well as any potential visual receptors onsite.

8.1.2 Results and Outcomes

A. Landscape and Topography

Based on a site visit, the Project site in general can be characterized with changing topography throughout the area that ranges from rolling terrain to steep slopes, particularly concentrated in the southern and western areas, with an elevation between 130 –185 m above sea level. The site predominantly exhibits mild to rough terrains, with more rugged conditions in the southwestern region.

The Project site can be classified as a desert-like habitat that is arid and barren with little to no vegetation coverage. In addition, the Project site is completely vacant and no key structures or man-made features appearing above ground were noted such as roads, electricity lines, pipelines, transmission lines, tracks, etc.

The figure below presents the general landscape of the Project site while the figure that follows presents the topography variations onsite based on a 3-D Digital Elevation Model (DEM).

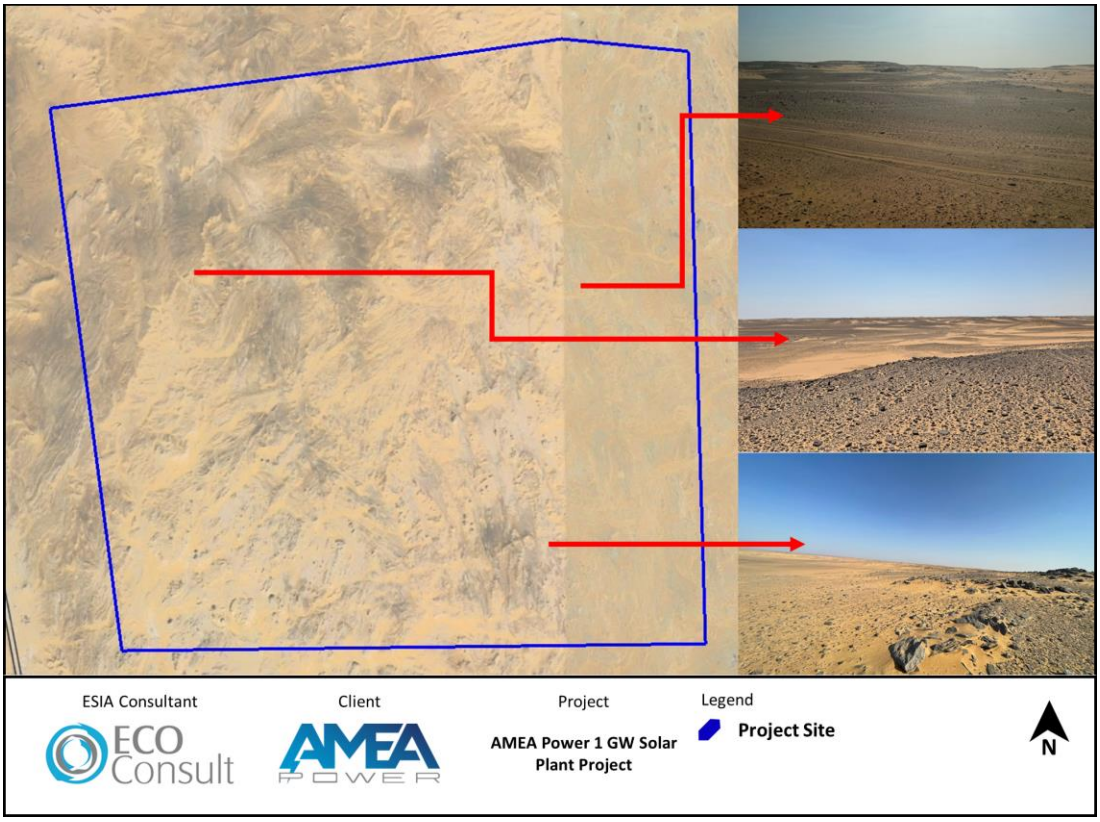

Figure 17: General Site Topography and Landscape

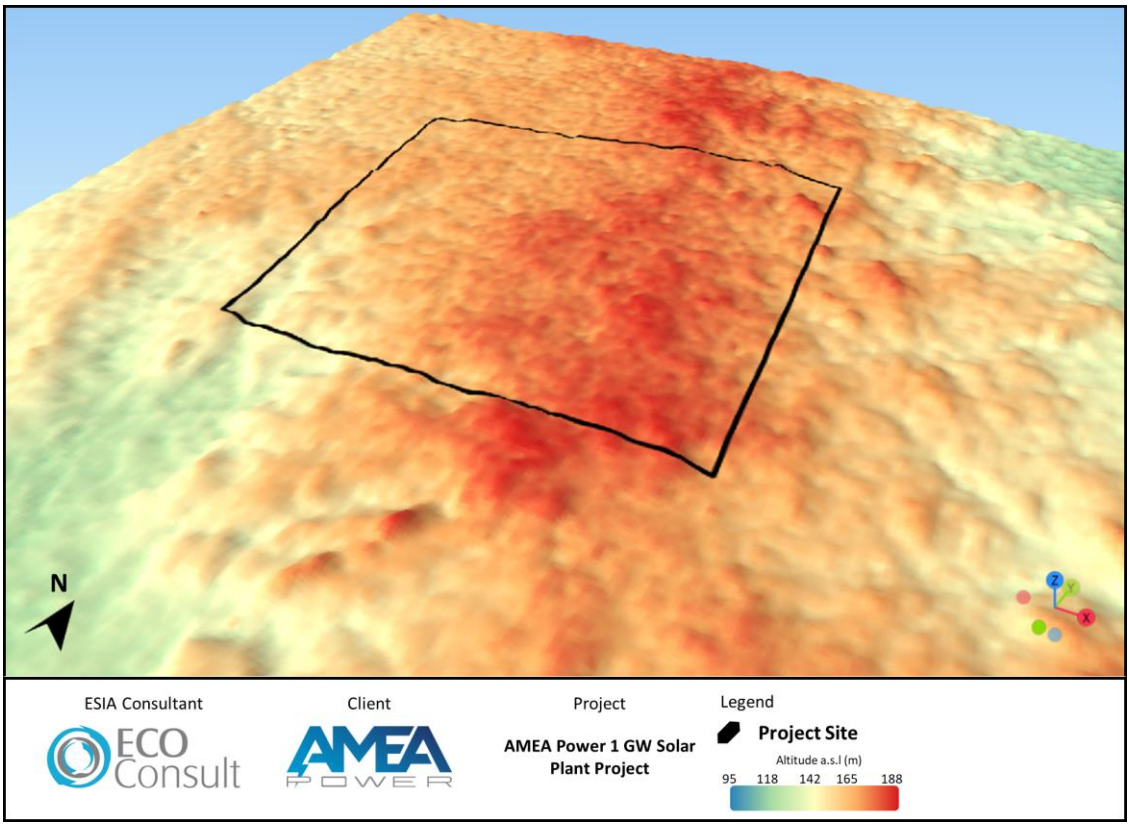

Figure 18: 3D DEM Modeling of the Project Site

B. Visual

Typical views from the Project site towards the north, south, east and south are mainly limited to the open landscape and topography that is similar in classification as the Project sites – a desert-like habitat that is barren. Such views are noted within the figure above earlier.

In addition, based on the site visit and desktop review undertaken, no key visual receptors were identified within the Project site, surrounding areas, or within a 5 km radius. The nearest potential visual receptor is Al Raqaba Local Unit, located 6.5 km away; however, there are no direct visible views from the Project site to the village. Additionally, the Project site is located around 40 km from the nearest civil and military airport.

The definition of key critical visual receptor was based on the "Guidelines for Landscape and Visual Impact Assessment (GLVIA)" as defined below.

Critical Receptors definition per GLVIA
Residents at home.
People engaged in outdoor recreation, whose attention/interest is likely to be focused on the landscape or particular views, including from public rights of way.
Communities where views contribute to landscape setting enjoyed by residents.
Visitors to heritage assets or other attractions, where views of the surroundings are an important contributor to the experience.
Travelers on scenic routes

The only potential receptor which could be impacted from a visual perspective (although not considered a critical visual receptor in accordance with earlier definition), would be drivers on the main highway on the Aswan – Luxor desert highway, which is located about 1 km west of the Project area as noted in the figure below.

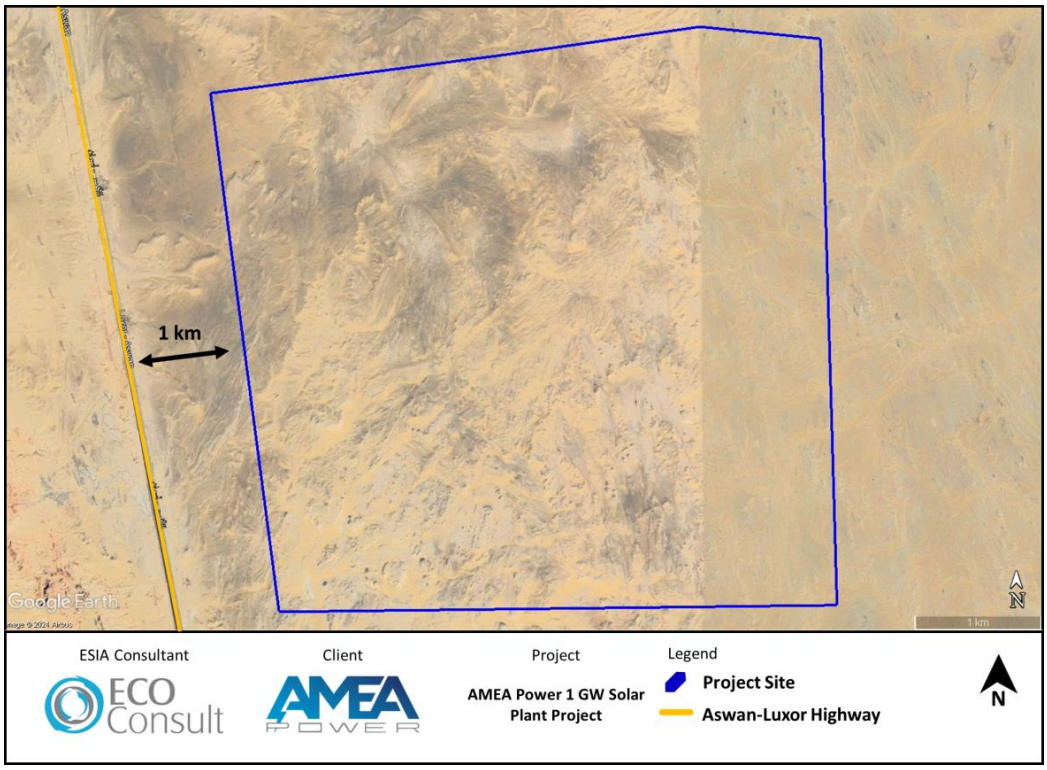

Figure 19: Luxor - Aswan Highway in Relation to the Project Site

8.2 Assessment of Impacts

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

8.2.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the arrays and the various Project components to include transmission cables, access roads and internal road network, storage buildings, etc. are expected to include land clearing activities, leveling, excavation, grading, etc.

Construction activities would create a temporary effect on the visual quality of the site and its surroundings. The visual environment during the construction phase would include the presence of elements typical of a construction site such as equipment and machinery to include excavators, trucks, front end loaders, compactors and others. However, as discussed, there are no key sensitive visual receptors within the Project site and surrounding vicinity.

The table below provides an overall summary of the impact on landscape and visual during the construction phase. The overall impact is considered to be of minor significance.

Construction Phase		
Type	Negative	N/A
Duration	Short-term	Limited to construction phase which is 17 months
Magnitude	Medium	Given that construction activities will be noticeable
Reversibility	Reversible	With completion of construction activities
Sensitivity	Low	Given that there are no sensitive receptors within the area
Likelihood	High	Given nature of activities expected
Extent	Low	Impacts will occur within the actual footprint of Project.
Significance	**Minor**	

Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC Contractor during the construction phase and which include:

- Ensure proper general housekeeping and personnel management measures are implemented which could include:
  - Ensure the construction site is left in an orderly state at the end of each work day.
  - To the greatest extent possible construction machinery, equipment, and vehicles that are not in use should be removed in a timely manner and kept in locations to reduce visual impacts to the area.
  - Ensure proper storage, collection, and disposal of waste streams generated as discussed in detail in 'Section 14.1.3'.

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

Monitoring and Reporting Requirements

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

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

8.2.2 Potential Impact during the Operation Phase

Anticipated impacts from the Project during the operation phase include potential impacts from Project visibility and potential impacts from glare, both of which are discussed below.

(i) Potential Impacts from Project Visibility

The Project is expected to be visible within the immediate vicinity and up to some kilometers around the Project site only and thus is likely to create visual impacts. The maximum height of the PV mounting structures is expected to be in the range of 2-3 m. Only the substation will comprise higher installations being typical for substations. As discussed earlier, there are no key sensitive visual receptors within the surrounding vicinity which could be affected from visibility of the Project.

However, being visible is not necessarily the same as being intrusive. Aesthetic issues are by their nature highly subjective. For some viewers, a PV Plant could be regarded as manmade structures with visual burdens while to others it represents a positive impact in the sense that they introduce a break in the otherwise dull and monotonous view – specifically within the barren and dessert nature of the area.

The table below provides an overall summary of the impact from visibility during the operation phase. The overall impact assessment will be of minor significance.

Operation Phase – Project Visibility		
Type	Negative/Positive	N/A
Duration	Long-term	Will be relevant for 25 years for entire operational period.
Magnitude	Medium	Impact will be noticeable within the surrounding areas (probably up to 1-2km range)
Reversibility	Reversible	With decommissioning of PV Panels, impact would no longer be relevant
Sensitivity	Low	Given that there are no key sensitive receptors within the area
Likelihood	High	Given nature of activities expected
Extent	Medium	The Project will be visible from around a 2 km distance.
Significance	**Minor**	

Taking the above into account, there are no mitigations to be considered.

(ii) Potential Impacts from Glare

Another issue associated with the Project is the potential for glare caused by sunlight reflected off the PV panel modules. It is important to note that PV Panels work on the concept of absorbing sunlight rather than reflecting it as in the case of other technologies (e.g. Concentrated Solar Panels CSP).

Nevertheless, not all of the incoming sunlight is absorbed and thus a minimal amount of incoming sunlight is reflected. Therefore, PV panels could be associated with potential for glare caused by sunlight reflected off the modules and the metal mounting structure. This depends on several factors such as the amount of sunlight hitting the surface, surface reflectivity, geographic location, time of year, cloud cover, and solar panel orientation. However generally, glare is likely to occur when the sun moves away from perpendicular to the panel and when the sun is low on the horizon (toward sunrise and sunset), because the solar panel is absorbing much less of the incoming light.

In addition, it is important to put things into perspective. According to the "Glint and Glare Study for Panoche Valley Farm" (Jack Pfaff, 2011), standard solar glass reflects much less light and has lower potential for glare when compared to other materials widely used in other developments such as steel, standard glass, plastic and even when compared to snow and smooth water. Figure 20 below provides a comparison of sunlight reflection from various incidents angles of solar glass in comparison to such materials.

In addition, throughout the world there are several PV development projects operating close to sensitive areas which could be potentially impacted by glare – such as airports; and thus, indicating that the potential for glare is rather not considered an issue of concern. This includes PV Project development near Thunder Bay Airport in Canada, Nellis Air Force Base in USA (Figure 21 below), Dusseldorf International Airport in Germany, Denver Airport in USA, and many others.

Common Reflective Surfaces (in surrounding environments for PV systems)		Incident angle in degrees						
		0	15	30	45	60	75	90
Material Reflectivity (percent of incident light reflected)	Steel	36.73%	39.22%	46.34%	57.11%	70.02%	83.15%	94.40%
	Snow (fresh, flakey)	21.63%	23.09%	27.29%	33.63%	41.23%	48.96%	55.59%
	Standard Glass	8.44%	9.01%	10.65%	13.12%	16.09%	19.10%	21.69%
	Plexiglass	8.00%	8.54%	10.09%	12.44%	15.25%	18.11%	20.56%
	Plastic	6.99%	7.46%	8.82%	10.87%	13.33%	15.83%	17.97%
	Smooth Water	4.07%	4.35%	5.14%	6.33%	7.76%	9.22%	10.47%
	Solar Glass (high light transmission, low iron)	3.99%	4.26%	5.03%	6.20%	7.61%	9.03%	10.26%
	Solar Glass w/AR coating	2.47%	2.64%	3.12%	3.84%	4.71%	5.59%	6.35%

(Note: Index of refraction values may vary slightly depending on suppliers and reference documentation. The values for the above calculations are averages or single values obtained from the list of references for this document).

Figure 20: Reflectivity of Various Materials based on Incident Angles

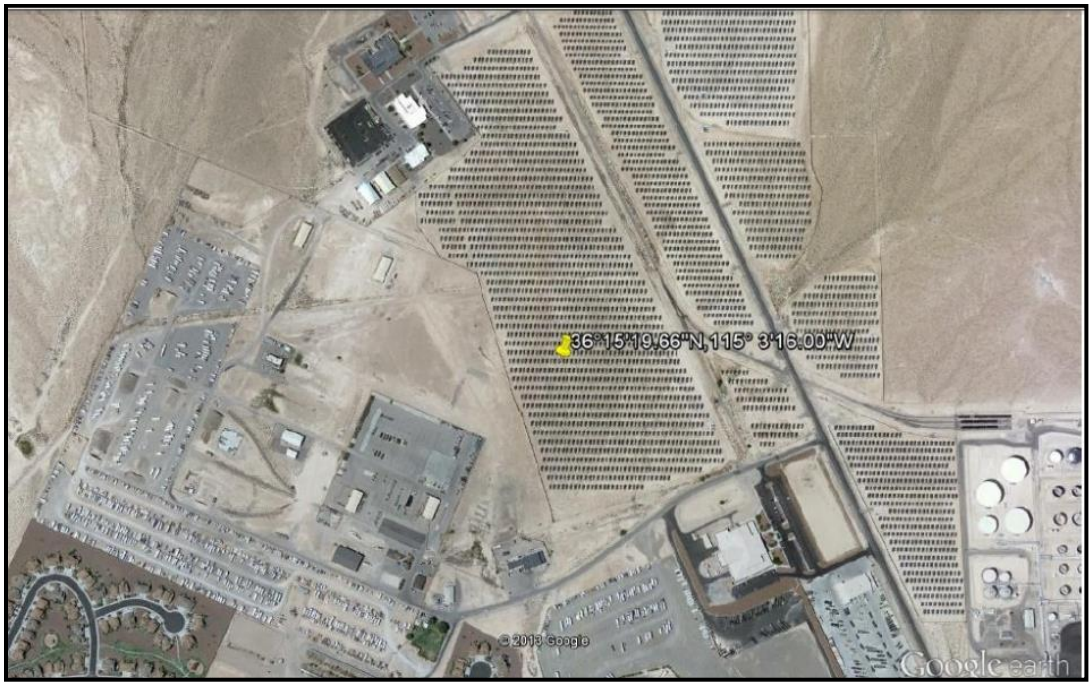

Figure 21: PV Modules Installed near the Nellis Air Force Base in Nevada – USA

In addition, as noted within "Section 2.3" earlier, the PV modules for the Project are designed with Anti-Reflective Coatings (ARC) to capture maximum sunlight and to minimize reflections and thus reduce the potential for glare. Moreover, an even more relevant effect of minimizing glare is soiling, though not regarded as desirable. With soiling, the deposition of dust and small particles on the module surface is inevitable, which often starts accumulating some hours after cleaning. The higher the degree of soiling, the lower the potential for glare. Therefore, the highest possibility of glare exists only directly after cleaning.

As discussed earlier, the only potential receptor which could be affected include commuters along the Luxor-Aswan Highway which runs close to the Project site. In certain conditions (specifically during sunrise and sunset), commuters might be temporarily affected by glare as they pass through the area. If glare does in fact impact drivers, then this could result in potential serious health and safety impacts such as accidents. However, based on consultations with other Solar PV Developments in the area which includes FMC representatives (Benban Park) and Abydos 500MW Solar PV Project, no such issues were reported as part of the grievance mechanism during the operational phase (located south of the Project site – refer to "Chapter 0" for additional details) – similar conditions are expected for this Project in specific as well.

The table below provides an overall summary of the impact from glare during the operation phase. The overall impact assessment will be of minor significance.

Operation Phase - Glare		
Type	Negative	N/A
Duration	Long-term	Will be relevant for 25 years for entire operational period.
Magnitude	Low	Given that it is likely to be minimal and if any limited to sunrise and sunset
Reversibility	Reversible	With decommissioning of PV Panels, impact would no longer be relevant
Sensitivity	Medium	Given that it could entail health and safety impacts on users on the road

Likelihood	Low	From experience of other operational PV projects in the area, no such issues were reported
Extent	Medium	Glare could occur at around a 2 km distance from the site.
Significance	**Minor significance**	

Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer and/or EPC Contractor during the construction phase and which include:

- Even though potential impacts from glare are not considered an issue of concern and there are no key sensitive visual receptors which could be affected by glare, there are standard requirements which must be taken into account from the Ministry of Civil Aviation and Operations Authority of Armed Forces (air force).

  Currently, as a standard practice for all mega solar PV projects, both entities requires that the Developer submit an application to obtain their approval. However, it is important to note that this process might have already been completed by NREA on behalf of the Developer.

- Upon completion of construction activities, a field assessment/evaluation should be undertaken to determine if such an issue exists on the nearby highway. Should it be determined that glare does affect driving conditions, then the Project will implement appropriate measures that will include coordinating with the Ministry of Transportation to install clear informative and pictorial signs on the highway for commuters regarding potential for glare within the area.

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

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Developer and/or EPC Contractor during the construction phase:

- Submission of permits from Ministry of Civil Aviation and Operations Authority of Armed Forces (air force).
- Submission of field assessment /evaluation report with photo documentation of measures implemented (if required).

9. LAND USE

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to land use. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

9.1 Assessment of Baseline Conditions

9.1.1 Methodology for Assessment

Assessment of baseline conditions was based on a site visit by the 'E&S Team' to the Project site and surrounding areas in September and October 2024. The site visit aimed to understand in detail any land use activities undertaken onsite. In addition, consultations were undertaken with key stakeholder groups to better understand and characterize the land use activities onsite as discussed further throughout this section.

9.1.2 Land Ownership

The Government of Egypt has allocated to NREA through Prime Ministerial Decree No. 466 of 2017 the specific plot for this Project for development of renewable energy projects through usufruct rights. As discussed earlier, such land areas provided to NREA for renewable energy developments, was proposed by the National Centre for Land-use Planning and was approved by the Council of Ministers. In general, key factors considered for selection of such areas required that areas had to be under governmental ownership in order not to require any land acquisition measures.

Based on the above, NREA has granted the Developer full access rights for the Project area for the development of a 1 GW Solar PV Project. A Land Lease Agreement was also signed between NREA and the Developer, for a duration of 25 years. In addition, NREA provided a formal letter stating that the allocated area is free of any obstacles or operations or land use encroachments.

In addition, consultations with the General Administration of Urban Planning in Aswan Governorate (as discussed previously in 'Section 6.3.1') indicated that the entire Project site area is under governmental ownership and is not allocated for any specific developments such as housing or agriculture. The land tenure of the Project area has been under Governmental ownership and property (i.e. public domain ownership) and was allocated by a Presidential Decree in 2017 to NREA for renewable energy development projects. Therefore, there are no land acquisition measures considered applicable for the Project development.

9.1.3 Land Use

Based on the site survey undertaken, no physical or economical land use activities were noted onsite nor any evidence which could indicate any such land use activities to include both formal or informal activities. In particular the following was noted:

- No physical structures were noted onsite (such as human settlements or structures). In addition, no man-made features appearing above ground were noted such as roads, electricity lines, pipelines, transmission lines, tracks, etc.
- No evidence of any economic activities to include in particular agriculture activities or grazing activities which are common practices undertaken by local communities. In particular, no ploughing marks were noted within the Project area (which would be indicative of agricultural activities) nor any livestock fecal remains (which could be indicative of grazing activities).
- No nomadic or Bedouin activity was noted within the Project site or evidence of such activities.
- Based on consultations undertaken with local communities (refer to "Section 6.3.2") it was also confirmed that there are no physical and/or economic land use activities undertaken within the Project area.

Finally, the history of the Project area has been traced through satellite maps (Google Earth) from 1984 to 2024. As indicated in the figure below, the maps do not show any visible and previous physical or economical activities within the Project site.

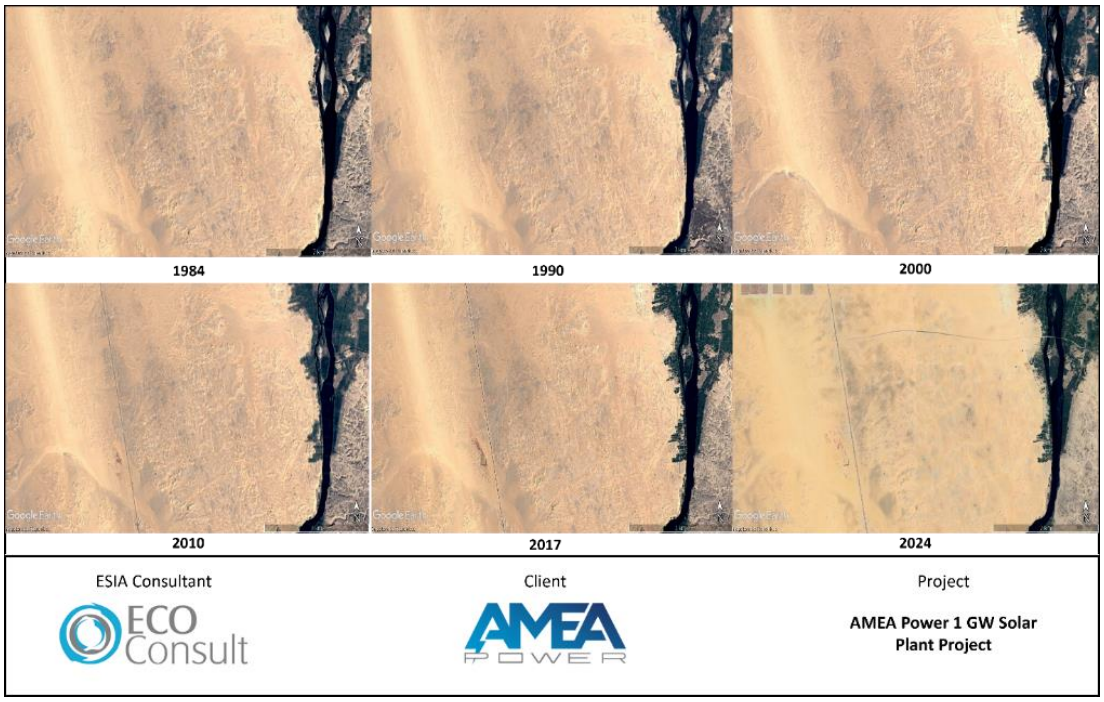

Figure 22: Historical Land Use of the Project Site

9.2 Assessment of Impacts

As discussed earlier, the Project is under governmental ownership. Therefore, there is no land expropriation or acquisition process to be undertaken for the Project. Therefore, there are no impacts anticipated in terms of land ownership. In addition, there are no physical or economical activities undertaken at the Project site. Therefore, there are no anticipated impacts on land use in relation to physical and/or economical displacement from the Project footprint.

Based on the above, there are no anticipated impacts on land use and there are no further requirements to be considered for the ESIA study.

10. GEOLOGY, HYDROLOGY, AND HYDROGEOLOGY

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to geology, hydrology and hydrogeology. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

10.1 Assessment of Baseline Conditions

Baseline assessment was based on secondary data as available from desktop review as well as a standalone assessment undertaken by the Developer (through technical consultant) to include a geotechnical and hydrology assessment.

The above entailed collecting information on the following:

- Geological conditions within the Project site to include formations, soil types, and geomorphology along with illustrative maps;
- Hydrology conditions of the Project site to include catchment within which the Project is located along with maps as appropriate. This includes drainage patterns, runoff volumes and surface water resources; and
- Hydrogeology conditions of the Project site along with maps as appropriate. This includes groundwater resources, groundwater quality, etc.

10.1.1 Geology

The geological formations within the Project site and surrounding areas are presented in the figure that follows, which are represented by various deposits ranging in age from Paleozoic Era to Quaternary Period. As noted in the figure below, the Project site is predominantly located within the Umm Barmil Formation Upper Cretaceous as further discussed below.

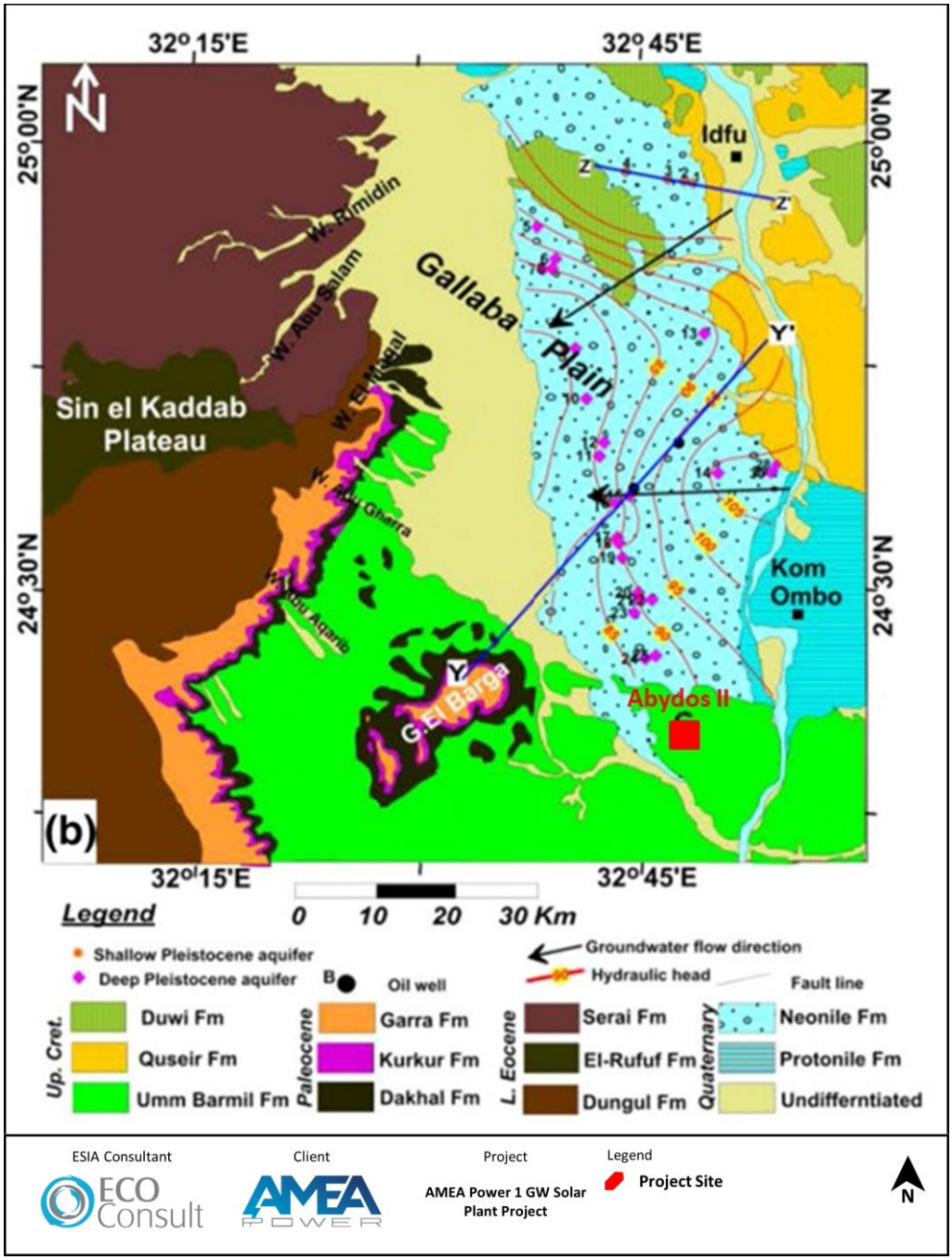

Figure 23: Geological Map of the Project Site and Surrounding Area

Upper Cretaceous Deposits

- The foundational soil of the lithologic succession in the study area dates back to the Upper Cretaceous. These rocks are composed of Nubian sandstone deposits of continental origin, representing stream water deposits in a shallow sea. The Nubian sandstone section within the Project area includes formations as shown in the figure below, listed from base to top.

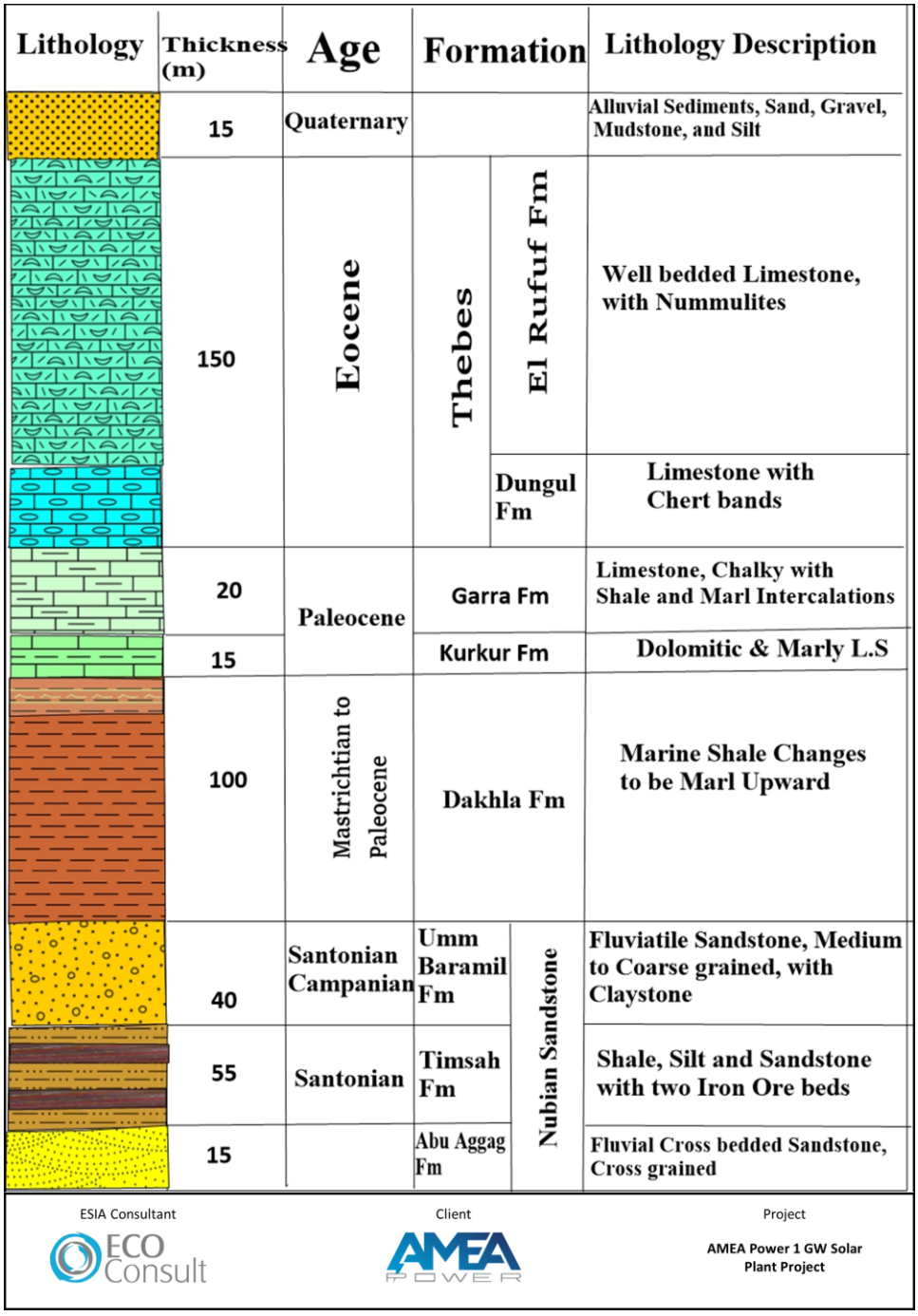

Figure 24: Geological Map of the Project Site and Surrounding

Umm Barmil Formation (Upper Cretaceous)

- This formation is widely exposed across the Project site, forming low topographic hills. It consists of fluviatile sandstone sequences, characterized by cross-bedded sandstone as shown in the figure below. The formation features white, reddish, highly fractured, and coarse sandstone, with red iron oxides present at the top. Sandstone rocks from the Nile River cut through this formation in the Kubanyia Basin region.

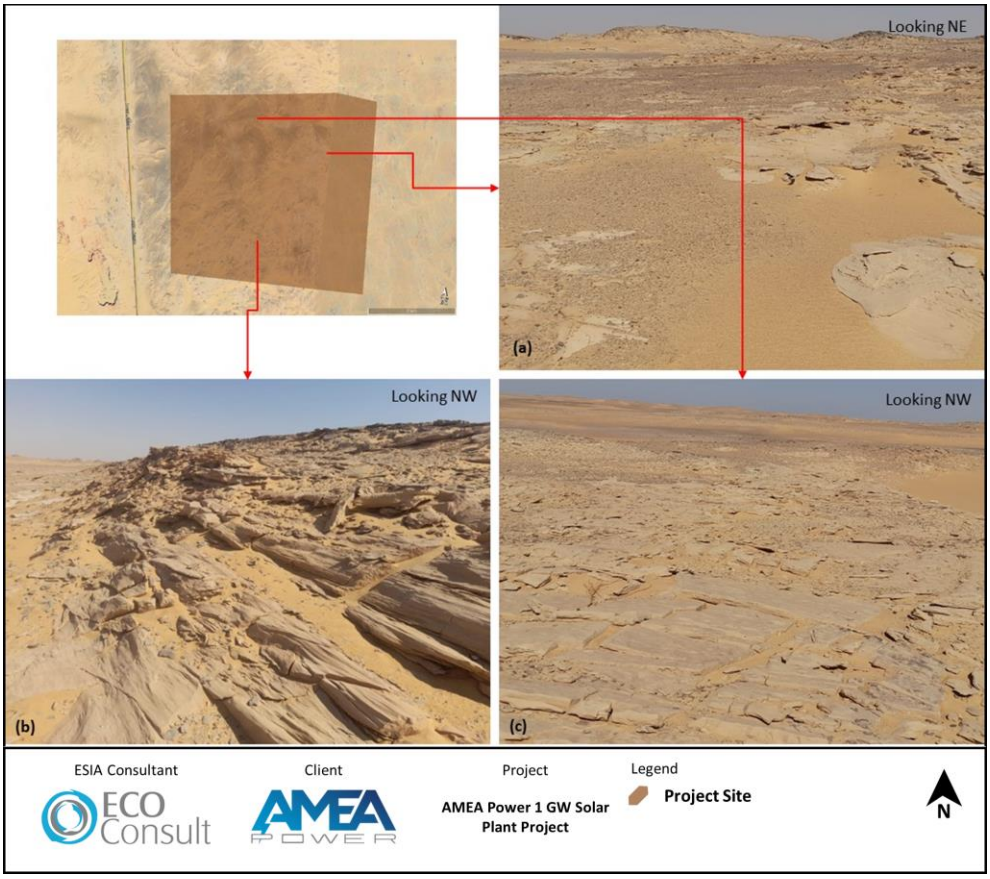

Figure 25: Sample Photos of Upper Cretaceous Nubian Sandstone (Umm Barmil Fm) exposed in the Project site

Dakhla Formation (Upper Cretaceous-Lower Tertiary)

This is exposed within the Project site and its surrounding areas as shown in the figure below, forming high elevated hills. It consists of dark-gray marine shale with calcareous intercalations, comprising black and dark gray shale layered with limestone in the study area. The marly sections, which become firmer and grayish towards the top, contribute to its composition, and the Dakhla Formation has a thickness ranging from 100 to 135 meters in the studied region.

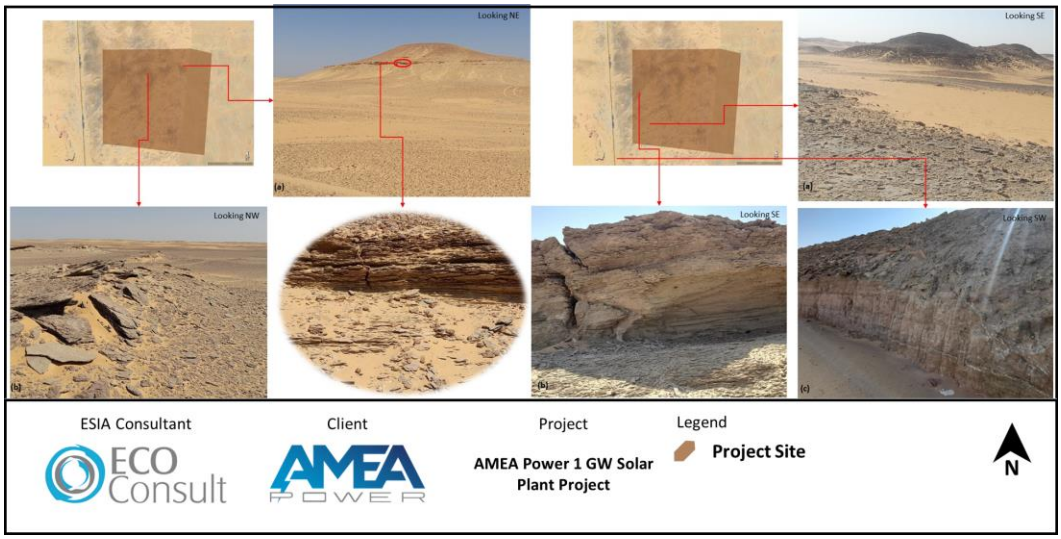

Figure 26: Sample Images of the Dakhla Formation Exposed within the Project Site and Surrounding

Quaternary Deposits

These deposits are wide spread across the Project site, even covering the surfaces of elevated hills and ridges. These deposits are found in various forms and compositions, including undifferentiated Quaternary deposits that consist of sand, gravel, silt, and clay as shown in the figure below. Prototile deposits are observable along the El-Gallaba Plain and in certain locations within the Project site. Additionally, a highly weathered layer sits atop the Cretaceous-Paleocene deposits, forming a spoil layer. This type of deposit is primarily composed of cobbles and gravel-sized sediments interspersed with varying sizes of sand and silt.

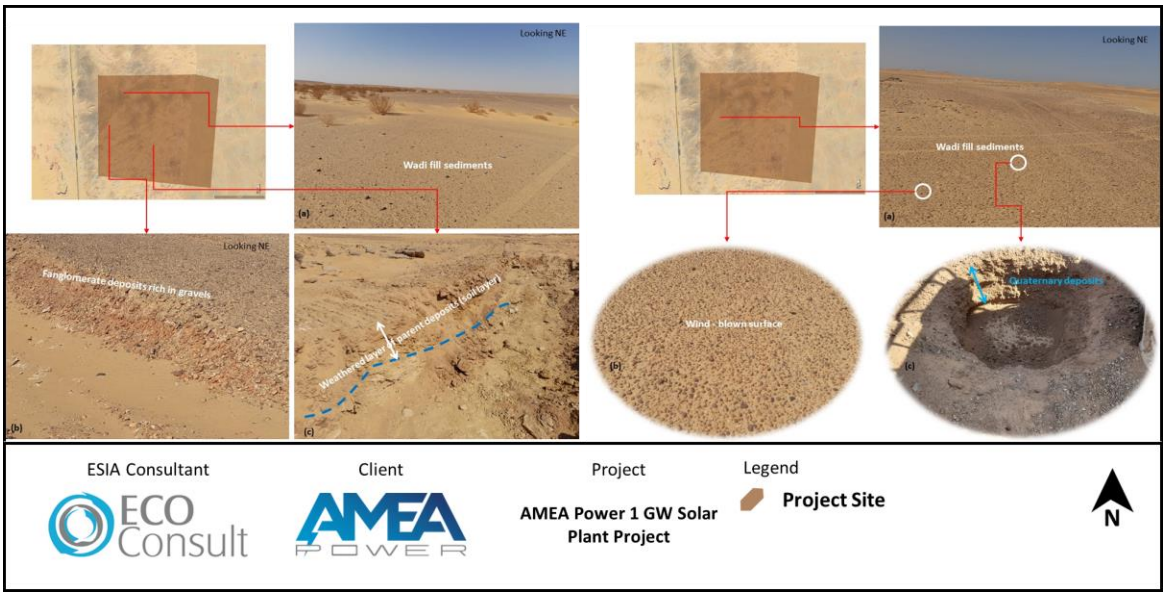

Figure 27: Sample Images of the Quaternary Deposits Exposed within the Project Site and Surrounding

Subsurface Geology

The subsurface lithostratigraphy was investigated through deep drilling to assess potential oil presence north of the Project site. A well reaching a depth of around 1150 m, as shown in the figure below, reveals the region's subsurface stratigraphy. The primary rock units identified in the succession include (Issawi et al., 2016):

- Heiz Formation: Dating to the Late Cenomanian and with a thickness of 45 m, the Heiz Formation consists of siltstone with thin carbonate bands in the Bahariya Oasis and southern Dakhla Basin. It aligns temporally with similar regional formations.
- Bahariya Formation: Originating from the Lower Albian-Cenomanian, the Bahariya Formation is about 268 m thick. It features cross-bedded ocher and gray sandstone with alluvial bands and shale, signifying fluviomarine conditions, similar to units in the Bahariya Formation of the Dakhla and Kharga oases.
- Abu Ballas Formation: Spanning the Upper Jurassic-Albian with a thickness of approximately 248.40 m, the Abu Ballas Formation comprises red and green fossiliferous clays and siltstones interspersed with sandstone bands. Fossils include Lingula sp., Polygyrina sp., and Mesosaccela subacuta, indicative of deposition in plains and marshy areas later covered by a shallow sea during the Lower Cretaceous.
- Six Hills Formation: Identified beneath the Abu Ballas Formation, the Six Hills Formation, named by German researchers (Hermina et al., 1989), includes crushed sandstone and alluvial layers with vegetative remnants. This Upper Jurassic unit is approximately 173.69 m thick.

- Basement: Beneath the Six Hills Formation, nearly 70 m of Precambrian granite is encountered, confirming its age in the Kom Ombo-3 well. This granite contrasts with sediment series observed in Western Desert boreholes.

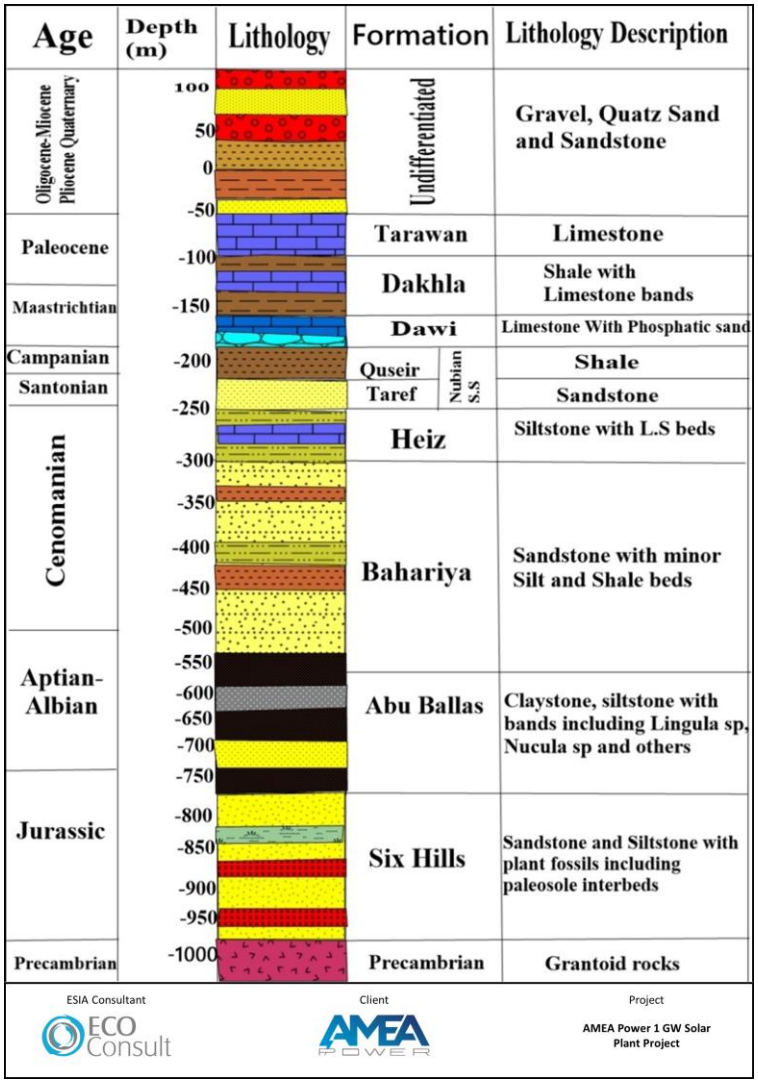

Figure 28: Litho Stratigraphic Succession of Kom Ombo-3 Well (Issawi et al., 2016)

10.1.2 Hydrology

A topographic and drainage map has been prepared for the Project site and surrounding areas from SRTM data and the use of 3DEM and GIS software. As noted in the figure below, the Project site is located in a wide rolling terrain to steep slopes area with an elevation of around 150m above sea level. Towards the west of the Project site, the land surface is elevated significantly until reaches a maximum of 500m where the intensity of the slopes increases approaching an area known as Gebel El-Barqa.

From the below figure, it is clear that there are no effective drainage lines (Wadis) crossing the exact Project site or its immediate surrounding areas. At Gebel El-Barqa which is located more than 21 km to the northwest from the Project site, the regional slope direction of this mountain is due to south and south east, which means that in case of heavy rainfall, Gebel E-Barqa drains its surface flow in the south and

southeast directions. The main channel of Wadi Qubaniyea lies about 3 kilometers southwest of the Project site.

Taking the above into account, the physiographic features of the area can be differentiated into two relief units as follows:

- **High Relief Unit**: Located in the west and southwest, this unit consists of a series of elevated plateaus composed of persistent chalky limestone with intercalated marl. It includes the Sin El Kadab plateau and Gebel El-Barqa, with their eastern scarps facing the Project site as shown in the figures below. The surface elevation of this unit ranges from 200 to 500 m above sea level.
- **Low Relief Unit**: This unit stretches from the scarp of the western plateau towards the Nile River floodplain to the east, spanning more than 35 km in width. Its surface relief ranges from 150 to 170 m above sea level as shown in the figures below. Known as the expansive El-Gallaba plain, this area is predominantly flat and is notably characterized by the complete absence of any drainage lines or tributaries.

Therefore, based on topographic maps, DEM models, and site investigations, the Project area's topographic relief is generally gentle rather than rugged. It features small, elevated, and dissected hills surrounded by wide, flat, and shallow lowlands. These gently sloping hills, formed from Upper Cretaceous deposits, are oriented in various directions. The lowlands, covering most of the Project area, occasionally function as catchment areas for runoff from the adjacent hills. The field photographs below illustrate the topographic relief at the site. In addition, as noted above the Project site is characterized with a complete absence of any dry drainage lines (Wadis) onsite and even the wider surrounding area. In addition, there are no permanent fresh surface water bodies or streams (lakes, irrigation or drainage channels) in the area and the Project area lies 8.5 km away from the Nile River to the west.

In addition, based on the site visit undertaken, it was indicated that the site is characterized with a complete absence of deep surface incisions of strong surface flow drainage lines or dry wadies. The Quaternary sediments are mainly made up fine to coarse grains, sand, and chert, indicating a low intensity of surface flow during rainfall events, which is insufficient to transport fine or larger fragments. Additionally, both the Quaternary sediments and the exposed Upper Cretaceous deposits are highly permeable, with substantial thickness. This high permeability allows the sediments to absorb large quantities of water during heavy rainfall, thereby preventing significant accumulation of rainwater that could lead to strong surface flow. Note: the mainstream of wadi Qubaniyea runs away to the east and south of the Project site.

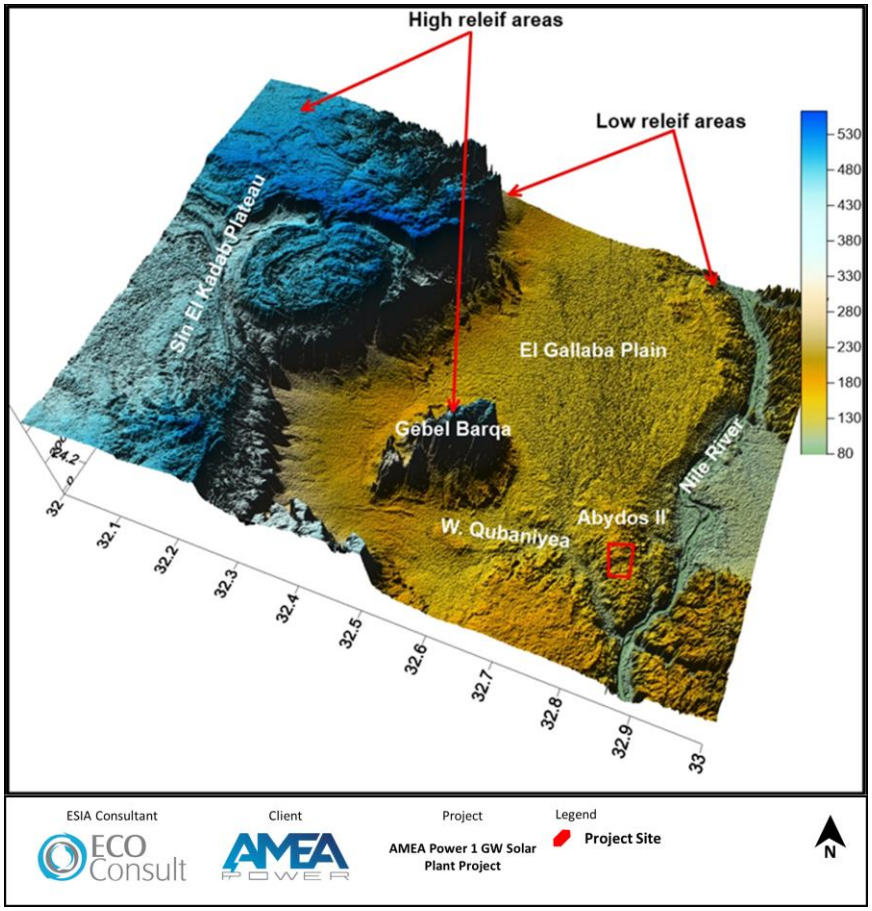

Figure 29: Digital Elevation Map Showing the Physiography of Project Area

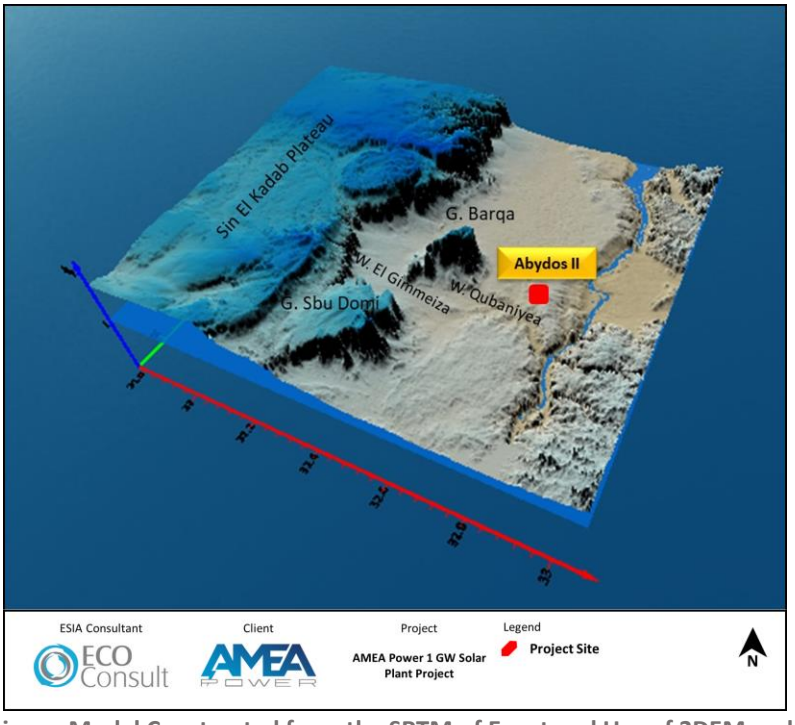

Figure 30: Drainage Model Constructed from the SRTM of Egypt and Use of 3DEM and GIS software

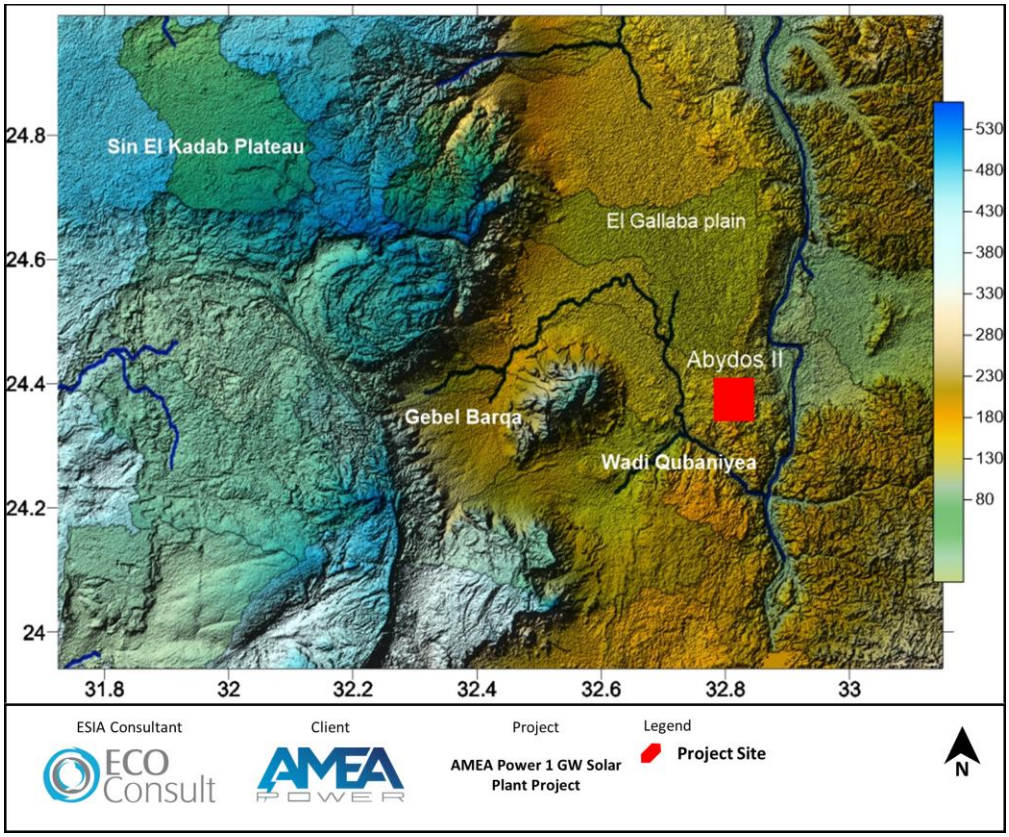

Figure 31: DEM of the Project Area in the Southern Part of El Gallaba Plain

10.1.3 Hydrogeology

More than 95% of Egypt's landscape is desert, with agriculture concentrated along the Nile Valley, Nile Delta, coastal areas, and oases. In Egypt's Western Desert, the Nubian aquifer provides a vital water source, holding significant fossil groundwater reserves from past pluvial periods. However, recharge to the aquifer is minimal, occurring mainly near mountains or permanent water bodies such as the Nile and Lake Nasser. Occasional rainfall and surplus water from rivers can add to the aquifer through fractures, but these pathways are often hidden under desert sands, complicating access.

As Egypt's population grows, there is a pressing need to expand into desert areas and tap into groundwater resources. Since the 1960s, the New Valley project has increased demand on these reserves, highlighting the need for sustainable aquifer management strategies. While the Nubian aquifer exhibits some regional flow, it largely functions as a fossil reservoir, primarily recharged from other ancient aquifers like the Kufra Basin. Recharge rates remain low compared to the rate of discharge, making the aquifer essentially an unloading system.

The Project site is located west of the Nile Valley, within the Aswan Governorate of a development corridor proposed by El-Baz. The Project site falls in the Upper Nile Platform Basin, one of Egypt's major groundwater basins.

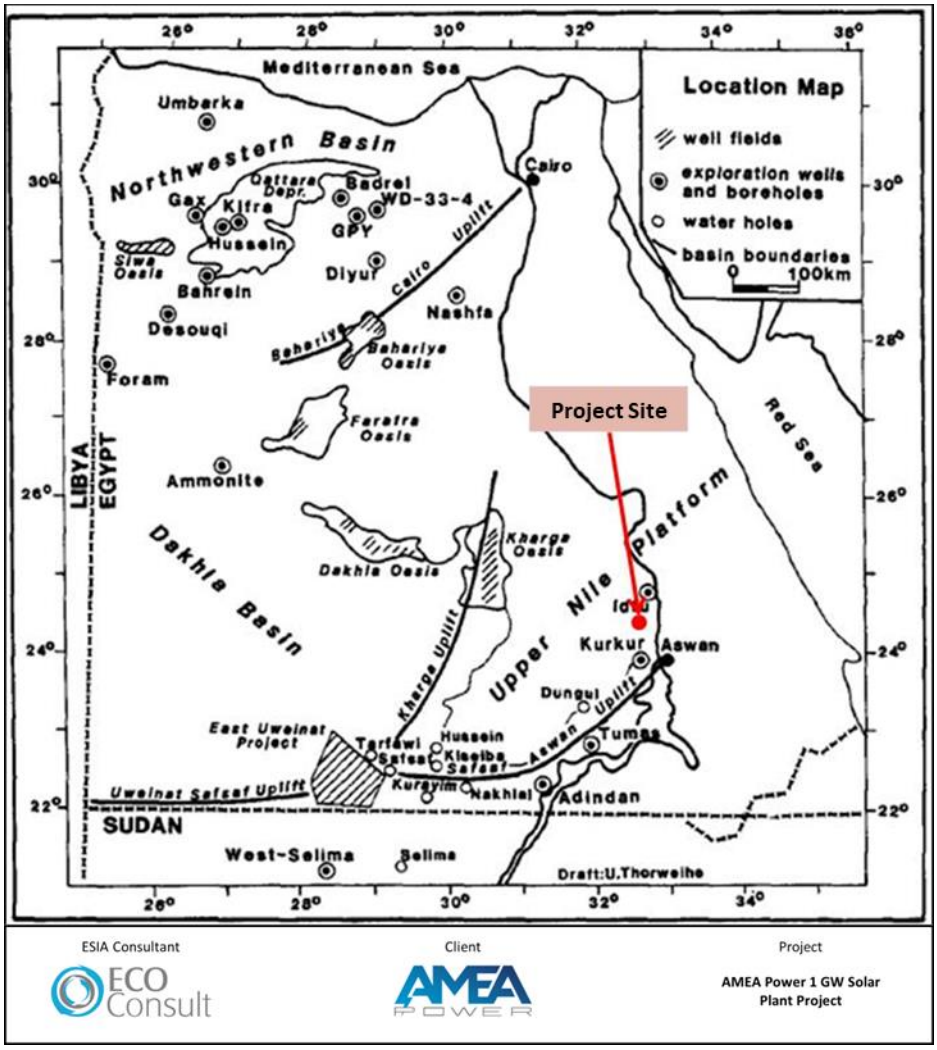

Figure 32: Groundwater Basins in the Western

According to the hydrogeologic map of Egypt as shown in the figure below, the primary groundwater aquifers in the region are outlined. A highly productive aquifer, depicted in the subsequent figure, lies beneath the Project site, serving as a crucial freshwater source for local agricultural projects and development initiatives.

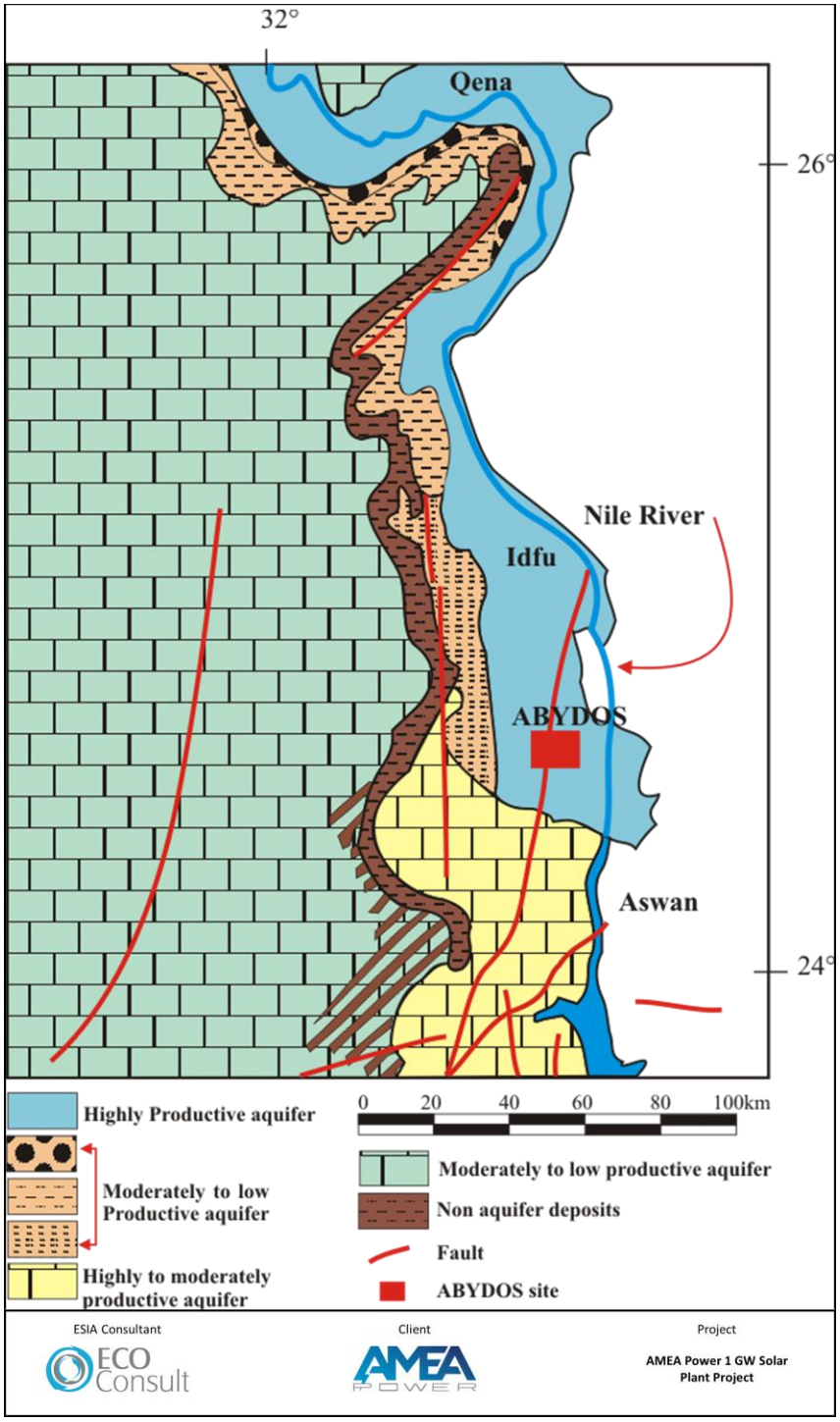

Figure 33: Hydrogeologic Map of the Project Area and Surrounding

Geological studies utilizing satellite radar imagery, field investigations, and unpublished data from newly drilled groundwater wells have enhanced our understanding of the subsurface conditions in the El Gallaba Plain. This area is recognized as a significant alluvial fan, likely part of the ancient Wadi El Qubaniyea alluvial system.

Data from the groundwater wells reveal variations in the geological structure of the El Gallaba Plain, leading to the identification of two distinct hydrogeological regimes: the northern and southern regimes

as shown in the figure below). The northern regime exhibits an increase in sand unit thickness with depth as shown in the figure below, while the southern regime is characterized by a greater thickness of clay units as depth increases as shown in the figure below.

The uppermost layer of the geological sequence primarily consists of unconsolidated clastic sediments, including wadi deposits, rock fragments, chert nodules, and sand of varying grain sizes mixed with clay. This upper unit has a thickness ranging from 50 to 60 meters, indicating the area's dynamic depositional history and its importance as a groundwater recharge zone. Summaries of the subsurface geology based on lithological logs from groundwater wells in the area are provided as shown in the figures below.

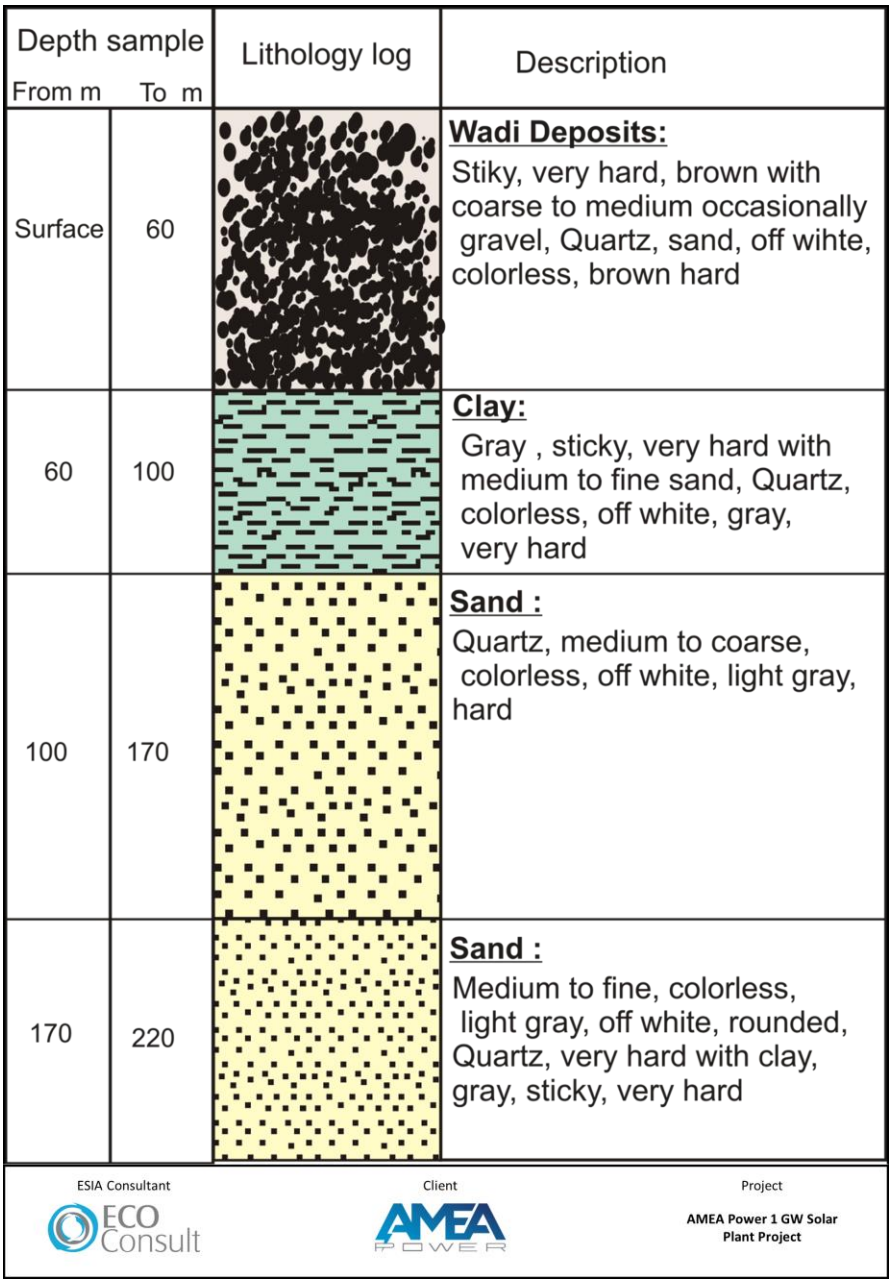

Figure 34: Lithological Log of a Groundwater Well Representing the North Hydrogeological Regime of the El Gallaba Plain

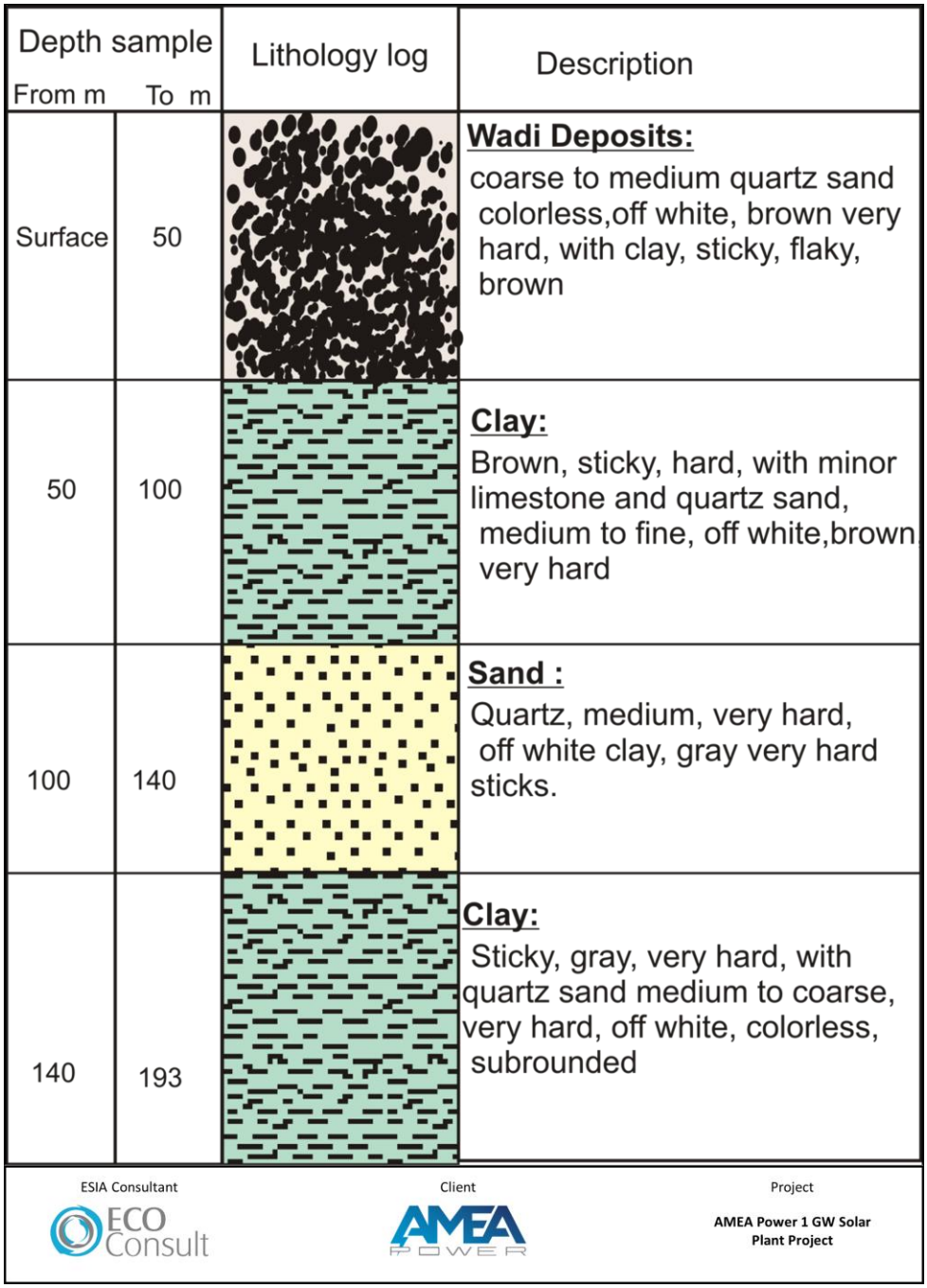

Figure 35: Lithological Log of a Groundwater Well Representing the Southern Hydrogeological Regime of the El Gallaba Plain

The sediment types and extent of the Quaternary aquifer were elucidated through the analysis of two hydrogeological cross-sections oriented in SE-NW and E-W directions (as shown in the figure below). These sections illustrate the lateral and vertical lithofacies changes of the aquifer sediments. Additionally, geoelectrical cross-sections in E-W and N-S directions reveal the vertical and horizontal variations of the water-bearing layers and the structural elements influencing the area (as shown in the figure below, Geoshy et al., 2020).

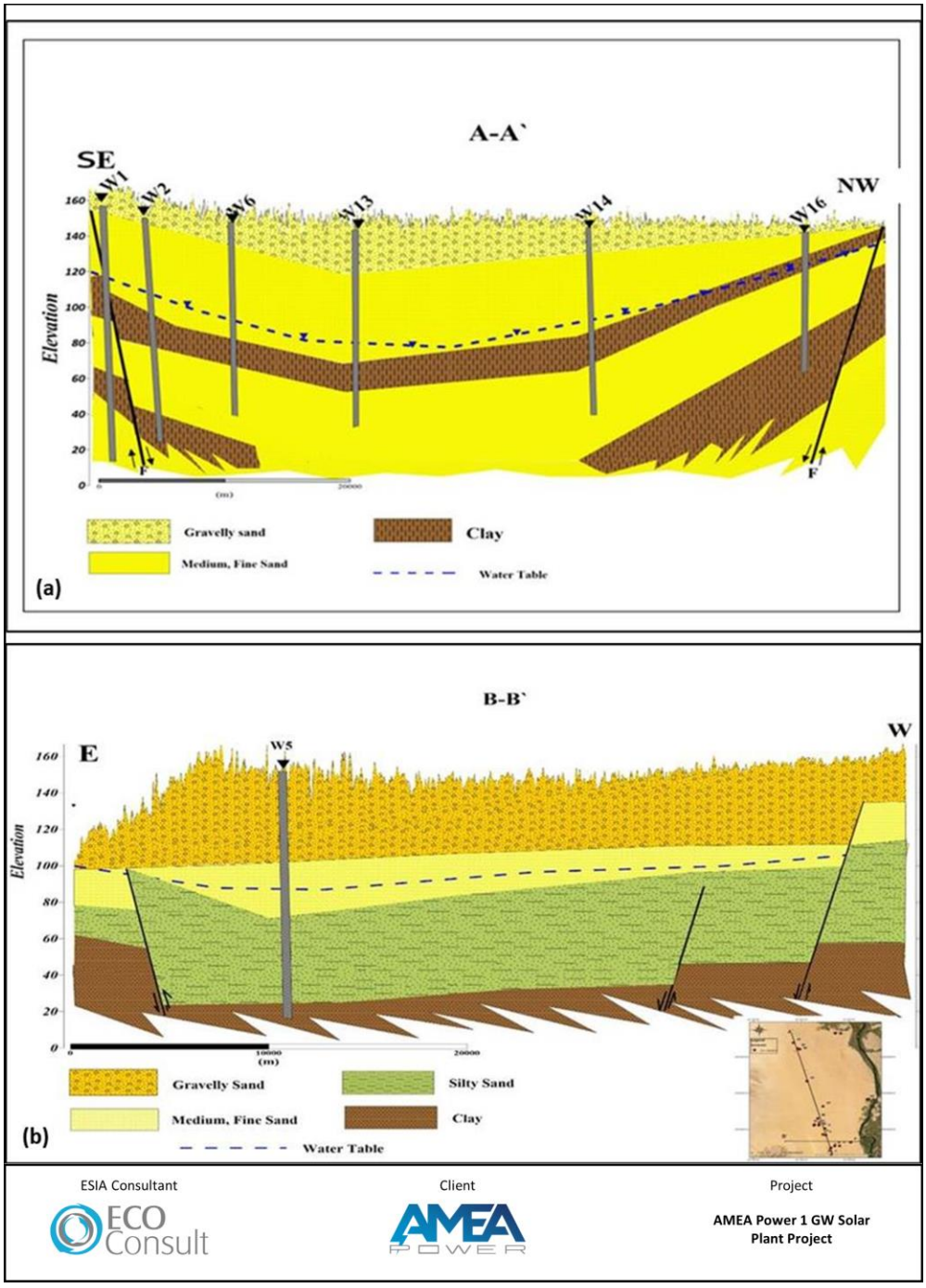

Figure 36: The Quaternary aquifer in El-Gallaba Plain: (a) NW–SE direction; (b) E-W direction

The cross-sections depict the horizontal and vertical variations of the water-bearing layers, highlighting how vertical displacement is affected by faulting and the position of the water table. A notable structural feature is the uplift of older aquitard layers, likely corresponding to the Duwi Formation and underlying strata, positioned against the relatively younger Quaternary deposits. In the eastern portion of the project site (as shown in the figure below), the groundwater aquifer is deemed weak due to the considerable thickness of the clay layer, which diminishes the reservoir's potential. The W-E and N-S cross-sections (as shown in the figure below) further confirm that the aquifer beneath the project site has low potential, primarily due to the extensive clay layer that restricts groundwater movement and recharge.

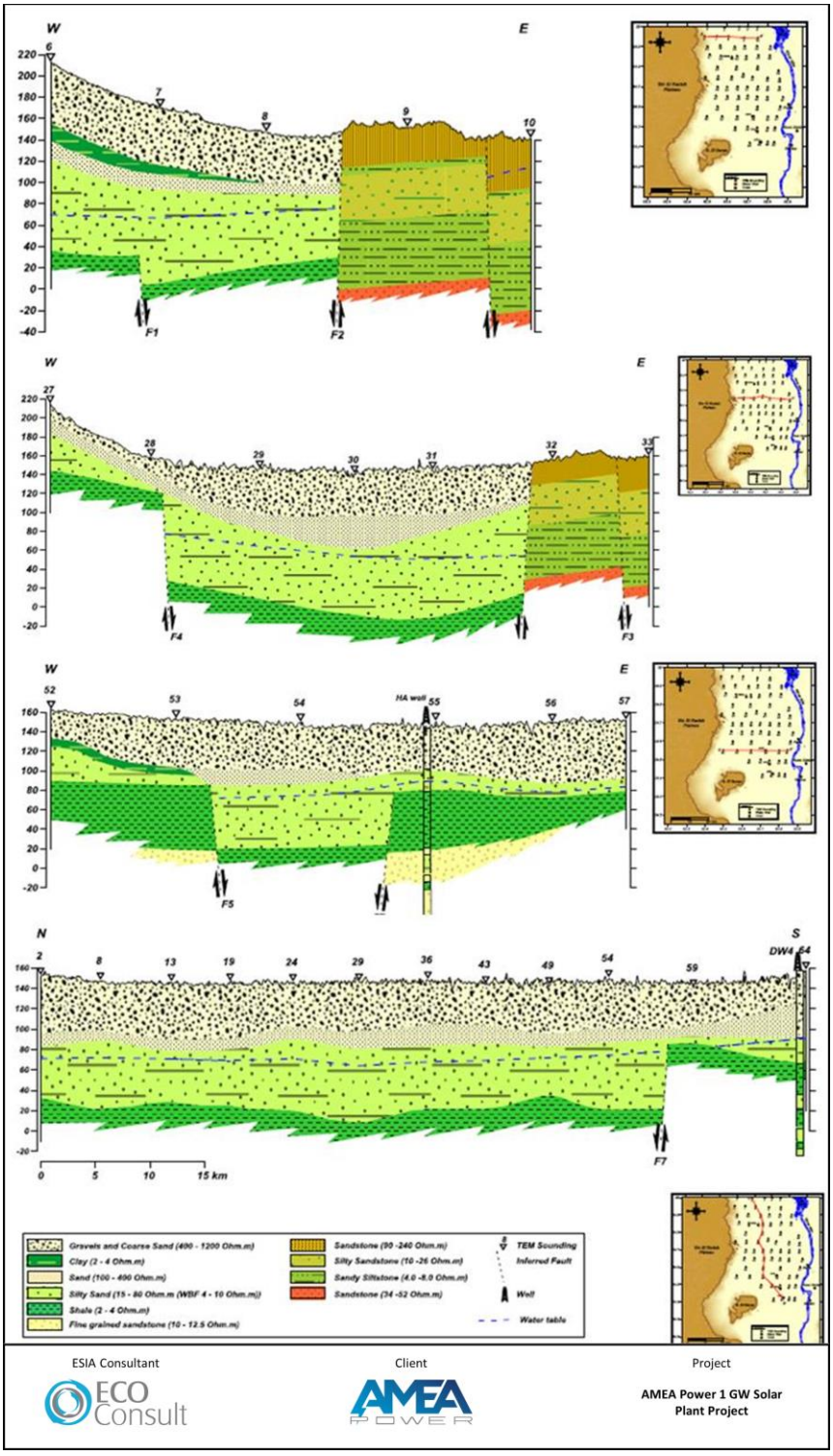

Figure 37: Geo-electromagnetic Cross- sections (Cross- sections A-A', B-B', C-C' and DD' in W-E direction Cross-section E-E' in N-S direction). (Geoshy etal., 2020)

Groundwater flow in the region occurs in multiple directions: from south to north in the southern area, from east to west in the central zone, and from west to east in the northern sector (as shown in the figure below). This variability in groundwater flow direction across the plain may be associated with local differences in abstraction rates.

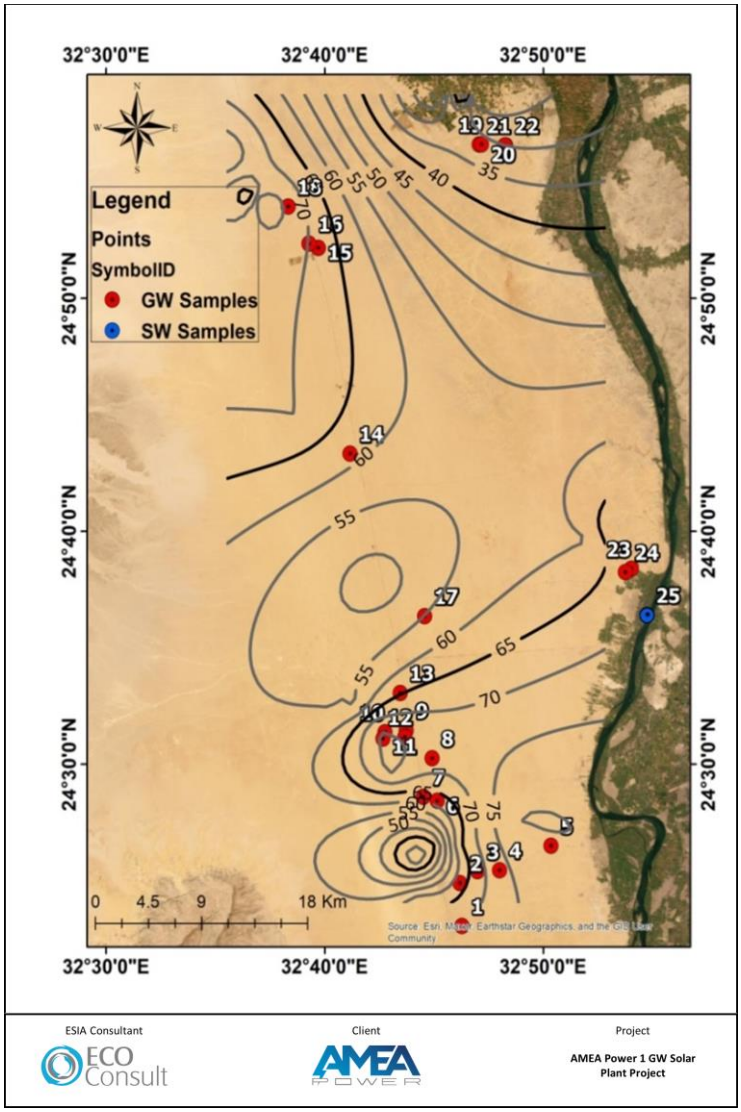

Figure 38: Groundwater Level Contour Map of the Quaternary Aquifer in El-Gallaba Plain

10.2 Assessment of Impacts

This section identifies and assesses the anticipated impacts from the Project activities during the construction and operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

10.2.1 Potential Impacts from Flood Risks on the Project Site

It is important to investigate potential risks of local flood hazards from drainage systems as during the rainy season and especially during flash flood events, this could affect the Project components. As discussed earlier, the Project is located within an area with low or absent drainage lines ("Section 10.1.2" earlier).

As noted within "Section 1.1.2" earlier, according to topographic maps, Landsat images and the digital elevation models that were developed for the Project area using the Shuttle Radar Topography Mission (SRTM) images (as also shown in the figure below), the Project site is not located within any drainage system and more specifically it is located at the upstream of the catchment given that the Project site's topography is elevated when compared to its surrounding as shown in the figure below.

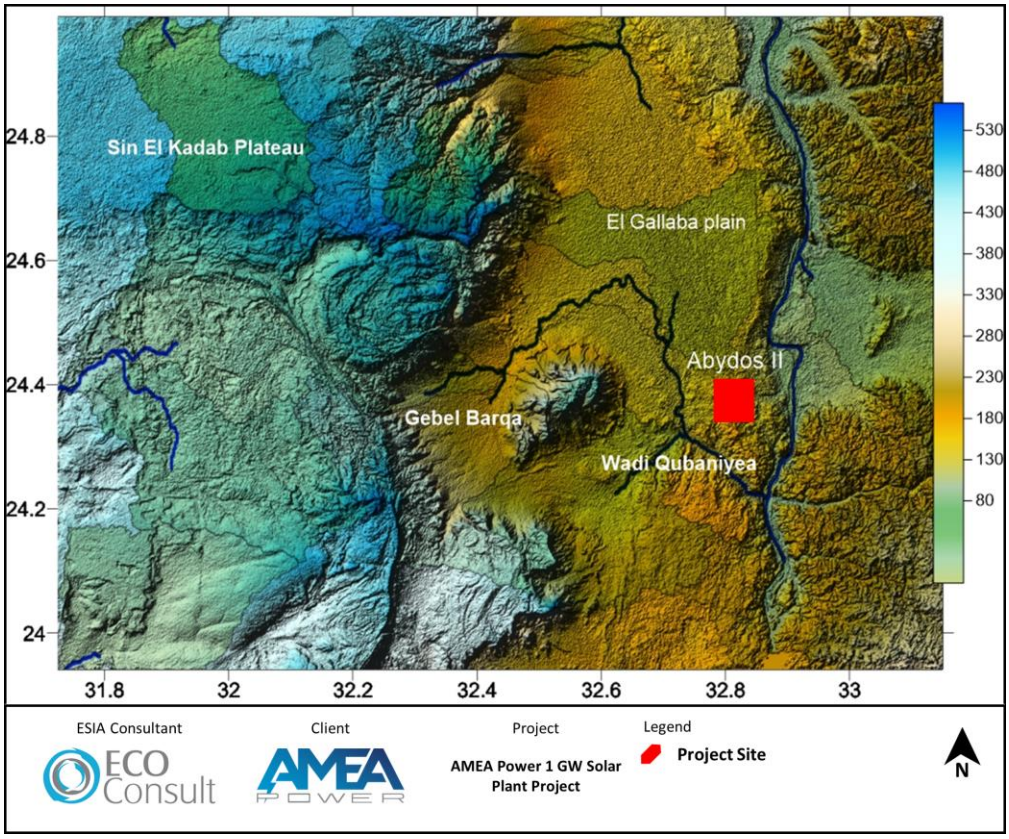

Figure 39: DEM of the Project Area in the Southern Part of El Gallaba Plain

However, such risks are considered critical and must be taken into consideration throughout the planning phase of the Project as they could inflict damage to the Project and its various components. A flash flood is defined as a rapid developed flood in just a few minutes or hours of excessive rainfall without visible signs of rain, or an accident like a dam or levee break. A flash flood can be generated during or shortly following a rainfall event, especially when high-intensity rain falls on steep slopes with shallow, impermeable soils, exposed rocks and poor or sparse vegetation.

Egypt is one of arid and semiarid Arabian countries that face flash flood in the coastal and Nile dry wadi systems. Wadi is a dry riverbed that can discharge large water volumes after heavy rainfall. Recently, flash floods have extensively occurred in Egypt where several events have occurred in Sinai Peninsula, Eastern Desert, Red Sea wadis such as Safaga, Ambagi, El-Baroud, and Upper Egypt such as Assiut, Sohag, Qena, and Aswan.

El Moustafa etal. (2020) overviewed the flash flood flowing to the Nile main stream in Aswan Governorate. It was delineated the drainage basins of area more than 50 km^2 along the both sides of the Nile (figure below). It is clear from this figure that the Project site is located in an area free from effective drainage basins. This is in line with the prepared drainage map and baseline assessment of the area using SRTM images and ARC-GIS software and the 3D model (as presented earlier in 'Section 10.1.2').

It is clear from this figure that the Project is located in an area devoid of effective drainage basins. This observation is further supported by the drainage map created using SRTM images and ARC-GIS software, as well as the 3D model as shown in the figure that follows. From the maps and models prepared, it can be concluded that the Project site is situated far from any drainage basins that would have the capacity to collect rainwater and generate surface runoff of varying intensities.

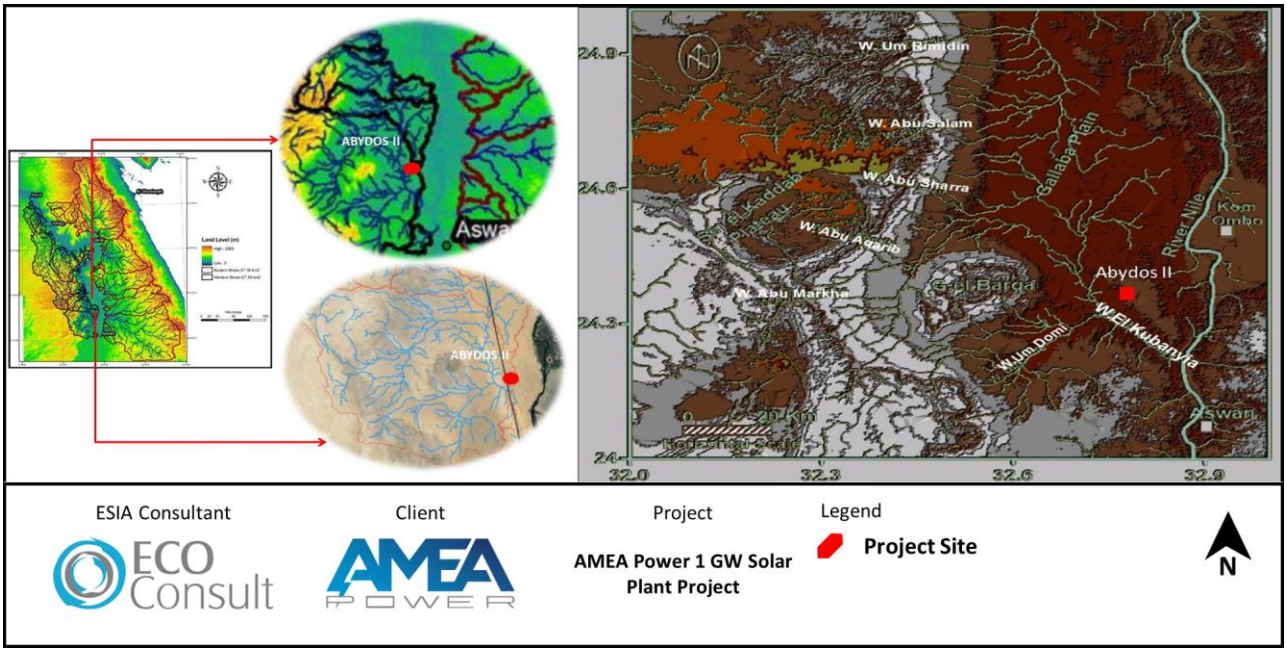

Figure 40: Map Showing the Drain-age Basins in the Eastern Desert

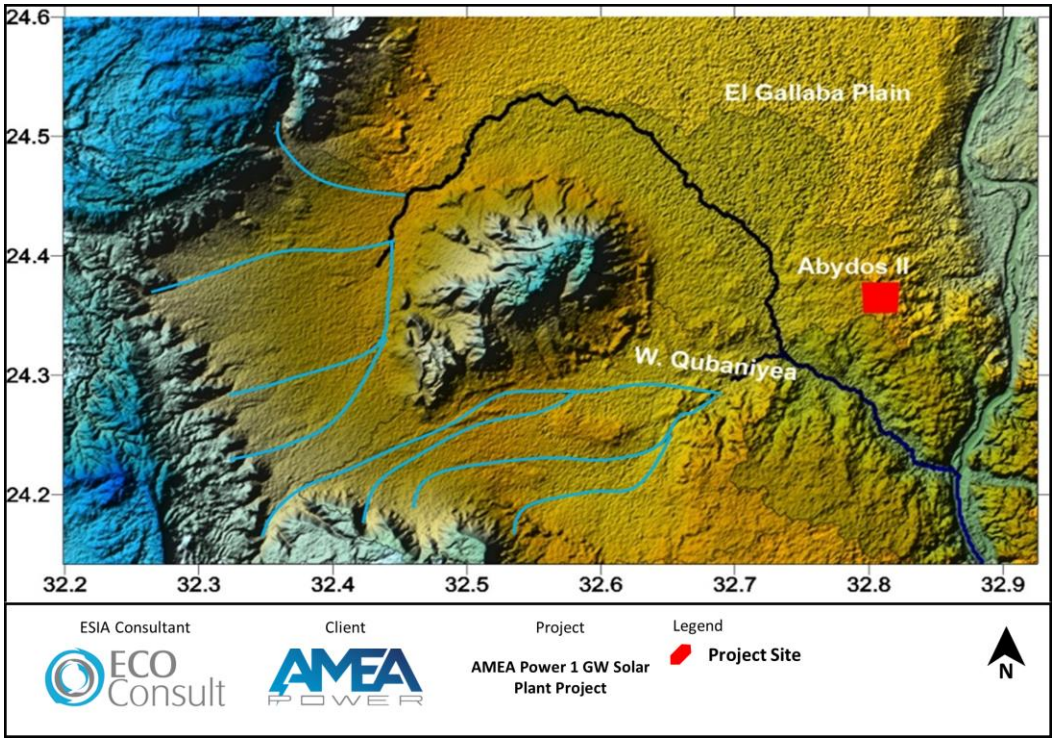

Figure 41: Drainage Lines Depicted in the 3D DEM Model of the Project Site and Surrounding

In addition, using the elevation profile option of google maps, some elevation profiles along the area of the Project site and its surroundings have been produced (as note in the figure below). The site indicate that the area is easily accessible, despite some elevated features in the form of intermittent chains of cohesive sandstone and marl deposits. The Project area has a gentle slope, ranging from 0.002 to 0.007 in the west and from 0 to 0.005 in the southeast directions. There is no evidence of deep drainage lines or basins crossing the site that could potentially collect large amounts of rainwater, leading to flash floods or intense surface runoff during heavy rainfall.

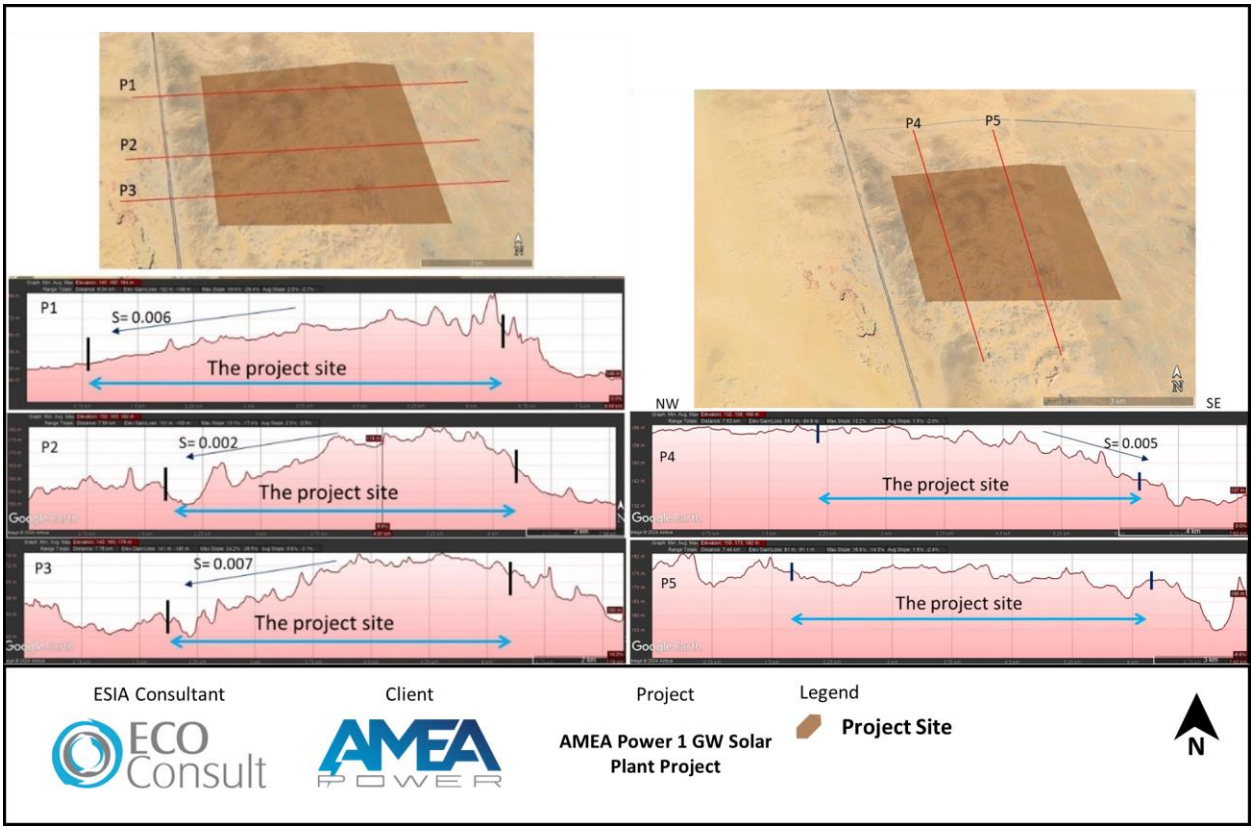

Figure 42: Google Elevation Profiles along Gallaba plain around Project Site

In addition to the above, a literature review was also used to collect information from available report, newspaper, dissertations and published articles as Eliwa, et al. (2015), Abdel Fattah et al. (2015), Mohamed (2019) and Saber et al. (2020) on flash floods that have caused life losses and significant damage in Egypt. The results are presented in the table below. As noted, the Project area that lies to the northwest of Kom Umbo city at the Faris west of the Nile Valley has not experienced any kind of flash floods along the history of flash food records of Egypt.

Table 17: Historical Records of Hazardous Flash Floods in Egypt

Date	Area	Recorded damages & References
October 2019	Cairo, Alexandria, meet Ghamr and new Cairo	12 Deaths, road damages
April 2018	Al ain Alshokhna, Fifth settlement "New Cairo"	Road damage, damaged vehicles, 10 million EGP loss
October 2016	Ras sedr, Sharm Elshekh, Hurghada, and Qena	Road damage, water pipe damage
2015	Assuit, Sohag, Qena, Luxor, and Aswan	Destroyed houses

2015	Alexandria, Al-bhera, and Matrouh Governorates	35 Deaths, 180 destroyed houses, dozens injured thousands of acres drowned
February, October 2015	North and south of Sinai, Red Sea region	Road damages, loading and unloading area of Hurghada International Airport drowned
March, May 2014	Taba, Sohag, Aswan, Kom Ombo	Dam failure at Sohag, road damages
2013	South Sanai & Sohag, and Assuit	Deaths, road damage, 750 million EGP loss
2012	W. Dahab, Catherine area	Dam failure, destroyed houses
January 2010	Aswan, Sinai, and Al Arish	8 Deaths, 1381 damaged houses, roads and infrastructure
2009	Along the Red Sea coast, Aswan, Sinai	12 Deaths, damaged houses and roads and 37 injuries
October 2004	W. Watier, Safaga, El-Qusier	Road damage
May 1997	Hurghada, Marsa Alam	200 Deaths, destroy roads, demolished houses damaged vehicles
November 1996	Dhab, Sohage, Qena, Safaga, El-Qusier, Marsa Alam,W. Aawag	3200 Destroyed houses
September, November 1994	W. El-Gemal, Marsa Alam, W. Sudr	1 Death, roads damage, 27 injuries
March, August 1991	South Sanai	32 Deaths, dam failure
October 1990	Qena Governorate	Demolished 180 houses
January 1988	South Giza	Roads damage and demolished houses
October 1987	Aswan Governorate	Roads damage, demolished houses and farms
1985	Aswan Governorate, W. Elarish, Qena and Sohag	5619 Deaths, demolished houses
February 1982	Aswan, Kom Ombo, Idfu, Assiut, Marsa Alam, El-Qusier	Drowning of 10 villages, 180 houses destroyed, and 1500 citizens displaced.
April 1981	Minia, Assuit, and Sohag	17 Deaths, road problems, and 200 houses destroyed
February, November, and December 1980	W. El-Arish	Destroyed houses, roads, and farms
May, October 1979	Giza	500 Houses destroyed
1975	Qena Governorate	Demolished houses, destroyed roods, and dam failure
February 1975	W. Al Arish	Demolished houses, destroyed roods, and dam failure

Finally, field investigations were undertaken to investigate and confirm the outputs above. The key outcomes include the following:

- The bedrock at the site mainly consists of clastic deposits rich in sand and gravel, characterized by high porosity and permeability. These deposits extend to considerable depths, allowing the surface layers to absorb large volumes of surface water runoff during rainfall.
- The area's topography is simple, lacking any high hills, mountains, or deep wadis (dry riverbeds or drainage lines) that could contribute to significant water flow.
- The project site is almost flat, with a very gentle slope towards the west and southeast directions.
- There are no indications of deep dry wadis traversing the site or large alluvial fan deposits that would suggest strong surface water flow.
- The site is located about 3 km northeast of the main course of Wadi El Qubaniyea, which could be prone to flash floods under heavy rainfall conditions.
- The drainage lines from the calcareous plateau, situated approximately 50 km west of the site, are short, wide, and shallow, indicating an absence of potential flooding risks.
- Records of severe flooding are uncommon in the project area as well as in the surrounding regions.

Therefore, taking the above into account, based on a preliminary analysis undertaken, no flood risks are anticipated within the Project site and hence there are no impacts anticipated from flood risks on the Project.

Developer is currently undertaking a standalone detailed hydrological and flood study to verify the above outcome.

10.2.2 Potential Impacts from Improper Management of Waste Streams during Construction and Operation

Given the generic nature of the impacts on soil and groundwater for both phases of the Project (construction and operation) these have been identified collectively throughout this section. Generally, this includes potential impacts from improper housekeeping practices (e.g. improper management of waste streams, improper storage of construction material and of hazardous material, etc.).

Improper housekeeping practices during construction and operation (such as illegal disposal of waste to land) could contaminate and pollute soil which in turn could pollute groundwater resources. This could also directly or indirectly affect flora/fauna and the general health and safety of workers (from being exposed to such waste streams). Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures as highlighted throughout this section, and which are expected to be implemented by the EPC Contractor throughout construction phase and Project Operator during the operation phase.

The table below provides an overall summary of the impact from improper management of waste streams during the construction phase and operation phase. The overall impact is considered to be minor significance.

However, this is a key issue to ensure is implemented properly, based on experience from other project developments in the area (refer to "Section 17.3").

Construction Phase			Operation Phase		
Type	Negative	Such impacts are controlled through implementation of general best practice.	Type	Negative	Such impacts are controlled through implementation of general best practice.
Duration	Short-term		Duration	Long-term	
Magnitude	Medium		Magnitude	Medium	
Reversibility	Reversible		Reversibility	Reversible	
Sensitivity	Low		Sensitivity	Low	
Likelihood	Medium		Likelihood	Medium	
Extent	Medium		Extent	Medium	
Significance	**Minor**		**Significance**	**Minor**	

Following the implementation of the mitigation measures highlighted throughout this section, the residual significance can be reduced to not significant.

(i) Solid Waste Generation

Solid waste is expected to be generated from construction and operational activities. Solid waste generated will likely include construction waste (such as debris) and municipal solid waste (during construction and operation such as cardboard, plastic, food waste, etc.).

Municipal solid waste and construction waste generated will likely be collected and stored onsite and then disposed to the closest approved disposal facility (being El Alaqi Landfill) which is located around 34km southeast of the project site or, if possible, reused in the construction activities.

From previous experience in other solar PV development projects, municipal solid waste is expected to be around 0.5kg per worker per day (where total number of workers during construction is 4,000 and during operation is 90). Construction waste is estimated to be around 1,000 kg per day at peak. Therefore, during construction total waste generated is expected to be around 3,000 kg per day (to include municipal and construction waste), while during operation total waste generated is expected to be around 45 kg per day (mainly municipal waste).

Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Coordinate with Aswan Solid Waste Management Department or hire a competent private contractor for the collection of solid waste from the site to the approved disposal facility (as discussed in further details below);
- Prohibit fly-dumping of any solid waste to the land;
- Establish a solid waste management area onsite that is of hard surface, properly secured, with appropriate labelling and signage. In addition, area should be equipped required containers for municipal and construction waste taking into account recycling measures as discussed in further points below;
- Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste";
- EPC Contractor only - during construction, distribute a sufficient number of properly contained containers clearly marked as "Construction Waste" for the dumping and disposal of construction

waste.

- EPC Contractor only – during construction, it is recommended that recycling measures are implemented. It is recommended that recycling is undertaken in the following approach: (i) separation and disposal of recyclables in a separate container (cardboard, paper, glass, metal, etc.); and (ii) separation and disposal of non-recyclable materials in a separate container (e.g. food waste). Each container must be clearly marked. In addition, EPC Contractor must seek ways to reduce construction waste by reusing materials (for example through recycling of concrete for road base coarse);
- Implement proper housekeeping practices on the construction site at all times; and
- Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the disposal site. The numbers within the records are to be consistent to ensure no illegal dumping at the site or other areas.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Inspection of waste management practices onsite;
- Review of records and manifests for volume of waste generated to ensure consistency;
- Developer to undertake as part of Audit Program (as described in further details in "Section 22.2") measures to ensure waste contractor is disposing waste at designated disposal site; and
- Regular environmental reporting on implementation of the waste management practices onsite.

(ii) Wastewater Generation

Wastewater is mainly expected to include black water (sewage water from toilets and sanitation facilities), as well as grey water (from sinks, showers, panels' cleaning, etc.) generated from workers during the construction and operation phase. Wastewater quantities are expected to be minimal. It is expected that wastewater will be collected and stored in fully contained collection tanks and then collected and transported by transportation tankers to be disposed at the closest Wastewater Treatment Plant (WWTP) (being New Aswan City WWTP).

From previous experience in other solar PV development projects, wastewater generated can be estimated at around 80% factor from total consumption. As identified in "Section 14.2.2" later, total water consumption during the construction phase is estimated at 400 m^3/day and during operation 60 m^3 per day. Therefore, total wastewater expected to be generated is estimated at around 160 m^3/day during construction and 45 m^3/ day during operation.

Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Coordinate with NAWWCo to hire a private contractor for the collection of wastewater from the site

to the closest WWTP (being New Aswan City WWTP);

- Prohibit illegal disposal of wastewater to the land;
- Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas;
- EPC Contractor only - ensure that constructed collection tanks during construction and those to be used during operation are well contained and impermeable to prevent leakage of wastewater into soil; and
- Ensure that collection tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities, including the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Inspection of wastewater management practices onsite;
- Review of records and manifests for volume of wastewater generated to ensure consistency; and
- Developer to undertake as part of Audit Program (as described in further details in "Section 22.2") measures to ensure wastewater contractor is disposing waste at designated disposal site
- Regular environmental reporting on implementation of the wastewater management practices discussed above.

(iii) Hazardous Waste Generation

Hazardous waste is expected to be generated throughout both the construction and operation phase and this could include consumed oil, chemicals, paint cans, etc. Hazardous waste generated will likely be collected and stored onsite and then disposed at the approved hazardous waste disposal facilities by EEAA.

From previous experience in other solar PV development projects, hazardous waste generated can be estimated at around 20 kg/day during construction and 2 kg/day during operation. Note: based on EEAA requirements for Solar PV development, broken/damaged panels are classified as hazardous waste and should be managed and disposed as such.

Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Coordinate and hire a private licensed contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities;
- Ensure that hazardous waste is disposed in a dedicated area that is enclosed, of hard surface, with proper signage and suitable containers as per hazardous waste classifications and that they are

labelled for each type of hazardous waste. The area should be properly ventilated due to the intense heat which could increase evaporation of chemicals that could make the ambient air of the storage potentially toxic and, in some cases, explosive.

- Ensure hazardous waste storage area is equipped with spill kit, fire extinguisher, secondary containment with 110% of stored volumes, anti-spillage trays and a hazardous waste inventory is available.
- Prohibit illegal disposal of hazardous waste to the land;
- Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste;
- Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing; and
- Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous waste disposal facilities. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Inspection of hazardous waste management practices onsite;
- Review of records and manifests for volume of hazardous waste generated to ensure consistency; and
- Regular environmental reporting on implementation of the hazardous waste management practices onsite.

(iv) Hazardous Material

The nature of construction and operational activities entail the use of various hazardous materials such as oil, chemicals, and fuel for the various equipment and machinery. Improper management of hazardous material entails a risk of leakage into the surrounding environment either from storage areas or throughout the use of equipment and machinery.

Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Ensure that hazardous materials are stored in proper areas and in a location where they cannot reach the land in case of accidental spillage. This includes storage facilities that are of hard impermeable surface, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another as per Material Safety Data Sheet

(MSDS);

- Maintain a register of all hazardous materials used and accompanying Material Safety Data Sheet (MSDS) must present at all times. Spilled material should be tracked and accounted for;
- Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.);
- Regular maintenance of all equipment and machinery used onsite. Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refueling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material;
- Ensure that a minimum of 1,000 litters of general-purpose spill absorbent is available at hazardous material storage facility. Appropriate absorbents include zeolite, clay, peat and other products manufactured for this purpose; and
- If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Inspection for storage of hazardous materials to include inspections for potential spillages or leakages; and
- Report any spills and the measures taken to minimize the impact and prevent from occurring again.

10.2.3 Potential Impacts from Erosion and Runoff during the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the various Project components to include PV arrays, substation, cables, etc. are expected to include land clearing activities, excavation, grading, etc.

The nature of construction activities discussed above could disturb soil, exposing it to increased erosion during rainfall events, which in turn if not controlled can result in siltation of surface water. Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures as highlighted throughout this section, and which are expected to be implemented throughout construction phase.

The table below provides an overall summary of the impact from erosion and runoff during the construction phase. The overall impact assessment will be of minor significance.

Construction Phase		
Type	Negative	Such impacts are controlled through implementation of general best practice.
Duration	Short-term	
Magnitude	Medium	
Reversibility	Irreversible	
Sensitivity	Low	
Likelihood	Medium	

Extent	Low	
Significance	**Minor**	

Following the implementation of the mitigation measures highlighted throughout this section, the residual significance can be reduced to not significant.

Mitigation Measures

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

- Avoid executing excavation works under aggressive weather conditions.
- Place clear markers indicating stockpiling area of excavated materials to restrict equipment and personnel movement, thus limiting the physical disturbance to land and soils in adjacent areas.
- Erect erosion control barriers around work site during site preparation and construction to prevent silt runoff where applicable.
- Return surfaces disturbed during construction to their original (or better) condition to the greatest extent possible.

Monitoring and Reporting Requirements

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

- Inspection for erosion and runoff control to include inspections for implementation of mitigation measures.

11. BIODIVERSITY

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to biodiversity. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

11.1 Assessment of Baseline Conditions

11.1.1 Flora Survey

A. Survey Objectives

The objectives of the survey are as follows:

- Collect onsite data regarding the flora within the Project area, including general lists of species, habitat identification and distribution, economic evaluation, photographic documentation, and assessment of threats to the floral ecosystem.
- Identify flora species currently present on site based on local distribution, existing habitats, and historical records.
- Document agricultural species, including crops and plants of economic interest.
- Identify medicinal species with known health benefits or traditional uses.
- Record traditional species that hold significance in local customs and practices.
- Document flowering species, including their phenology and blooming periods.
- Record fruiting species, noting their fruiting seasons and any potential agricultural value.
- Identify and document any pest or alien species

B. Habitat and Botanical Assessment

The habitat and botanical assessment were based on a comprehensive desk study and a field survey conducted on 26-27 September 2024. The field visit followed standardized methodologies outlined in this chapter. A general reconnaissance of the entire study area was conducted, with all identified sites of interest visited during the survey. Minor adjustments to the selected sites were made as necessary, based on field conditions and the botanical team's local expertise and professional judgment.

A single visit at this time of year was deemed appropriate for this type of survey as the majority of plant species which could be present will retain some vegetation above ground meaning identification of rare or important species would still be possible.

In addition, as noted further below, consultations with key stakeholders (mainly Nature Conservation Egypt), indicated that methodology for assessment is considered sufficient.

C. Desk Study

A desk study was conducted to gather information on the potential botanical interest within the Project area. The output of this exercise includes a list of species of conservation concern that could potentially be impacted by the Project. Sources of information included the Flora of Egypt, in-country Red Data Books, the IUCN Red List, and other relevant publications.

D. Field Survey

During the field survey, a comprehensive habitat and flora assessment was conducted within the Project site. Quadrat surveys were carried out in areas with representative habitat types. The habitat survey enabled the identification of Natural or Modified Habitats, as defined by IFC Performance Standard 6 (PS6) and associated Guidance Notes. Habitat condition surveys were completed for both Natural and Modified Habitats, where present, with each habitats' condition being assessed based on the parameters outlined in the table below. The resulting habitat scores were used to evaluate the potential for achieving no net loss or net gain of habitats.

Table 18: Calculation of Habitat Condition Scores

Habitat	Condition Rating	Condition Score	Summary
Site Habitat Definition	Habitat Lost	0.0	Habitat that is irreversibly damaged. For example, by concrete, roads, hard standing quarrying etc..
	Very Poor	0.2	Habitat that has been significantly damaged by anthropogenic factors (e.g., agriculture / construction).
	Poor	0.4	Poor quality habitat. Low plant species composition and poor vegetation coverage.
	Moderate	0.6	Habitat is improved from Poor but still not supporting a diverse community of plants and coverage is still patchy.
	Good	0.8	Site supports a more diverse community of plants with a good coverage of plants.
	Very good	1.0	Represents the best quality habitat in the region. .

Twenty-five (25) quadrats, each measuring 10 x 10 meters, were selected based on the observed vegetation heterogeneity to obtain a broad sampling of representative community types within the Project area. The distribution of sampling points was designed to cover as much of the Project area as possible, with particular focus on environmentally sensitive areas and the presence of distinct plant communities. Data was collected on floristic composition using the Braun-Blanquet method (Müller-Dombois and Ellenberg, 1974), including species diversity, coverage, and dominance, along with the identification of endemic and endangered species, vegetation coverage, threats, sensitive areas, and ecological hotspots. GPS coordinates were recorded at each point using a Garmin 12 XL receiver.

Before the field surveys, a detailed analysis of satellite imagery was carried out, in conjunction with the local botanical expert's knowledge, to identify the most suitable sampling points. The field survey covered the target area, with 25 sampling points surveyed for flora as shown in the figures below. Quantitative methods were employed to gather data on the composition, diversity, coverage, and dominance of plant species. Special attention was given to ecologically sensitive areas and species of conservation concern, including endemic species.

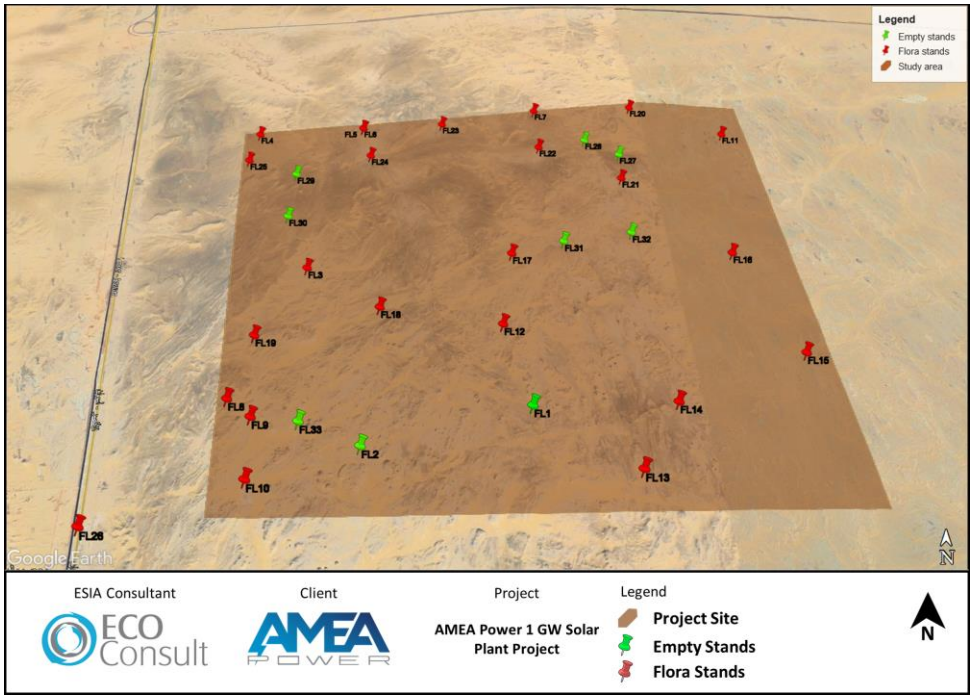

Figure 43: A Map Showing all Sampling Sites along Abydos II Station. Red Symbols Indicate the undertaken Sampling points, while Green Symbols Indicate Empty Points

Figure 44: Photos from the project area

Quantitative methods were utilized in gathering data on plant species composition, richness, diversity, coverage, density and dominance. Considering that a large portion of the Project area is placed on sandy gravely and rocky habitats, with a predicted low distribution of flora, specific locations were quantitatively surveyed where there is a visual abundance of flora as determined by the preliminary site walkthrough.

Additionally, the following data were recorded for each site within the respective transect. Vegetation cover estimate (%) of each species using the Braun-Blanquet scale as indicated in the table below (Müller-Dombois and Ellenberg, 1974).

Table 19: Braun-Blanquet scale

Scale	Range of Cover
5	>75%
4	50 - 75%
3	25 - 50%
2	5 - 25%
1	<5%
+	Few
r	Solitary or rare

Crude indication of population size for each species was conducted using the magnitude terms of DAFOR scale as outlined in the table below (Sutherland, 1996):

Table 20: DAFOR Scale

Value	Percentage Cover (%)
D = Dominant	>75
A = Abundant	51 - 75
F = Frequent	26 - 50
O = Occasional	11 - 25
R = Rare	≤10

Life forms of the species were identified following the Raunkiaer scheme as outlined in the table below (Raunkiaer, 1937).

Table 21: Raunkiaer Scheme

Code	Life form
PH	Phanerophytes
CH	Chaemophytes
GH	Geophytes-Helophytes
Th	Therophytes

The global geographical distribution of the recorded species in the study area was determined from Zohary 1966-1987; Feinbrun-Dothan 1978-1986 and Boulos 1999-2005 and 2009 as seen in the table below.

Table 22: Geographical Distribution Coding

Code	Chorotype
SA	Saharo-Arabian
ME	Mediterranean
SZ	Sudano-Zambezian
IT	Irano-Turanean
ES	Euro-Siberean

The potential and actual economic uses of wild plants were assessed based on: (i) field observations, (ii) information collected from local inhabitants, and (iii) literature review (Täckholm 1974, Zohary 1966-1987,

Feinbrun-Dothan 1978-1986, Boulos 1983, 1989, Mossa et al. 1987, Mandaville 1990, Ayyad 1992, Belal and Springuel 1996, Shaltout 1997, Heneidy and Bidak, 2001, 2004). The potential economic uses are coded as follows:

Table 23: Economic Uses of Wild Plants

Code	Uses
M	Medicinal Uses
G	Grazing Use
E	Edible (by human beings)
F	Fuel

E. Plant Identification

Plant species in each surveyed area were tentatively identified in the field, with duplicate samples of the present vascular plants collected during each survey. These samples were then catalogued in tabulated form, following the species nomenclature as per Täckholm (1974) and Boulos (1999-2005 and 2009). The herbarium sheets are stored in the Herbarium of the Faculty of Science at Kafrelsheikh University.

F. Conservation Status and Endemism

The IUCN Red List of Threatened Plant Species was used to screen plant species falling under any of its appendices and categories, applying the IUCN Red List Methodology based on IUCN (2019). A checklist, supplemented by a database for Egyptian endemic flora, was developed for the survey based on El-Khalafy et al. (2021) and El-Khalafy (2023). The following websites were utilized for identifying the conservation status of plant species:

- https://www.speciesplus.net
- https://www.iucnredlist.org
- https://tools.bgci.org
- https://powo.science.kew.org
- https://www.gbif.org

G. Analysis Survey

Field Observations

- The floristic inventory of study area includes 15 plant species belonging to 14 genera and 7 families as shown in the table below.
- Only Zygophyllum had a high largest genus (2 species), but the 13 genera had one species as shown in the table below.
- The largest represented families were Brassicaceae (n = 5 species), Zygophyllaceae (n = 3), and each of Asteraceae and Chenopodiaceae (n = 2). The remaining 3 families were represented collectively by 3 species (20%) as shown in the figure below.

Table 24: Post-Field Data Attributes (Flora Only)

#	Species	Family	Distribution		Local Economic Importance	Life Span	Life Form	DAFOR
			Local	Global				
1	*Astragalus vogelii* (Webb) Bornm.	Fabaceae	Da. S.	SA	Grazing, medicine	Ann.	TH	R
2	*Cornulaca monacantha* Delile	Amaranthaceae	O., Mp., D., S.	SA+SZ	Grazing, medicine	Frut.	CH	R
3	*Enarthrocarpus lyratus* (Forssk.) DC.	Brassicaceae	N, O, M, De, S	ME	Grazing, medicine	Annual	TH	R
4	*Fagonia indica* Burm.f.	Zygophyllaceae	O., Da., R., GE.	SA+IT	Grazing, medicine	Per.	CH	D
5	*Farsetia aegyptia* Turra	Brassicaceae	O, M, D, R, S	SA+ SZ	Medicine	Shrub	CH	R
6	*Hyoscyamus boveanus* (Dunal) Asch. & Schweinf.	Solanaceae	O., Da., R., S.,	endemic	Medicine	Per.	CH	A
7	*Morettia canescens* Boiss.	Brassicaceae	De, S	SA+ SZ	Grazing	Per.	CH	A
8	*Salsola tetragona* Delile	Amaranthaceae	M, O, D	SA+ SZ	Medicine	Shrub	PH	D
9	*Schouwia purpurea* (Forssk.) Schweinf.	Brassicaceae	S	ME+ SZ	Human Food, Fuel	Annual	TH	O
10	*Senecio glaucus* subsp. coronopifolius Maire	Asteraceae	N, O, M, D, R, S	SA+ IT	Human Food	Annual	TH	F
11	*Sonchus oleraceus* L.	Asteraceae	N, O, M, D, R, S	ME+ ES+ IT	Grazing, Human Food	Annual	TH	R
12	*Stipagrostis scoparia* (Trin. & Rupr.) De Winter	Poaceae	N, O, M, D, S	SA	Grazing	Perennial	GH	R
13	*Zilla spinosa* (L.) Prantl	Brassicaceae	N, D, R, S	SA+ SZ	Grazing, medicine, Human Food, fuel	Shrub	CH	F
14	*Zygophyllum coccineum* L.	Zygophyllaceae	R, S, D	SA+ SZ	Medicine	Perennial	CH	D
15	*Zygophyllum simplex* L.	Zygophyllaceae	D., R., GE., S.	SZ	Medicine	Ann.	TH	O

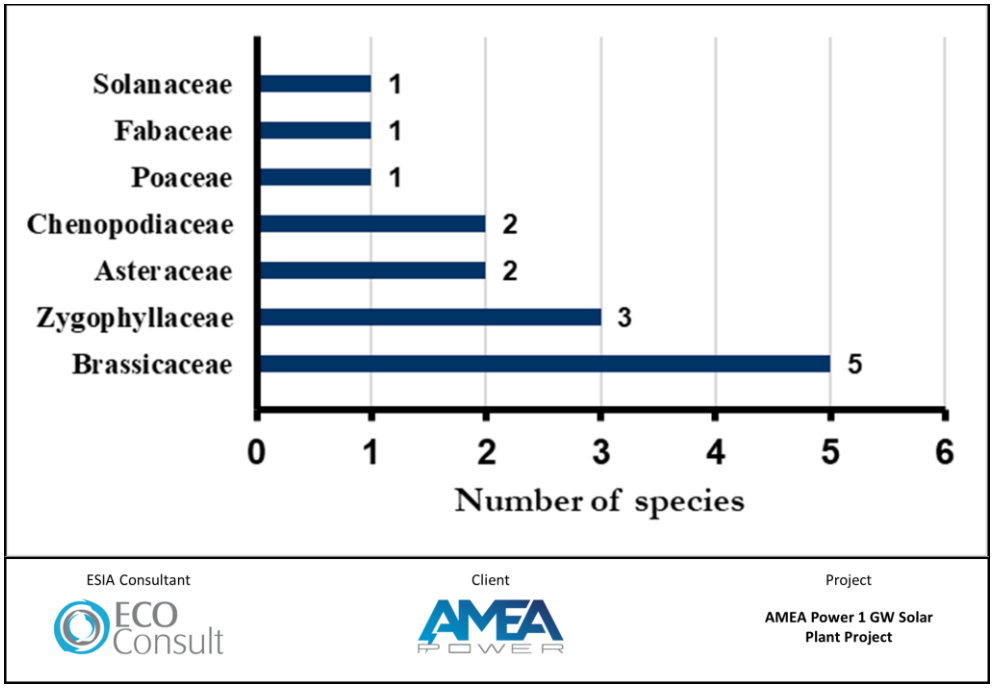

Figure 45: Number of Species recorded in each Family across all Sites

- The surveyed species include 7 shrubs (46.7%), 6 annuals (40%), one perennial (6.7%), and one grass (6.7%) in the figure below.

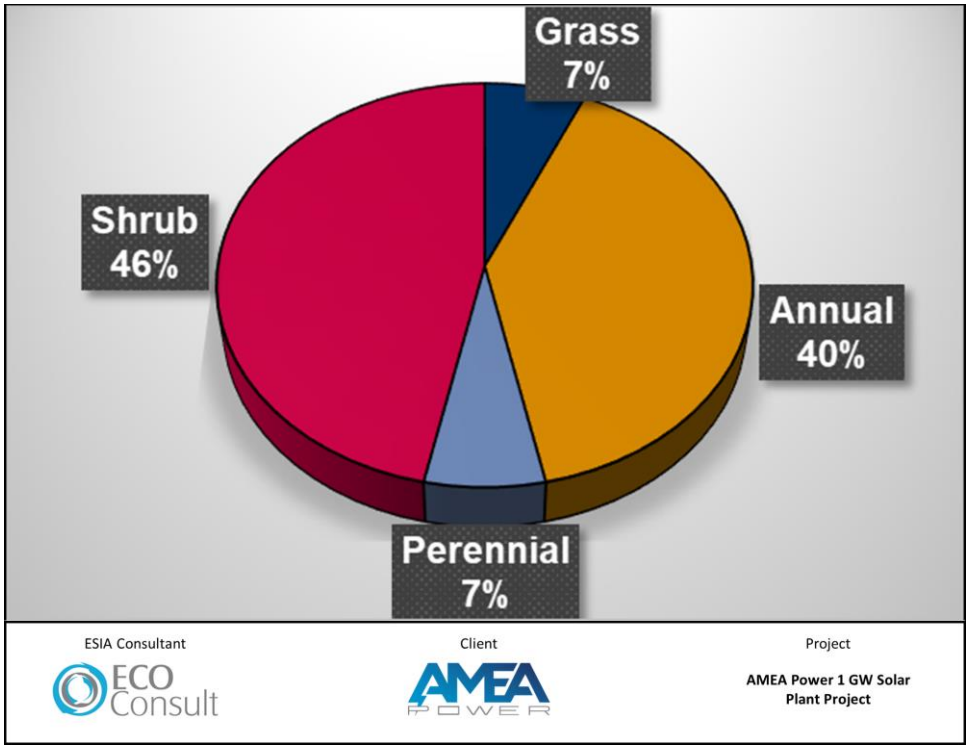

Figure 46: Life Span of the Recorded Species

- The Crude indication of population size for each species was conducted using the magnitude terms of DAFOR scale indicated that the vegetation cover is poor to moderate in this region, where 40% of the

recorded species are rare, and 20% are dominant, while the abundant, frequent, and occasional are 13.3% each) as shown in the figure below.

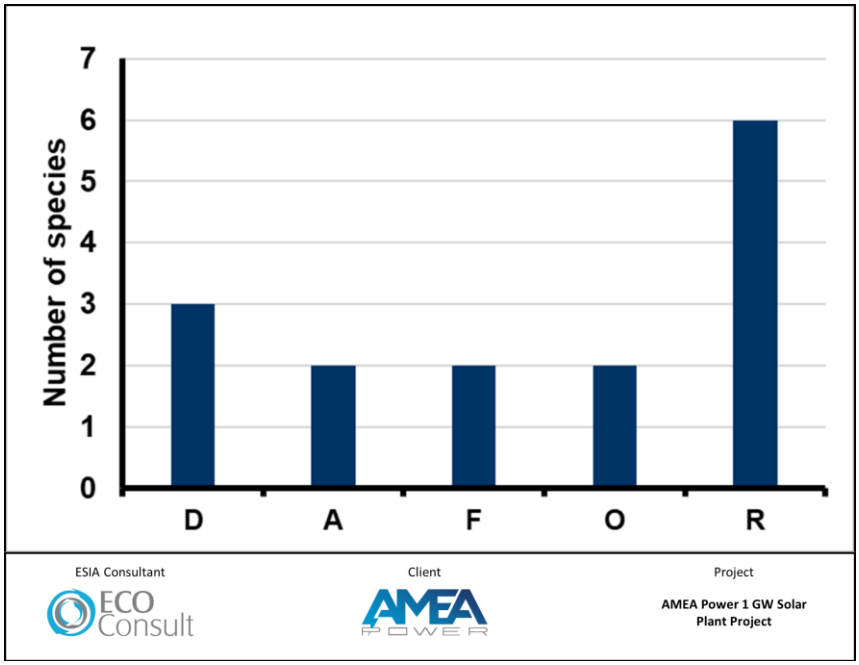

Figure 47: Distribution of vegetation according to DAFOR Scale (D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare)

- The life forms were distinguished into: 7 chamaephytes (46.7%), 6 therophytes (40%), one phanerophyte (6.7%), and one geophyte-helophyte (6.7%) – refer to figure below.

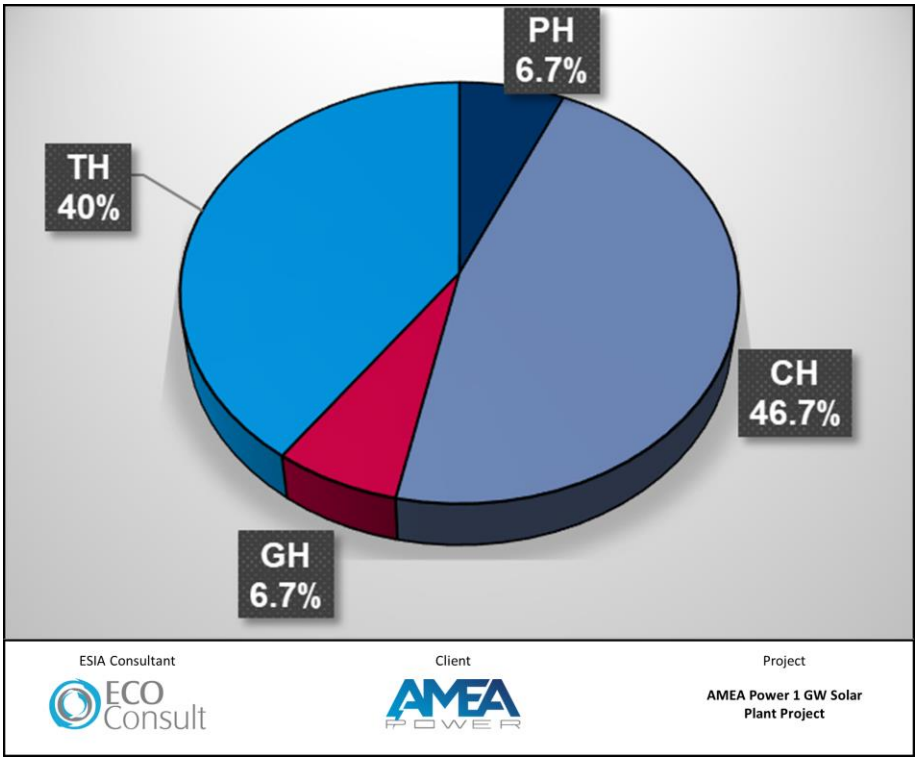

Figure 48: Percentage of species in each life form (PH=phanerophytes, CH=chamaephytes. GH=geophytes-helophytes, and TH=therophytes)

- The economic importance of the recoded species indicated that 9 species (60%) have medicinal uses, 7 species (46.7%) are grazed by animals, 4 species (26.7%) are used as human food and 2 species (13.3%) are used as fuel plants as shown in the figure below.

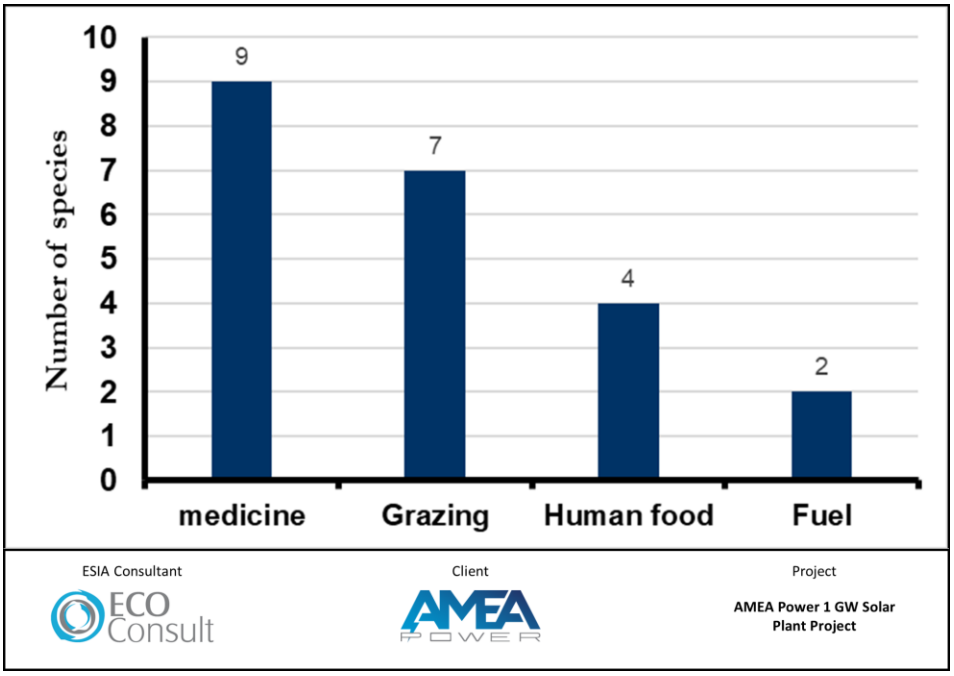

Figure 49: Economic importance of the recorded species across all sites

- During the field survey of the study areas, one endemic plant species (*Hyoscyamus boveanus* (Dunal) Asch. & Schweinf.) was recorded.

- Dominant Plant Communities: A total of two plant species were recorded as dominant within the all-studied sites. *Fagonia indica* (n: 5) is the highest species recorded as dominant (48.5%). Other dominant species is: *Salsola tetragona* (n: 2) as shown in the table and figures below.

Table 25: Dominant Species, Species Diversity, and Vegetation Cover (%) in Each Studied site

No.	Date	No. of species	Vegetation cover (%)	Common Name	Scientific Name	Notes
1	26/09/24	0	0	-	-	
2	26/09/24	0	0	-	-	
3	26/09/24	2	5	Dammran	*Salsola tetragona*	ضمران
4	26/09/24	3	7	Halaawa	*Fagonia indica*	حلاوة
5	26/09/24	3	10	Halaawa	*Fagonia indica*	حلاوة
6	26/09/24	2	3	Halaawa	*Fagonia indica*	حلاوة
7	26/09/24	3	2	Halaawa	*Fagonia indica*	حلاوة
8	26/09/24	4	15	Halaawa	*Fagonia indica*	حلاوة
9	26/09/24	2	8	Halaawa	*Fagonia indica*	حلاوة
10	26/09/24	4	90	Dammran	*Salsola tetragona*	ضمران
11	27/09/24	3	60	Halaawa	*Fagonia indica*	حلاوة
12	27/09/24	1	3	Halaawa	*Fagonia indica*	حلاوة
13	27/09/24	6	75	Halaawa	*Fagonia indica*	حلاوة

14	27/09/24	4	80	Dammran	*Salsola tetragona*	ضمران
15	27/09/24	2	3	Halaawa	*Fagonia indica*	حلاوة
16	27/09/24	1	7	Halaawa	*Fagonia indica*	حلاوة
17	27/09/24	1	1	Halaawa	*Fagonia indica*	حلاوة
18	27/09/24	7	65	Halaawa	*Fagonia indica*	حلاوة
19	27/09/24	2	6	Halaawa	*Fagonia indica*	حلاوة
20	27/09/24	3	15	Halaawa	*Fagonia indica*	حلاوة
21	27/09/24	5	10	Dammran	*Salsola tetragona*	ضمران
22	27/09/24	5	90	Dammran	*Salsola tetragona*	ضمران
23	27/09/24	4	65	Dammran	*Salsola tetragona*	ضمران
24	27/09/24	4	85	Dammran	*Salsola tetragona*	ضمران
25	27/09/24	1	2	Halaawa	*Fagonia indica*	حلاوة
26	27/09/24	7	80	Dammran	*Salsola tetragona*	ضمران
27	27/09/24	0	0	-	-	-
28	27/09/24	0	0	-	-	-
29	27/09/24	0	0	-	-	-
30	27/09/24	0	0	-	-	-
31	27/09/24	0	0	-	-	-
32	27/09/24	0	0	-	-	-
33	27/09/24	0	0	-	-	-

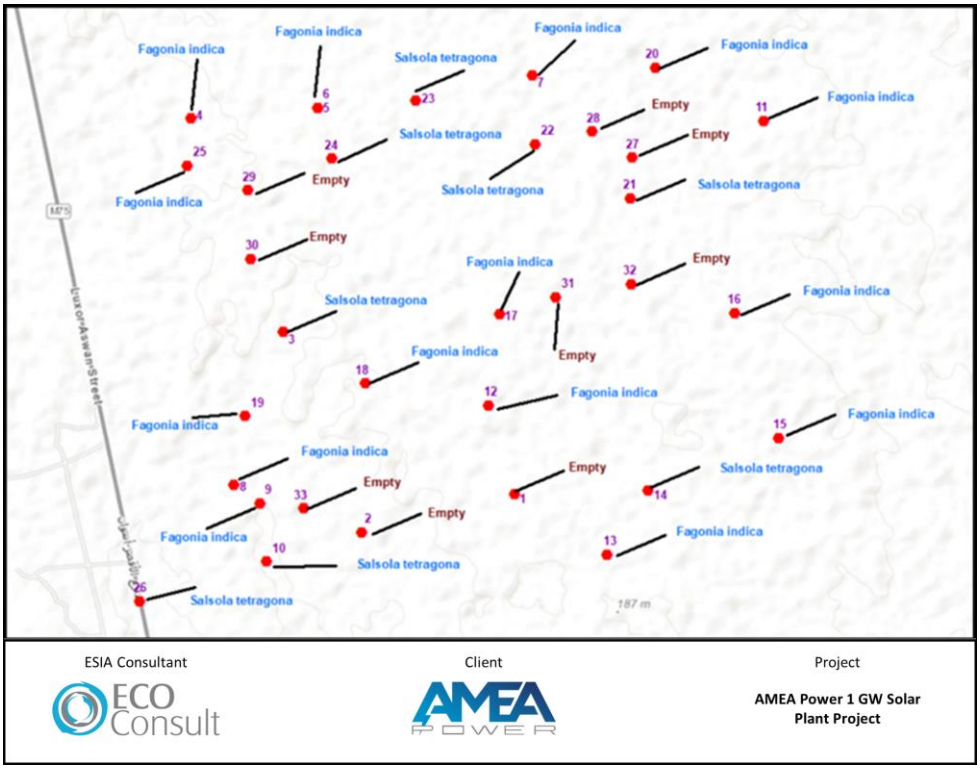

Figure 50: Distribution of dominant species in the study area

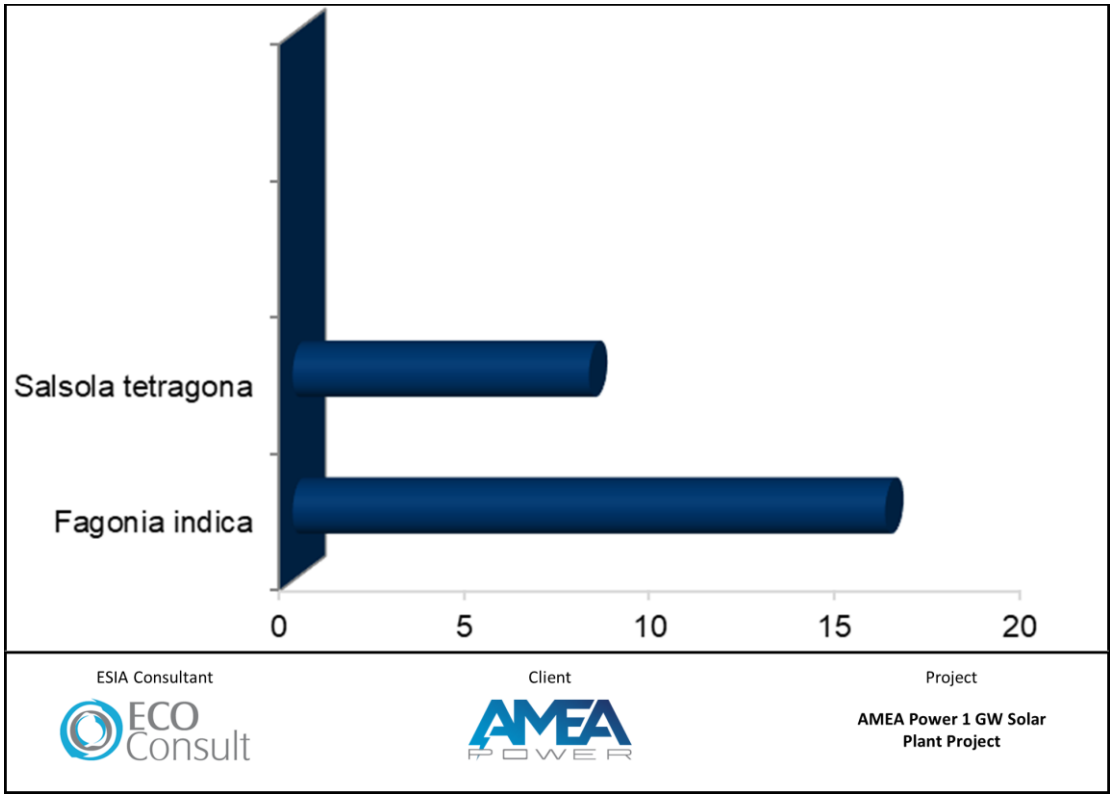

Figure 51: Dominant species among all sites

H. Analysis and Key Sensitivities

Endemic Species

Based on a desk review of recent publications and studies on endemic and endangered species in Egypt—particularly in the Nile region, as well as the eastern and western deserts, and the Red Sea—the following information was gathered: Approximately six endemic species (Shaltout et al., 2018; El-Khalafy, 2023) have potential to be found within and around the study area, especially in the Nile River region and the eastern and western deserts as shown in the following table.

Table 26: List of Endemic and Near-Endemic Plants Recorded by Previous Works

Scientific Name	Family	Geographic Distribution
Endemic		
Hyoscyamus boveanus (Dunal) Asch. & Schweinf.	Solanaceae	De,S
Persicaria obtusifolia (Täckh. & Boulos) Greuter & Burdet	Polygonaceae	Nf (Long canals)
Atractylis carduus var. marmarica	Asteraceae	Dw
Sonchus macrocarpus	Asteraceae	N, M, De
Tephrosia kassasii Boulos	Fabaceae	N (Nubia)
Glinus runkewitzii Täckh. & Boulos	Molluginaceae	N

During the field survey of the study areas, only one endemic plant species from the list above was observed, which is *Hyoscyamus boveanus* (Dunal) Asch. & Schweinf. (refer to figure below). This species is distributed in Oases, Red Sea coast and South Sinai locations in Egypt.

Figure 52: Hyoscyamus boveanus

The following details pertain to this species:

- Arabic Name: Sakaran
- Justification**:** *Hyoscyamus boveanus* is endemic to Egypt and has an estimated population there of between 3000-6000. It is primarily found in the Saint Katharine Protectorate (SKP) and the Mediterranean coastal strip; however, it is also found in areas of vegetation and oases in other parts of Egypt. The subpopulations are generally small and severely fragmented. In total the Extent of occurrence (EOO) of this species is estimated to be approximately 81,000km^2. Climatic changes, especially drought and flooding effect and overgrazing are the biggest threats that impact the presence of this species. The population is severely fragmented, and there is a general decline in its habitat quality as mountains act as a barrier between the small subpopulations. Regular monitoring of the species takes place within the SKP and it is observed that the number of individuals of this species has decreased in recent time due to the severe climatic changes and over-collecting.

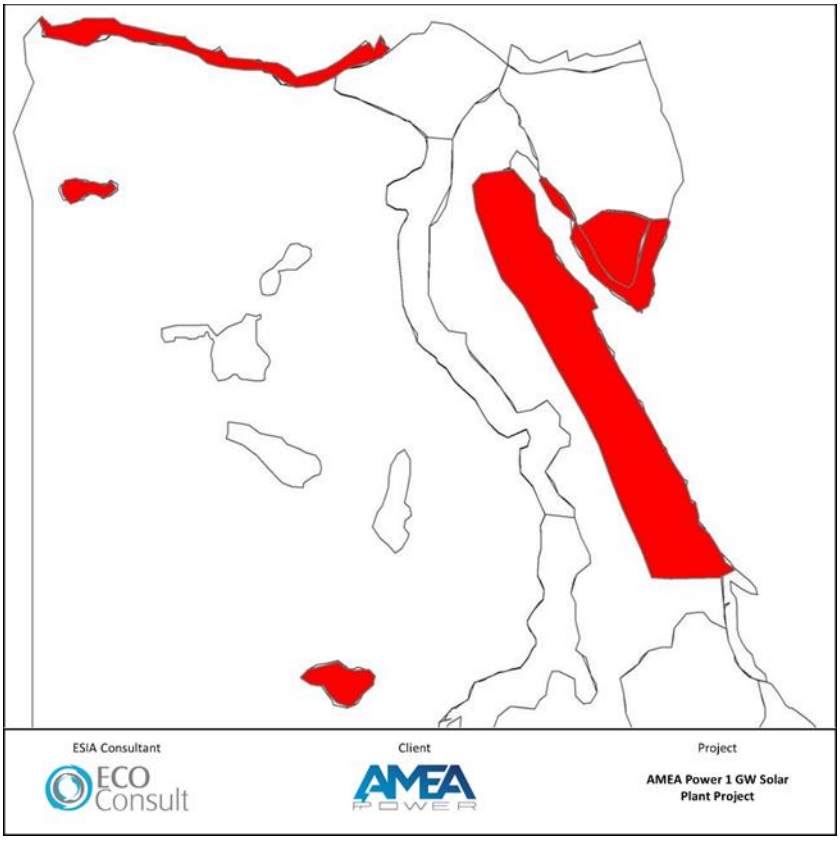

Figure 53: Distribution range of *Hyoscyamus boveanus* (Source: www. http://geocat.kew.org/)

- **Ecology and Habitat:** *Hyoscyamus boveanus* is a perennial herb. It has been observed that flowers appear in mid spring and reproduction is by seed in late summer. Following the IUCN Habitat Classification Scheme, this species was found to be primarily restricted to montane wadis with sandy soil of in mountain areas. Its soil has a sandy texture (93% sand, 3% silt and 4% clay). In agreement with Kamh et al. (1989), Balba (1995), Moustafa & Zayed (1996), and Omar et al. (2013), soil analysis showed that this species is distributed in alkaline and non-saline to slightly saline soil (pH = 8.07). The soil is characterized very high content of soluble salts and low content of organic matter (0.4%). EC of the soil showed a slight high percentage of total soluble salts in the soil (EC = 3.72 dS m^{-1}, TDS= 2381 ppm). Most of the available nutrients have low values. In agreement with Omar et al. (2013), *Asclepias sinaica, Artemisia judaica* and *Alkanna orientalis* were the most associated species for this species.

- **Systems:** Terrestrial

- **Use and trade:** The species has economic importance as a medicinal plant. The Bedouins occasionally mix the flowers of this species with tobacco (Nicotiana sp.) and smoke the mixture for its intoxicating effects. In addition, other Bedouins also smoke the leaves for their mind-altering effects.

- **Threats:** The vegetation within SKP has been subjected to disturbance through human activities including "overgrazing and over-collecting" (Mosallam 2007; Khafagi et al. 2012). Feral donkeys cause destruction to a variety of plant species through trampling (Khafaja et al. 2006). It was observed that long-term drought and the destructive effect of sudden flooding, overgrazing and over-collection are of the main threats that impacted the status and distribution of this species.

Overgrazing is one of the most threats that affect the distribution of this species. In addition, environmental conditions (especially drought) are of the main threats that impacted this species. Over-

collecting for unmanaged scientific research also results in a decline in the population size of this species and affects its habitat. Urbanization and construction of new tourism villages also affected the distribution of this taxon in the Mediterranean coastal strip. Because of these effects (natural and human), it is expected that the wild population of this species could be in extreme danger in the relatively near future. A full list of threats based on the IUCN Classification Scheme is presented in the table below.

Table 27: Threats to Hyoscyamus boveanus based on the IUCN Threats Classification Scheme.

Threat	Timing	Scope	Severity	Impact score
Agriculture & aquaculture, 2.3. Livestock farming & ranching, Nomadic grazing	ongoing	Whole (>90%)	Very rapid declines	High impact:9
Climate change & severe weather, Droughts	ongoing	Whole (>90%)	Very rapid declines	High impact:9
Climate change & severe weather, Temperature extremes	ongoing	Whole (>90%)	Very rapid declines	High impact:9
Climate change & severe weather, storms & flooding	ongoing	Majority (50-90%)	rapid declines	High impact:8
Biological resource use, Gathering terrestrial plants, Intentional use	ongoing	Majority (50-90%)	Slow, significant declines	Moderate impact:6
Residential & commercial development, Tourism & recreation areas	ongoing	Minority (<50%)	slow but significant declines	Low impact:5
Invasive & other problematic species, genes & diseases, Invasive non-native/alien species/diseases	ongoing	Minority (50%)	Slow, significant declines	Low impact:5

Field Observations

- During the field study, 33 quadrats were surveyed, within which 15 plant species were observed. The highest species diversity was recorded along the project area ranges from 1 species to 7 species (figure below). Vegetation cover ranges from 1% to 90% as shown in the figure that follows.

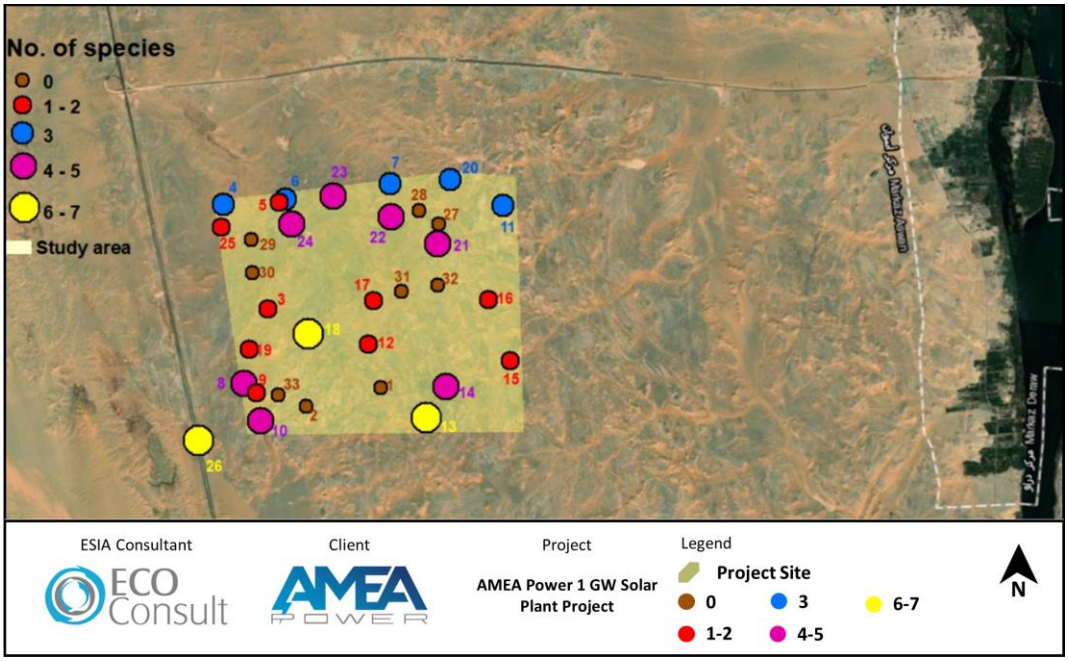

Figure 54: Species Diversity Among all Stands

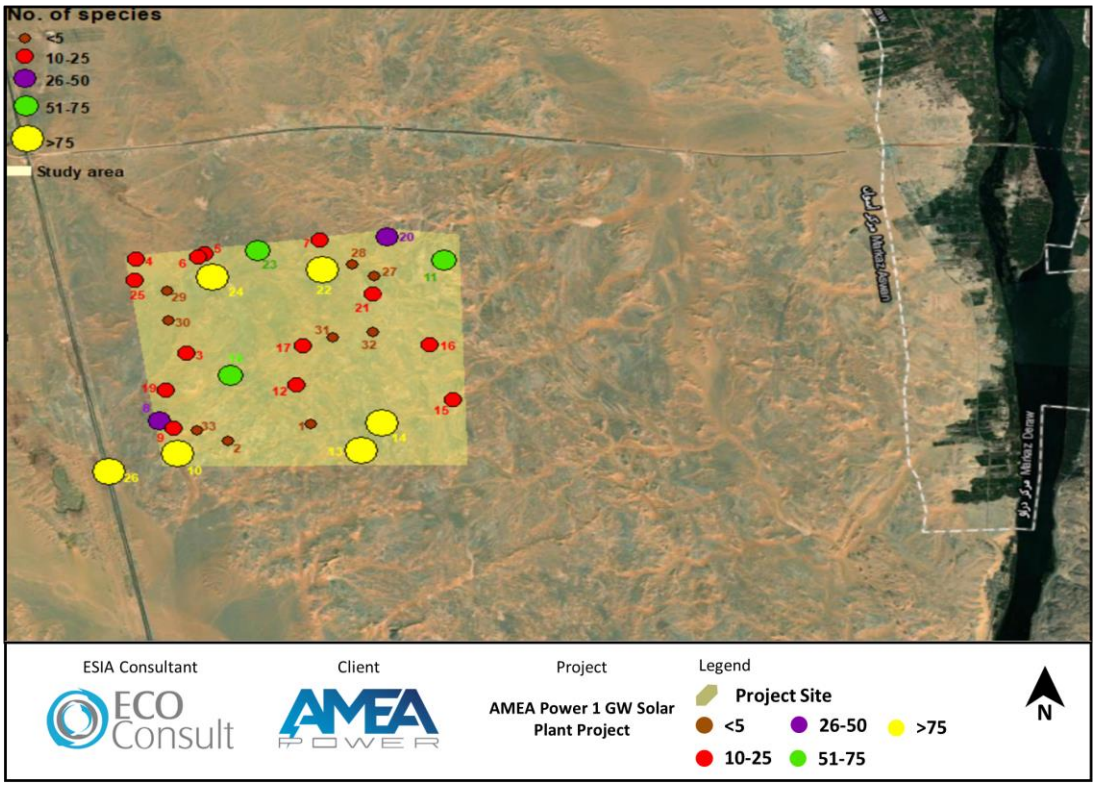

Figure 55: Vegetation cover among all sites

- Only one of the recorded species is listed by IUCN as Least Concern (6.7%), while 14 species (93.3%) are still non-evaluated (one of which is the endemic *Hyoscyamus boveanus* which was recorded in two locations – points 22 and 23).

- Regarding national geographic distribution, Deserts region (14 taxa), is the richest region in plant species, followed by Sinai region (13 taxa), Oases (9 taxa), Red Sea (8 taxa), Mediterranean (7 species), Nile region (5 species) and finally Gebel Elba (2 taxa).

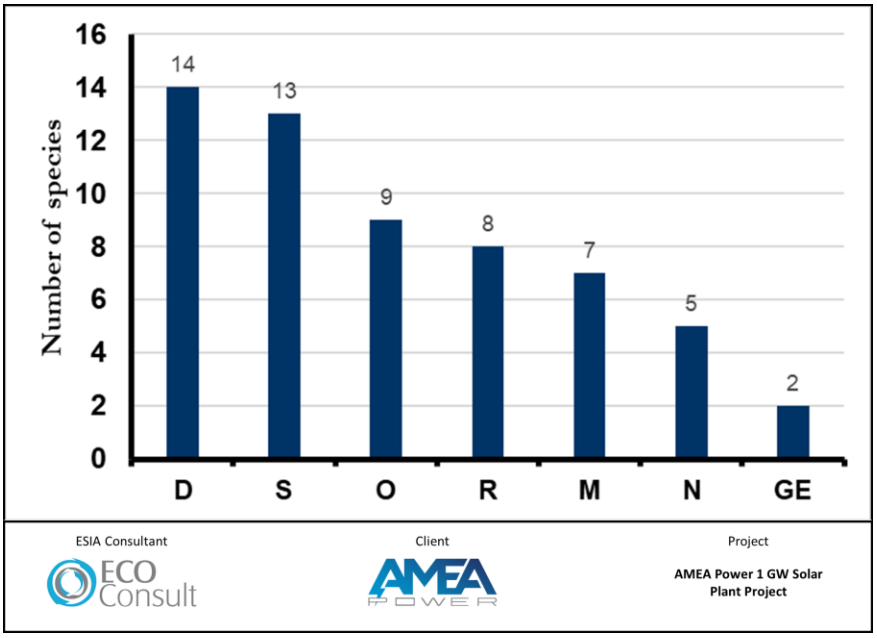

Figure 56: Number of recorded taxa in surveyed area in relation to national phytogeographical regions (D: Deserts, S: Sinai Peninsula, M: Mediterranean coastal strip, N: Nile region, O: Oases, R: Red Sea, and GE: Gebel Elba)

- Regarding the global phytogeographical distribution, the bi-regionals elements were the highest (9 species = 60%), followed by mono-regional (4 species = 26.7%), while pluri-regional (one species = 6.7%) was the lowest. Nine species (60%) were Saharo-Arabian, 8 were Sudano-Zambezian (53.3%) and each of Irano-Turaean and Mediterranean elements (3 species = 20%).

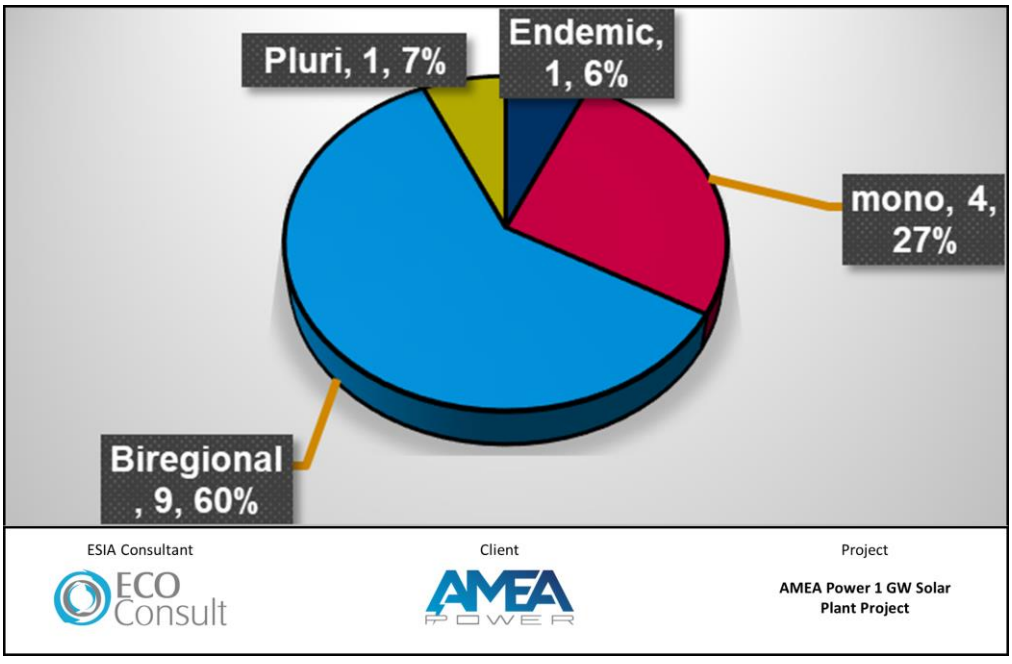

Figure 57: Global phytogeographical distribution of the species

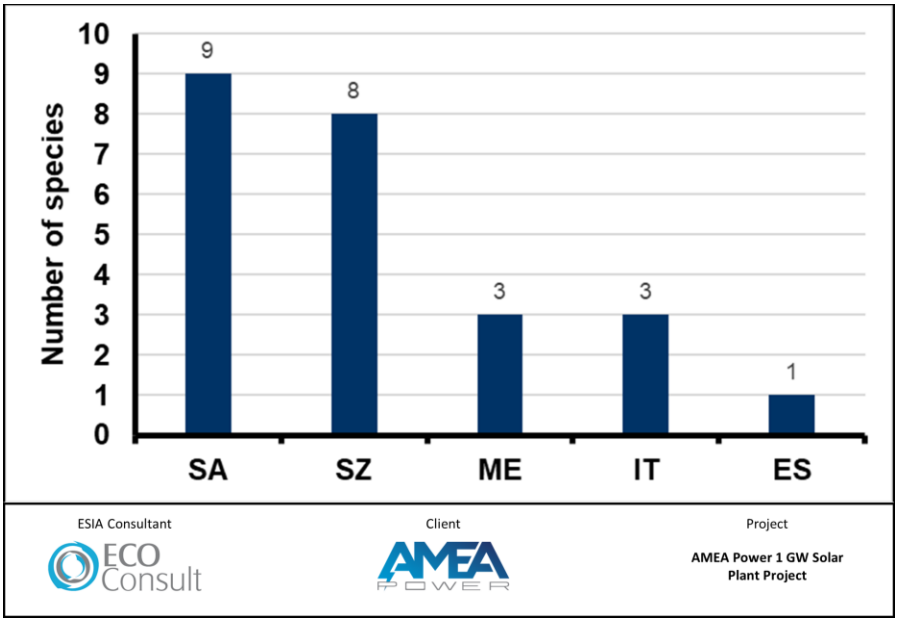

Figure 58: Chorotype spectrum of the recorded species in the study area

COSM: Cosmopolitan, SA: Saharo-Arabian, ME: Mediterranean, SZ: Sudano-Zambezian, IT: Irano-Turanian, TR: Tropical, ES: Europian, PAN: Panotropic, PAL: Paleotropical

Threats

Four different types of threats were determined during the field visits in the surveyed area. The threats upon the surveyed area could be arranged descending as follows (refer to figure and table below):

1. Trampling (22 sites = 66.7 %)
2. Road (4 sites = 12.1 %)
3. Human garbage (2 sites = 6.1%)
4. Burning (1 site =3%)

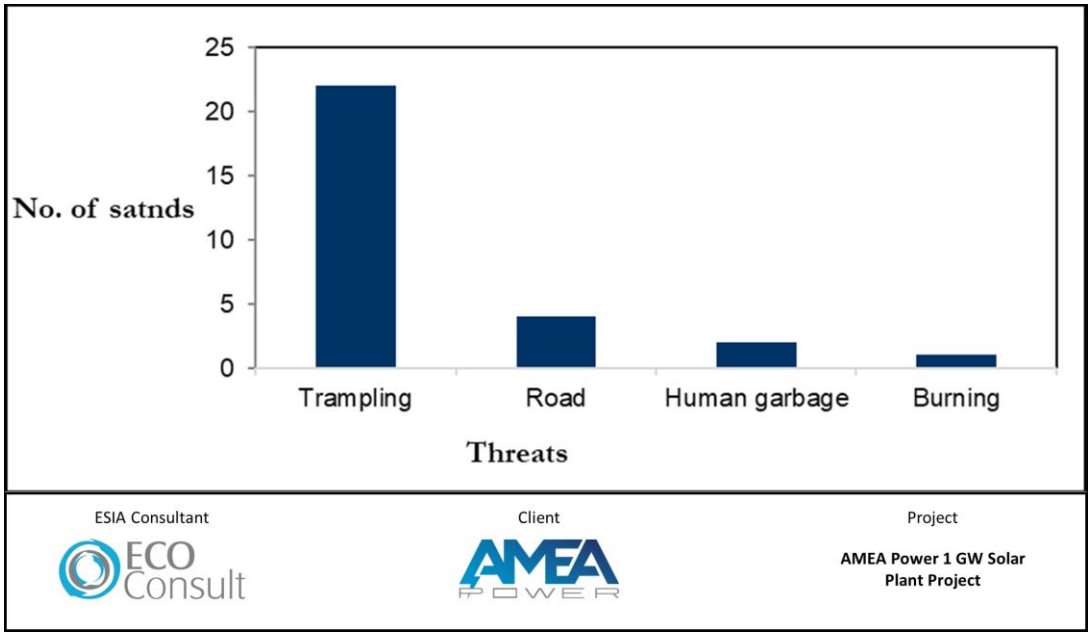

Figure 59: Arrangement of the threats that impacted the sites in the surveyed area

Regarding the degree of threat, the low degree was represented in the majority sites as seen in table below.

Table 28: Potential Impact on Floristic Composition along all Sites

No.	Threat	(%)	Level		
			High	Medium	Low
1	Trampling (22 sites)	66.7	9.1	13.6	77.3
2	Road (4 sites)	12.1	25	-	75
3	Human garbage (2 sites)	6.1	-	50	50
4	Burning (1 site)	3	100	-	-

Alien species

No alien or invasive species have been recorded within the Project area. However, such species may occasionally be introduced through human activities, particularly within the footprint of proposed infrastructure or in nearby areas, often for ornamental, agricultural, or shading purposes. The table below provides information on the alien or invasive species with potential to occur or be introduced in the Project area.

Table 29: List of Alien Species, Families, Habit and status with potential to be encountered within the project area

Species	Family	Habit	Status
Acacia saligna (Labill.) H.L.Wendl.	Fabaceae	Tree	Invasive
Bassia indica (Wight) A.J. Scott	Chenopodiaceae	Annual	Invasive
Bouganvillea glabra Choisy	Nictaginaceae	Tree	Casual
Conyza bonariensis (L.) Cronquist	Asteraceae	Annual	Invasive
Ficus nitida Thunb.	Moraceae	Tree	Invasive
Lycopersicon esculentum Mill.	Solanaceae	Perennial	Casual
Nicotiana glauca Graham.	Solanaceae	Tree	Naturalized
Ricinus communis L.	Euphorbiaceae	Tree	Invasive

Symphyotrichum squamatum (Spreng.) Nesom	Asteraceae	Perennial	Invasive

It is important to recognize that casual and naturalized species have the potential to become invasive. The above list highlights key floral species with a high likelihood of being introduced through construction activities, movement of materials, personnel, and other related factors (Shaltout, 2020).

Conclusion

Despite the limited diversity of flora in the area (only 15 species identified), one endemic species (*Hyoscyamus boveanus)* was recorded.

11.1.2 Fauna Survey Baseline

Based on the Convention on Biodiversity (CBD), approximately 92% of the land in Egypt is composed of desert and only 8% is agricultural land (8%) (Cbd.int, 2020). There are five main habitat systems in Egypt as follows (Harhash, et al., 2015, Ministry of Environment, 2016):

1. Desert habitat
2. Marine habitat
3. Wetlands habitat system
4. Artificial habitat
5. Fresh water habitat

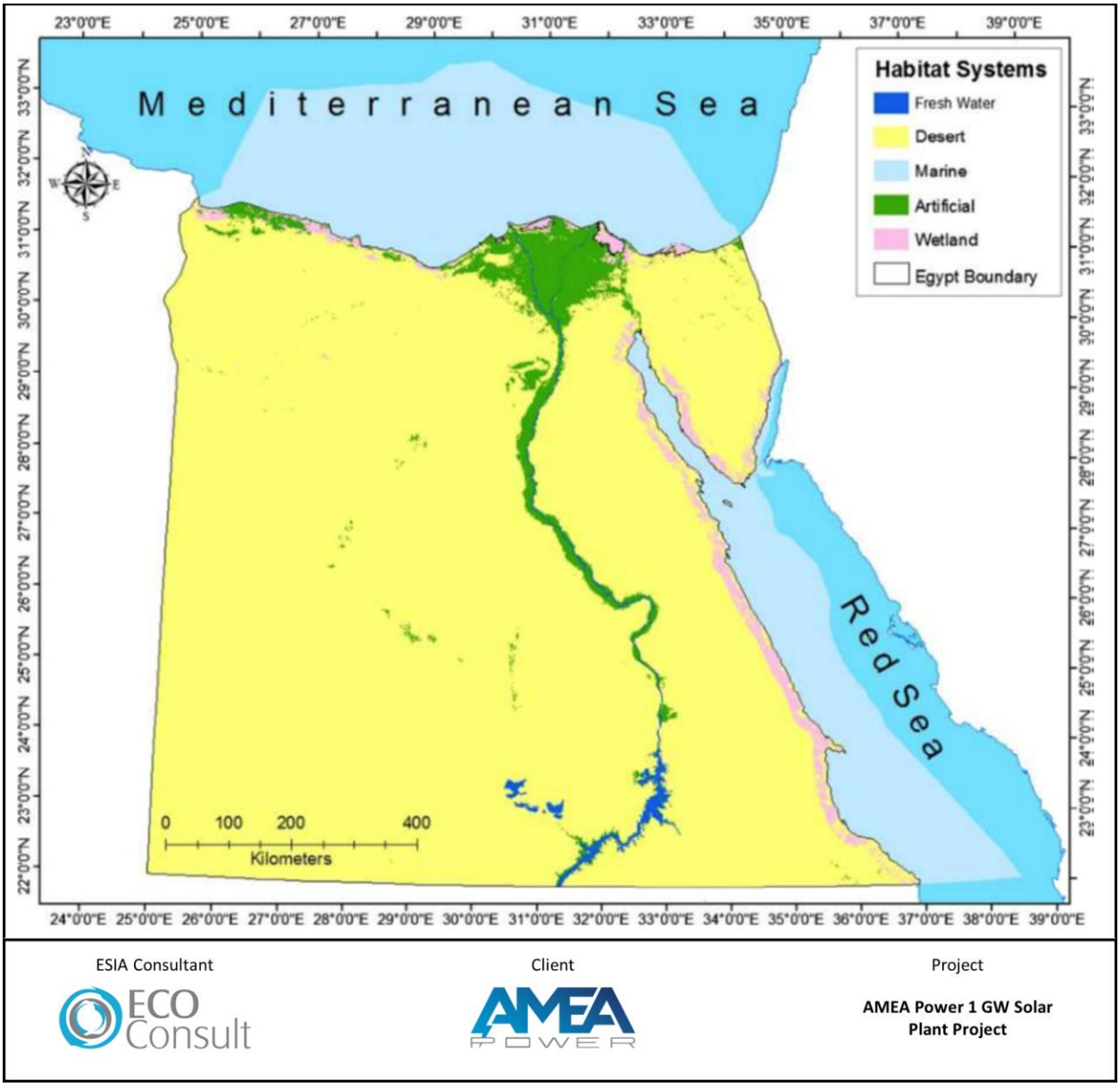

Figure 60: Habitat Map of Egypt (Harhash, et al., 2015, Ministry of Environment, 2016)

Many of the flora and fauna in the desert habitat in Egypt are considered of ecological importance, especially in Sinai area (i.e., 324 species of fauna). Wetlands are also considered an important ecosystem, with 80 plants, 100 animals and 82 fish, notably along the Nile, spread over 1,530 km of the national territory (Cbd.int, 2020).

Overall, Egyptian biodiversity comprises 143 types of globally important species, 800 species of non-flowering plants, 2,302 flowering plants, 111 species of mammals, 480 species of birds, 109 species of reptiles, 9 species of amphibians, and more than 1,000 species of fish (Cbd.int, 2020).

Based on the most recent data published for the Egypt biodiversity profile by CBD, there are 51 species of mammals already endangered, along with 26 bird species and 26 reptile species (Cbd.int, 2020). According to the Map of Life 2020, which assembles and integrates data from different sources such as IUCN, WWF and GBIF, there are 370 birds, 124 mammals, 51 reptiles, 4 turtles, 8 amphibians, 24 Sphingid moths, 36 dragonflies and 3 conifers recorded in Egypt (Mol.org, 2020).

According to Protected Planet, a World Database on Protected Areas (WDPA), there are 50 protected areas in Egypt. The protected area covers approximately 13.14% of the country's land and 4.95% of its marine (UNEP-WCMC, 2020).

Typical of all desert regions, habitats of the Project Site and the Study Area are limited in diversity and coverage. Habitable areas, even for the hardiest desert species, are restricted locations that have certain topographic features, which allow adequate moisture to be available at or near the ground surface. The Project site and the surrounding desert land is mostly barren and supports a very little permanent animal and plant life.

The site is located next to the Luxor – Aswan Western Road fronting Nile's western bank of Benban Village (figure below). This site is considered as a part of southern western desert is a mixture of sandy plains and rocky habitat types. The site topography is a mix of rocky, gravel desert hills vary in heights alternating with furrow-like sandy vegetated depressions in between, where the vegetation cover grow on the scarcity annual precipitation which aggregate and collected in these sandy drainage depressions in years with good precipitation season.

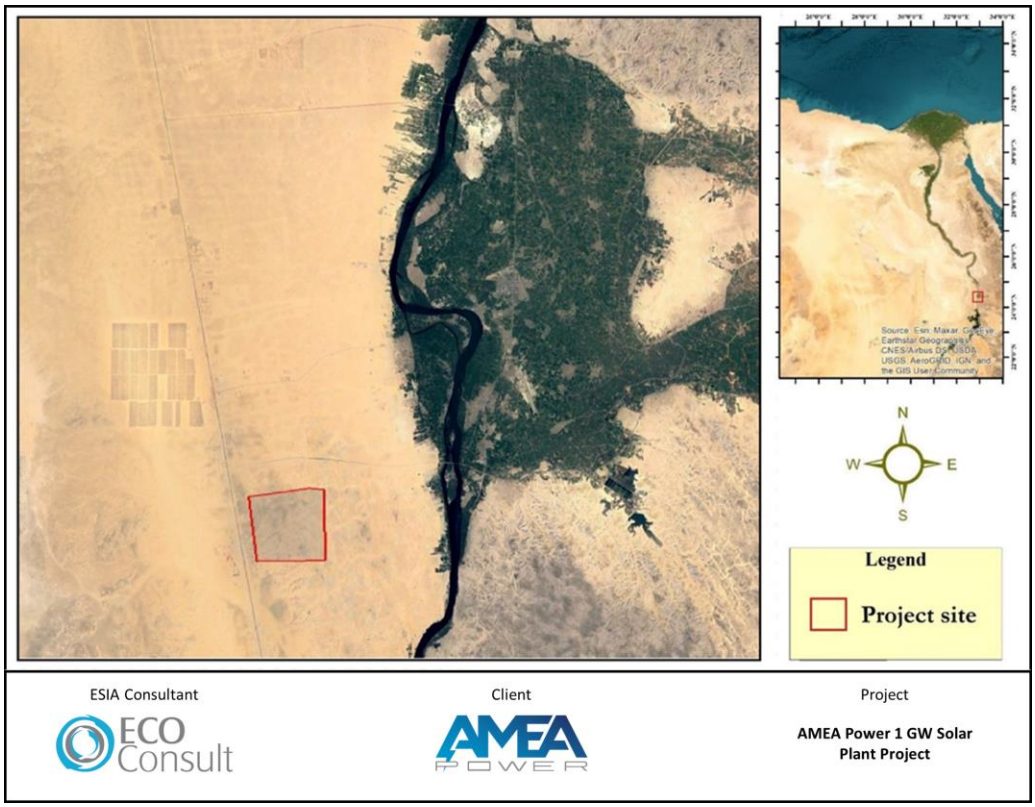

Figure 61: Map of the study area of the Project - 1GW Solar Project boundaries, and its buffer area in, Aswan governorate.

A. Key Biodiversity Areas (KBAs)

According to International Biodiversity Assessment Tool (IBAT), the Project site is not located within or near areas of critical environment concern, such as protected areas and/or Key Biodiversity Areas (KBAs) / Important Bird Areas (IBAs). The closest IBA is around 34km north of the site, which is Upper Nile IBA while Lake Nasser IBA is located around 120 km to the south of the project site (figure below). Also, no

protected areas are documented in the area where the closest protected area is the proposed Kor and Dongol Protected area which is located 88 km to the southwest of the project site.

Protected Areas:

The nearest area is evaluated as a proposed protected area (Kor Kor and Dongol), it's about 88 km to the southwest of the Project site. In addition, the Project alignment does not pass near or through established protected areas or key biodiversity areas. The closest distance between the Project site and Wadi Al Alaqi protected area (17) is about 160 km to the south, and Elba protected area (18) is about 195 km to the southeast and 175 km to east with Wadi El Gemal National Park (24). The Project is far from these areas to have any effect on them or the receptors detailed on the designation citations. Locations of protected areas are shown in the figure below.

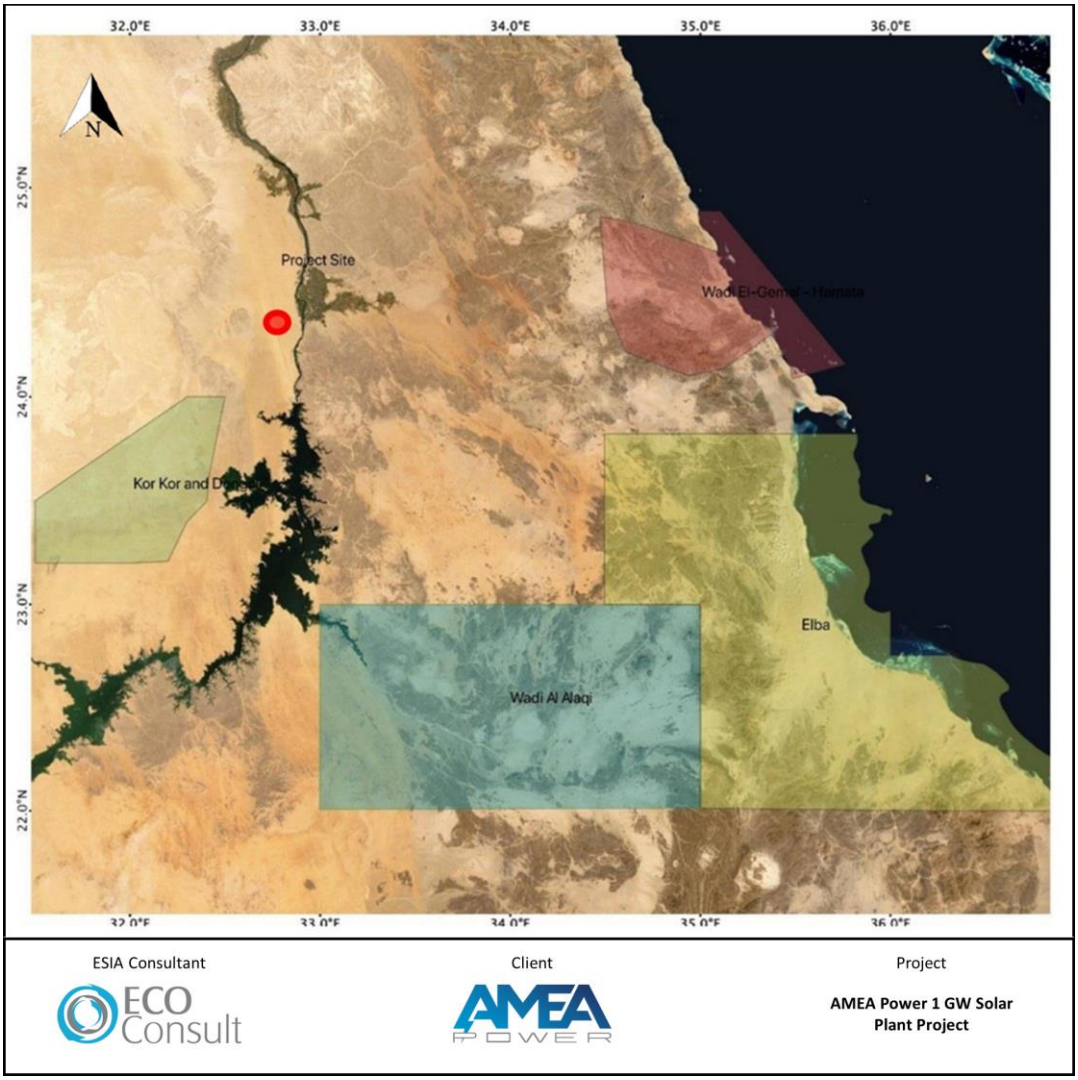

Figure 62: Locations of closest protected areas in relation to the project site.

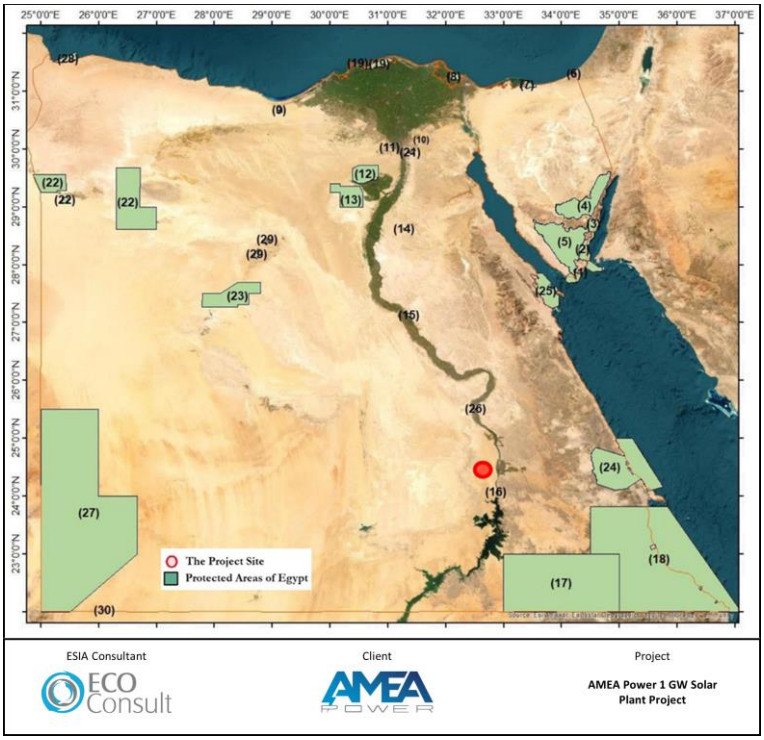

Figure 63: The project site and its buffer area, in relation to the closest protected areas of Egypt.

Important Bird Area (IBAs)

The nearest areas evaluated as Important Bird Area (IBAs) by BirdLife International are Aswan Reservoir IBA (13) which is approximately 36km south of the site, Lake Nasser IBA (14) which is approximately 39km to the south of the project site, and the Upper Nile IBA (12) which is approximately 59km to north of the Project site. The project alignment does not pass near or through Important Bird Area (IBA) or any another key biodiversity areas. Locations of Important Bird Area (IBA) in relation to the Project site are shown in the figure below.

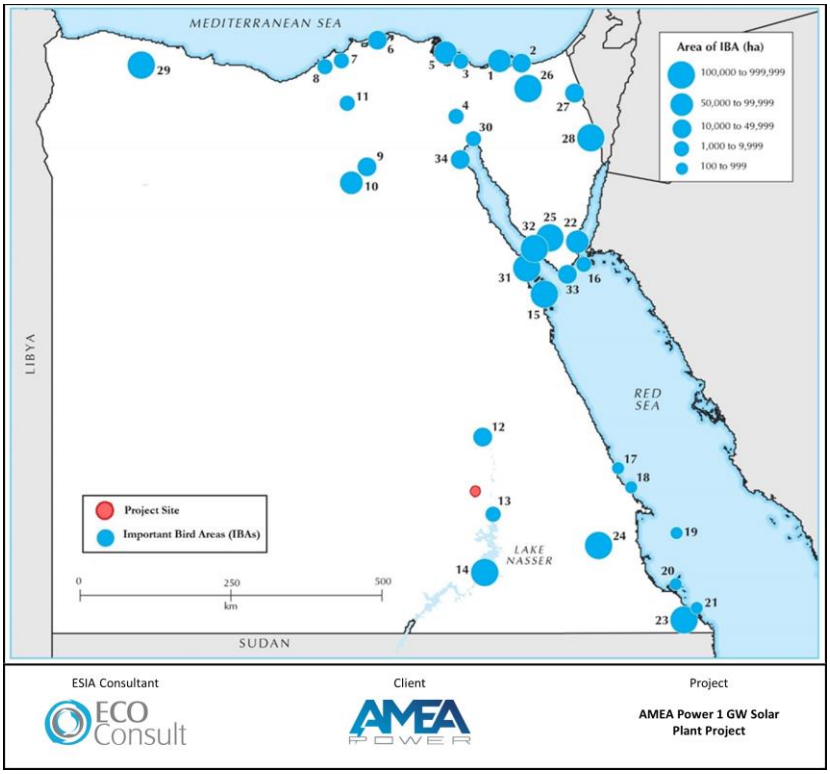

Figure 64: The project site and its buffer area, in relation to the closest Important Bird Area (IBA) by BirdLife International.

- Aswan Reservoir IBA (13): This site was identified as important IBA in 1999 because it regularly supports significant populations of key species of birds, meeting ('triggering') IBA criteria, A1, (1999).

  The IBA is an important winter site for *Aythya nyroca* which winters in internationally important numbers at the site. Over 6,000 waterbirds were counted in winter 1989/90, while c.3,000 were counted in February 1995. The most numerous birds were *Anas penelope*, *Aythya ferina*, *Aythya fuligula* and *Fulica atra*. Characteristic breeding birds include *Gallinula chloropus*, *Vanellus spinosus* and *Ceryle rudis*. *Egretta garzetta* and *Ardeola ralloides* breed in the vicinity of the reservoir. (Birdlife International, 2024). https://datazone.birdlife.org/site/factsheet/aswan-reservoir-iba-egypt

- Lake Nasser IBA (14): The site was identified as important IBA in 1999 because it regularly supports significant populations of key species of birds, meeting ('triggering') IBA criteria, A1, A4i, A4iii (1999).

  The IBA has become increasingly important as a wintering area for migratory Palearctic waterbirds. During January and February 1995, over 56,000 waterbirds were counted at about 20% of the lake. Thus, the total number of waterbirds wintering in the entire lake could be in excess of 200,000, making it one of the most important wetlands in Egypt. Most abundant of these were *Podiceps nigricollis, Pelecanus onocrotalus, Aythya fuligula, Aythya ferina, Anas clypeata, Anas penelope* and *Larus ridibundus*. Characteristic breeding birds include *Alopochen aegyptiacus*, *Milvus migrans, Burhinus senegalensis, Charadrius pecuarius, Vanellus spinosus, Galerida cristata* and *Prinia gracilis*. This is the only area where *Rynchops flavirostris* and *Motacilla aguimp* are known to breed in Egypt. During the summer months there is a significant influx of *Mycteria ibis* and *Pelecanus rufescens* into Lake Nasser (BirdLife International, 2024). https://datazone.birdlife.org/site/factsheet/lake-nasser-iba-egypt.

  Shooting of waterbirds is reported to take place regularly during winter, particularly by visiting European hunters, who take both game and non-game (protected) birds. Illegal hunting, collection and

trade in protected species (mainly *Crocodylus niloticus*, *Varanus niloticus* and *Gazella dorcas*) is widespread. Development has increased in the south-eastern part of the lake, as a result of the Tushka Reclamation Project. While this has led to increased disturbance to birds and their habitats at Lake Nasser, new wetland habitats are being created in the desert, benefiting waterbirds.

- Upper Nile IBA (12): The site was identified as important in 1999 because it was regularly supporting significant populations of the bird's key species, meeting ('triggering') IBA criteria, A1, A4i, A4iii (1999).

  This is the stretch of the Nile River with the highest concentrations of wintering waterbirds in Egypt. In the winter of 1989/90, 21,100 waterbirds were counted in this region. The river immediately above the Isna Barrage appears to hold the largest numbers of waterbirds within the site. The islands are particularly attractive to resting waterbirds. *Aythya nyroca* winters in internationally important numbers. *Netta rufina* winters regularly in small numbers, while *Marmaronetta angustirostris* is an irregular and rare winter visitor, last recorded from the area in 1983. This section of the Nile valley is likely to be of importance for staging waterbirds and other migrants, such as *Ciconia ciconia*, during the migration seasons (BirdLife International, 2024). https://datazone.birdlife.org/site/factsheet/upper-nile-iba-egypt

  All the islands in the Nile River were declared a Protected Area by Prime Ministerial Decree 1969/1998. Disturbance caused by a growing number of fishermen and tourist cruises is increasing. There is a substantial water-pollution problem caused by untreated discharge from sugar, phosphate and dairy factories, as well as from urban areas. Erosion of the Nile banks has become a problem since the construction of the High Dam. As a mitigating measure, long stretches of the Nile banks are being encased with rocks. This will alter the natural condition of this part of the Nile and potentially reduce its importance for waterbirds. Reed-control programs are likewise reducing vital waterbird habitat.

B. Methodology

Terrestrial Ecology Survey Methodology

The terrestrial survey was completed between the 8th and 10th of October 2024 and covered the Project footprint and a wider study area extending several kilometers in each direction around the Project Site (figure below). A single visit to site was deemed appropriate to identify presence or potential presence of habitats suitable for species of conservation concern.

In addition, as noted further below, consultations with key stakeholders (mainly Nature Conservation Egypt), indicated that methodology for assessment is considered sufficient.

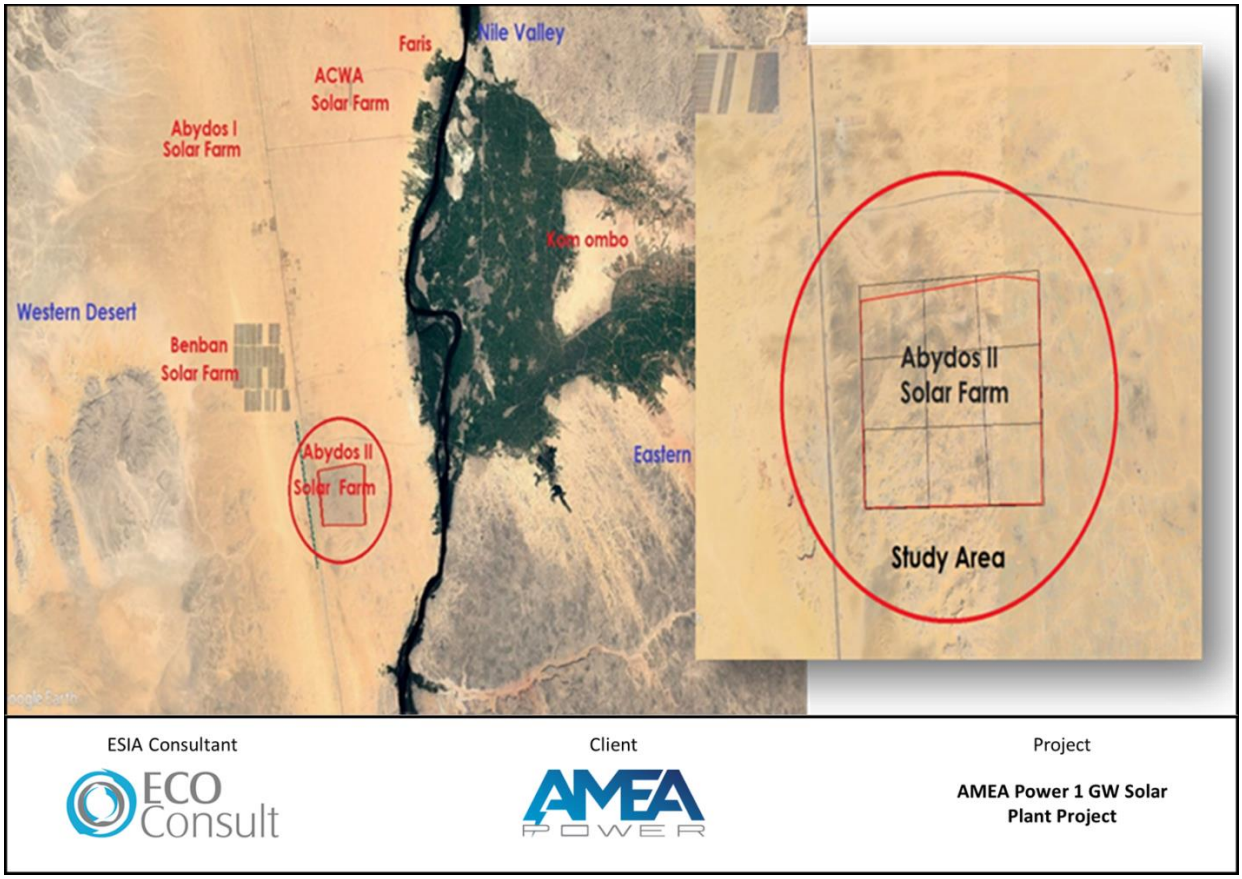

Figure 65: The Study Area And The Project Site Of The Project - 1GW Solar Farm Project

Available secondary data specifically covering the Project Site, or the Study Area is lacking in the scientific literature. Considerable secondary data, however, are available on the nearby but very similar area of the Benban solar farm. In addition, significant data is available on the Kom Ombo area within the larger geographical context of the southern region of the Western Desert of Egypt. Field survey was therefore, designed to collect site-specific data and to verify information available from the more "coarse grain" studies covering the south-eastern region of the Western Desert. The overall goal of this survey was to assess the existing environmental conditions in the Project area based upon a combination of available secondary data and field surveys. The desktop review of secondary data consisted of thoroughly reviewing and analyzing all available data on the general area of the Project as well as the proposed Project site. Survey of the habitat types at the regional scale was initially based upon the Egyptian national habitat type classification (Ayyad and Ghabour, 1977; Saleh, 1993, Harhash, et al., 2015, Ministry of Environment, 2016) and review of satellite imageries data, and it will be verified by field survey.

Terrestrial fauna was assessed at both the habitat and species levels, covering resident and transient species, including amphibians, reptiles, birds, and mammals. Their ecological relationships were also surveyed and described. The surveys identified key terrestrial fauna present at or near the area of the proposed Project site, including endangered and protected species, if any, that may be impacted by the proposed development. The site survey methodology for this study was based on walkover by dividing the Project site into a network of grids, where each grid area is nearly 1.5 square kilometers. The surveys also included methods based on a similar approach to grid-based sampling as shown in the figures below.

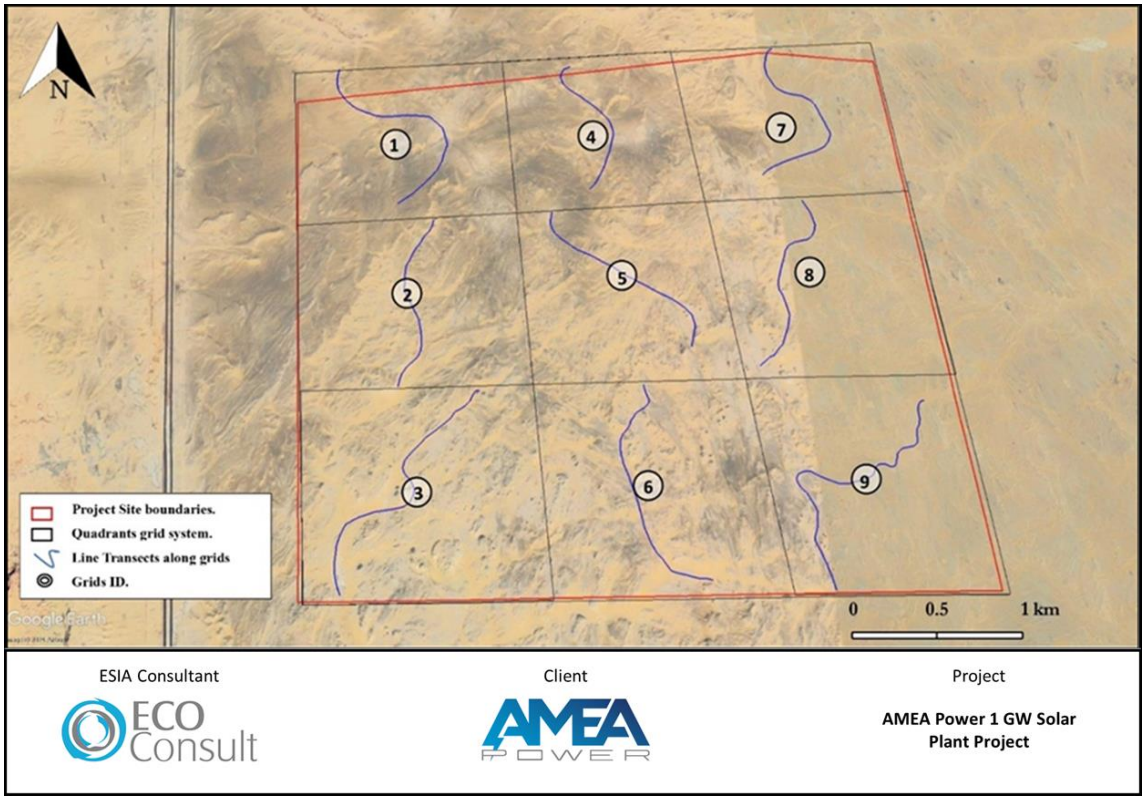

Figure 66: Study Site of Project - 1GW Solar Farm Project Divided into a Quadrants Grid System With Sampling Fixed Width Line Transects Across The Grids

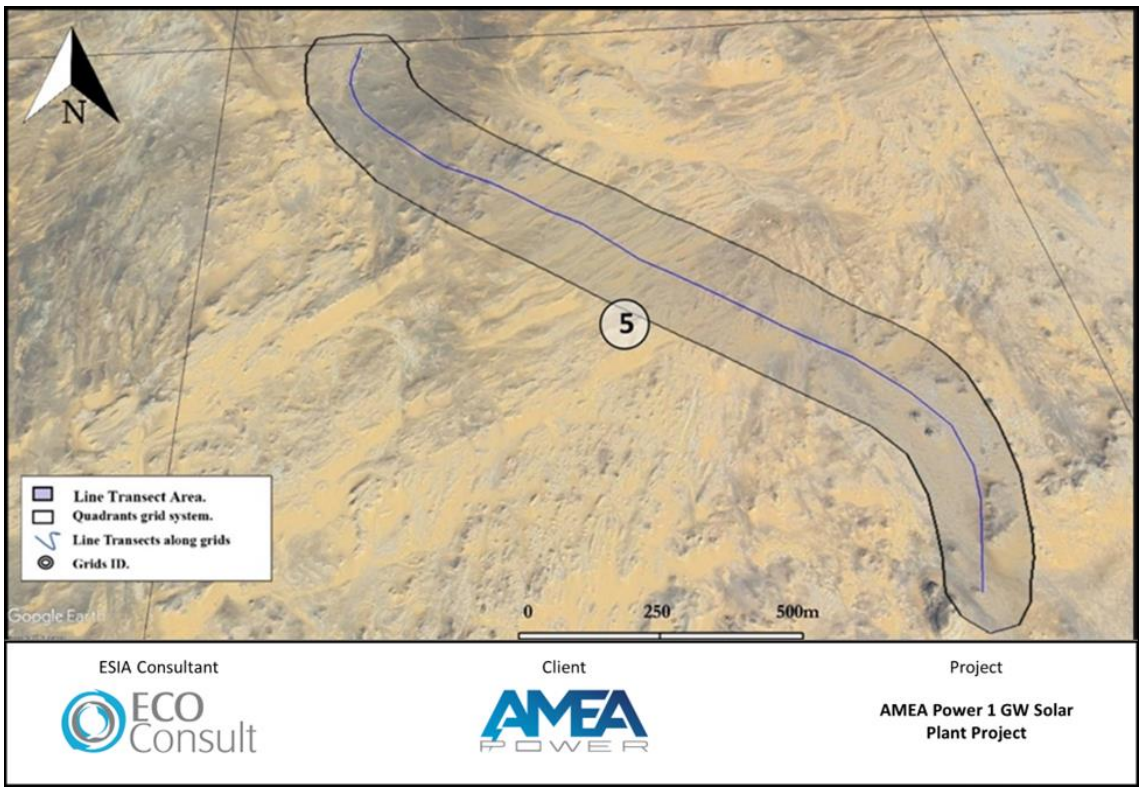

Figure 67: Fixed Width Line Transects; Each Transects Covered an Area Equal To Its Length × Width Of Ca. 200 Meters On Both Sides (100 M On Each Side Of The Surveyor).

The field survey was based on a walkover methodology, with systematically placed fixed-width line transects conducted along the surveyed site alignment, as applicable. Each walking transects covered a length of 1.51-2.1 kilometers and a width of approximately 200 meters on both sides of the surveyor to ensure a very high and accurate detection probability. Additionally, nearly all vegetation points along the site were surveyed for faunal presence, especially for mammals, birds, reptiles, and invertebrates.

No elements of the fauna were collected during the field survey at the surveyed site or at any adjacent areas where relatively important habitats were located. Indicators of biodiversity, including mammals, birds, reptiles, scorpions, and tenebrionid beetles, were used to assess species richness. Seasonal changes in the occurrence or abundance of certain elements of the biota could not be covered since the survey spanned only one season.

Diurnal reptile species were surveyed using active searches along the line transects detailed above. They were captured using long tweezers after following their tracks or dug out of their burrows and subsequently released at the point of their capture after identification. Identification was carried out according to the keys of Saleh (1997) and Baha El Din (2006).

Bird observations were made using fixed-width walking transects along the site grids. Bird counts were carried out along predefined fixed-width line transects, each of which was 1,500 meters along the walking path and 200 meters wide (100 meters on each side of the surveyor) to ensure a high and accurate detection probability. Observations were conducted using the naked eye, in addition to Nikon Prostava 10×42 binoculars, so each sector covered an area of 200 square meters in each survey grid, especially in the areas of bird attraction (Bibby et al., 2000).

Bird counting and monitoring surveys were conducted during the morning hours immediately after sunrise. Observations of resident and migratory birds were recorded for each species in each area, and distances to the bird or flock center were recorded using a portable laser rangefinder (Range Finder). For each recorded species, the group configuration, its size, and other additional information such as habitat, GPS coordinates, and time were also documented. During the registration of birds in flight status, care was taken to reduce double counting by observing their flight direction (Bibby et al., 2000).

Approximately nine fixed-width line transects were systematically placed and conducted along the project site, nearly every 1.5 km² grid as applicable. Each walking transects covered a length of 1.51-2.1 km, and the total length of all transects was 16.19 km along the project alignment and its surrounding area. Thus, the total area covered by all transects was 3.27 km².

In addition, a carcass search was conducted along 10 km of the OHTL within 2 km parallel to the Project site, as the line transect covered a length of 10 km and a width of approximately 200 meters on both sides of the surveyor to ensure very high and accurate detection probability.

Mammals were recorded during the walking transects, along the Project alignment and adjacent areas. Visual sightings and evidence will be the primary method of data collection supplemented by evidence sightings from observed tracks and dung. The occurrence of small carnivores such as foxes and smaller cats was detected based on their tracks or direct observation.

Bats species were expected to be in the study area, during site surveys bats roosting searches was conducting along the project alignment at any potentially suitable structures as the rocky caves, crakes, buildings or trees for any evidence of their presence.

Local conservation status for mammals followed (Osborn, & Helmy, 1980, Basuony et al., 2010), reptiles based on (Baha El Din, 2006; El-Gabbas, 2012) and birds followed IUCN (IUCN, 2024).

C. Findings

Habitats

According to Olson et al (2001), the Project area is located in the Desert and Xeric Shrublands Biome and more specifically in the Ecoregion of South Sahara Desert (figure below). Although the Project site is less than 7 km from the Nile Valley Flooded Savanna Ecoregion which is a humid and richly vegetated ecoregion, the Project site is extremely dry and poorly vegetated. Geomorphologically, according to Zahran et al (2016), the Project site is located in the Southwestern Desert, to the West of the Nile, which generally covers more than two thirds of the surface area of the country.

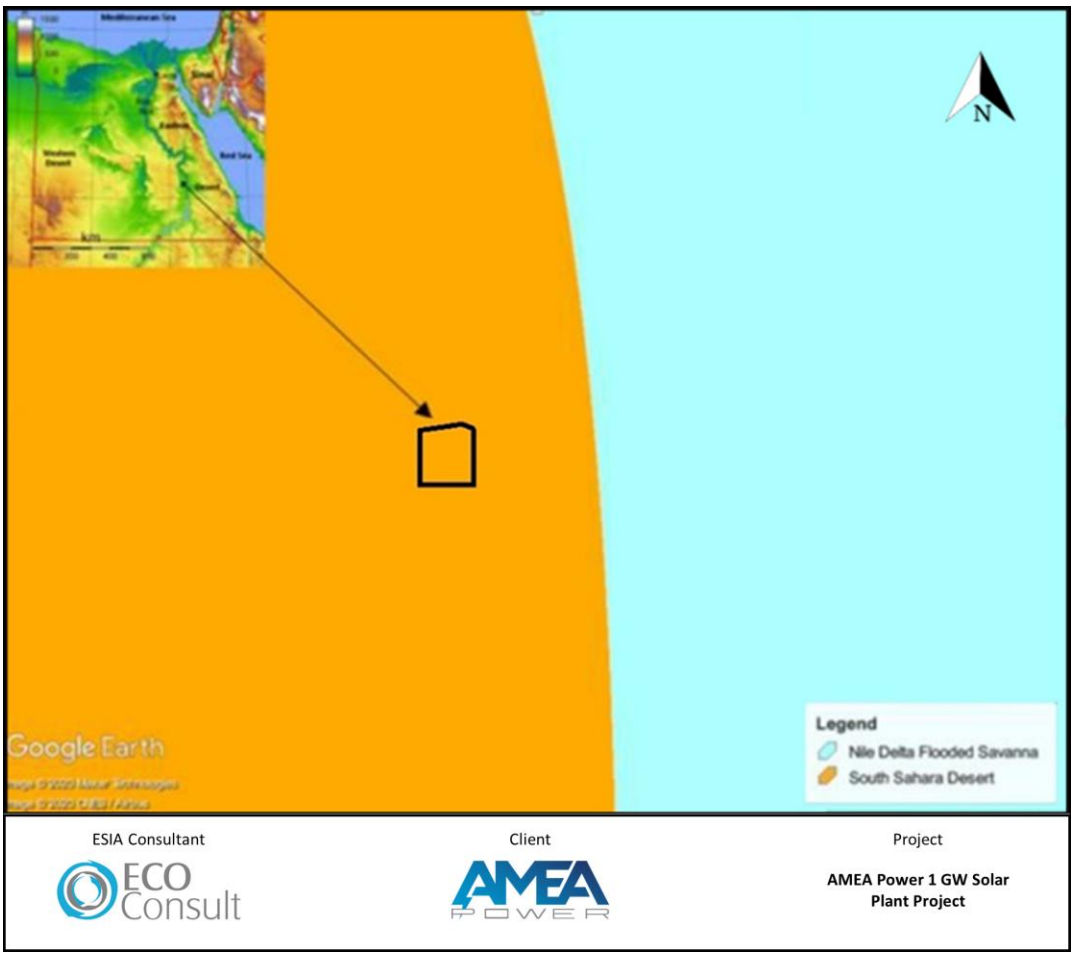

Figure 68: Location of Project Site in Relation To Ecoregions Of The World (Olson Et Al, 2001)

Typical of all desert regions, habitats of the Project Site and the Study Area are limited in diversity and coverage. Habitable areas, even for the hardiest desert species, are restricted locations that have certain topographic features, which allow adequate moisture to be available at or near the ground surface. The Project Site and the surrounding desert land are mostly barren and supports a very little permanent animal and plant life.

The whole site is considered as a natural habitat without any evidence of anthropogenic activities. Also, the Project site is a natural desert habitat composed of a mixture of sandy, gravel plains and rocky habitat types. The site topography is a mix of rocky, gravel desert hills varying in heights alternating with furrow-like sandy vegetated depressions in between. The vegetation cover grows on the scarcity annual

precipitation which aggregates and collects in these sandy drainage depressions in years with good precipitation season as shown in the figures below.

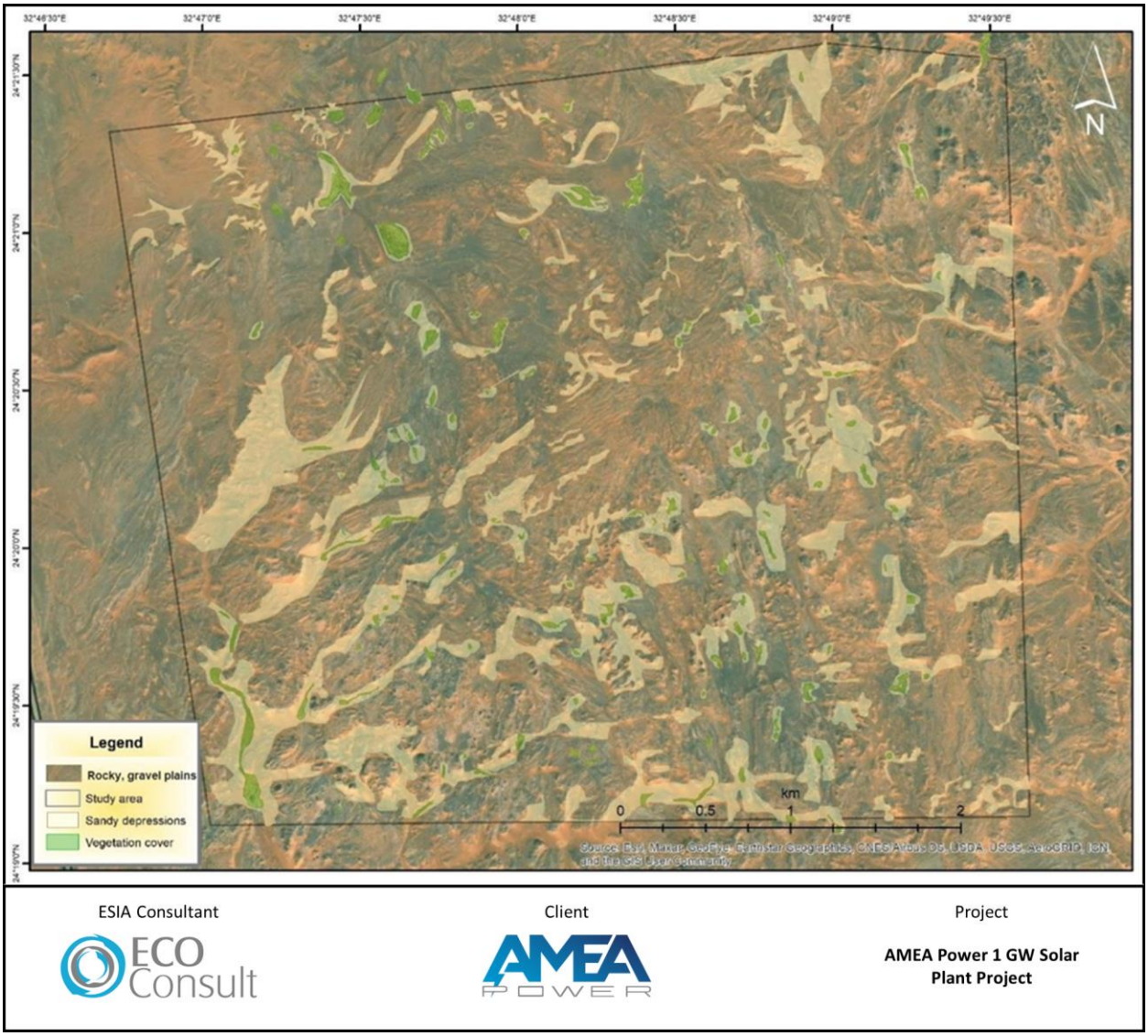

Figure 69: Habitats Map of The Project Site Including, A Mixture Of Sandy, Gravel Plains And Rocky Habitat Types And Very Limited Vegetation Cover Restricted To The Sandy Drainage Depressions.

The Project site has a very limited vegetation cover not exceeding 1% of total surface area of the Project site and restricted to the sandy drainage depressions. Where present the vegetation is dominated by *Salsola imbricata* which is considered a common species and typical in such habitats. 80% of the vegetation recorded on site was this species, with *Zilla spinosa* and *Zygophyllum album* also recorded with each making up roughly 10% of the present vegetation, *Tamarix nilotica, Hyoscyamus boveanus* and some scattered *Orobanche* were recorded rarely across the site. More than 90% of shrubs were very dry because of scarcity of water (figures below). *Hyoscyamus boveanus* was found in two locations; Stand 22 (24.35278, 32.80639) and Stand 23 (24.35611, 32.79722) with up to nine individuals found in total.

Figure 70: The community of the vegetation covers along Project - 1GW Solar Farm Project site, A) *Salsola imbricata,* B) *Zilla spinosa,* C) *Zygophyllum album*, D) *Tamarix nilotica,* E) *Orobanche* F) Dray shrubs.

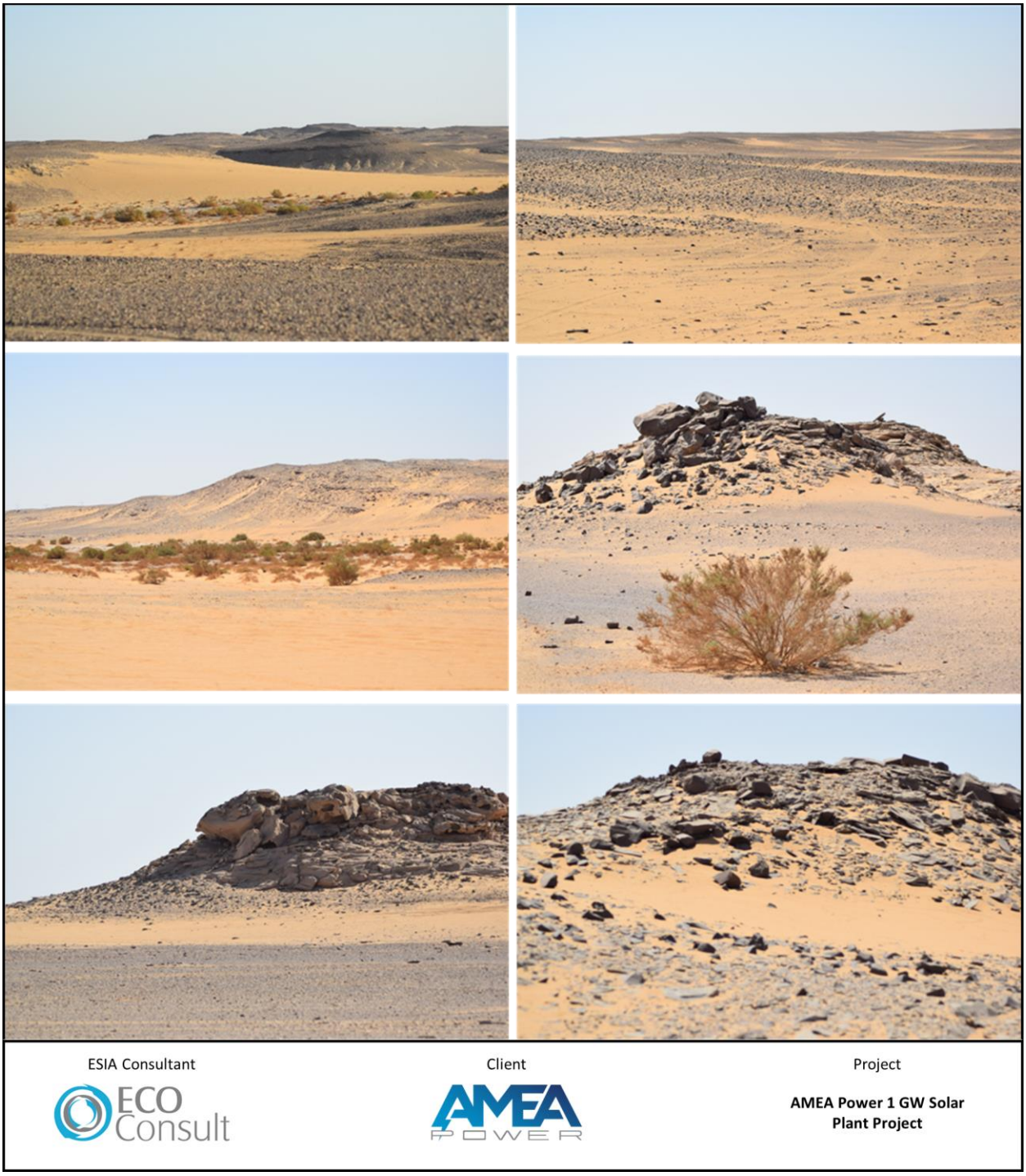

Figure 71: General Views of the Landscape of Project Site showing the variety of land topography with vegetation cover that sandy drainage depressions

D. Mammals

During the survey no mammal species were recorded as a direct observation within the Project site in specifically. Two species were recorded as indirect observation (tracks) along the surveyed sites of Project,

namely, Red Fox (*Vulpes vulpes*) and Lesser Egyptian Jerboa (*Jaculus jaculus*). Both these species are listed globally and locally as a Least Concern species according to the IUCN red list (Basuony et al., 2010).

Generally based on a literature review of mammals of Egypt (Osborn, & Helmy, 1980, Basuony et al., 2010), previous studies in the closest site of Benban, Fares (ACWA Power), and Abydos I Solar Farm projects, and based on their global distribution maps and the suitability of the habitat at the project site, 27 further mammalian species have potential to be present within the Project area and local area, these are shown in the table below. Since the number of mammals recorded was low, they are considered one of the lowest abundant groups during the survey. This deviation from literature can be attributed to the fact that most mammals are nocturnal, wide ranging and therefore require the placement of numerous different types of traps in the various habitats of the study area, in addition to the setting of camera traps to capture images of the mammals in that area.

Globally, only one species with a potential to be present on site is listed as threatened according to IUCN's Red List of Threatened Species (IUCN, 2020) and that is Dorcas Gazella (*Gazella Dorcas*) which is listed as "Vulnerable". The species is believed to be extremely rare in the Project site and its vicinity since the Project site is very close to a main highway with a high baseline level of human activity. If recorded, the species would most definitely be on passage since the Project site and its vicinity does not provide vegetation cover for food or rest. Striped Hyena (*Hyaena hyaena*) (IUCN Near Threatened) is also potentially present within the Project area. Three species listed as being of conservation concern locally also have potential to be present in the study area, these are; Greater Mouse-tailed Bat (*Rhinopoma microphyllum*), Sand Cat (*Felis margarita*) and Dorcas Gazella which are all were listed locally as "Vulnerable" according to the local Egyptian red list (Basuony et al., 2010), while the project site contains broadly suitable habitats, these species are believed to be extremely rare in the region and therefore unlikely to occur based on the evidence available and the habitats present .

One known endemic sub-species was Swamp Cat (*Felis chaus niloticus)*, and two mammalian species classified as near endemic; Christie's Long-eared Bat (*Plecotus christii*), and Greater Egyptian Gerbil (*Gerbillus pyramidum*) were identified as having potential to be present during the desk study, no evidence of these species was observed during the field study.

Also, there are three mammalian species, Egyptian swamp cat, Sand Cat and Wild Cat (*Felis silvestris*) are the only mammalian species listed in CITES (CITES, 2021) which have potential to be present on site according to the desk study.

Egyptian swamp cat is widespread throughout the Nile valley and delta, and tend to prefer marshland, often restricted to agricultural habitats with long grass. They feed on a variety of food items including small mammals, waterbirds, reptiles, amphibians, fishes, and fruits. No habitat of this type is present on site and it is considered unlikely that this species will be present in the Project area.

In addition to the terrestrial mammals noted above, up to nine bat species have potential to be present in the study area. On site studies included searched of potential roosting locations such as rocky caves and crags but no evidence of use by bats was found. No buildings, bridges or trees are present within the Project area.

Figure 72: Observed mammals during the survey along the Project - 1GW Solar Farm Project site, A) Red fox Vulpes vulpes tracks, B) Red fox dung inside its burrows, C) Lesser Egyptian Jerboa Jaculus jaculus tracks, D) Rodents tracks, E, F, G, H) Caves and crakes.

Table 30: Mammalian Species with potential to be present within the Project surrounding areas

English name	Scientific name	global IUCN	Egypt IUCN	Protected Status	Endemicity/ restricted Range	Resident/ migratory	Habitat preference	Abundance in Egypt
Egyptian Fruit Bat	*Rousettus aegyptiacus*	Least Concern	Least Concern	No	No	Resident	Relatively humid caves and old empty buildings	Common
Egyptian Tomb Bat	*Taphozous perforatus*	Least Concern	Least Concern	No	No	Resident	Roosts in cracks, empty buildings, caves	Uncommon
Arabian Horseshoe Bat	*Rhinolophus clivosus*	Least Concern	Least Concern	No	No	Resident	Areas with trees, roosts in caves and old empty building	Uncommon
Trident leaf-nosed bat	*Asellia tridens*	Least Concern	Least Concern	No	No	Resident	Desert species live in arid rocky caves and crakes	Common
Egyptian Mouse-tailed Bat	*Rhinopoma cystops*	Least Concern	Least Concern	No	No	Resident	Desert species live in arid rocky caves and crakes	Uncommon
Greater Mouse-tailed Bat	*Rhinopoma microphyllum*	Least Concern	Vulnerable	No	No	Resident	Desert species live in arid rocky caves and crakes	Uncommon

Egyptian slit-faced bat	*Nycteris thebaica*	Least Concern	Least Concern	No	No	Resident	Desert species live in arid rocky caves and crakes	Uncommon
Christie's Long-eared Bat	*Plecotus christii*	Data Deficient	Least Concern	No	Near Endemic	Resident	Desert and semi-arid desert habitat species live in arid rocky caves and crakes	Uncommon
The lesser mouse-tailed bat	*Rhinopoma hardwickii*	Least Concern	Least Concern	No	No	Resident	Desert and semi-arid desert habitat species live in arid rocky caves and crakes	Uncommon
Cape Hare	*Lepus capensis*	Least Concern	Least Concern	No	No	Resident	Thick vegetations habitats	Common
Lesser Egyptian Jerboa	*Jaculus jaculus*	Least Concern	Least Concern	No	No	Resident	arid deserts	Uncommon
Egyptian spiny mouse	*Acomys cahirinus*	Least Concern	Least Concern	No	No	Resident	Roky arid regions, desert gardens, houses	Common
House Mouse	*Mus musculus*	Least Concern	NA	No	No	Introduced	urban areas, rocky valley near the sea	Common

Lesser Egyptian Gerbil	*Gerbillus gerbillus*	Least Concern	Least Concern	No	No	Resident	deep in sandy deserts, sand dunes and salt marshes	Common
Greater Egyptian Gerbil	*Gerbillus pyramidum*	Least Concern	Least Concern	No	Near Endemic	Resident	palm groves, olive and fruit gardens, coastal plains, sand dunes, gravel, and desert oases	Uncommon
Sundevall's Jird	*Meriones crassus*	Least Concern	Least Concern	No	No	Resident	Desert, sandy like areas	Uncommon
Brown Rat	*Rattus norvegicus*	Least Concern	NA	No	No	Resident	Village houses, canal banks and near water sources	Common
Egyptian wolf	*Canis lupaster*	Least Concern	Least Concern	No	No	Resident	Desert, farms, and gardens	Common
Egyptian Red Fox	*Vulpes vulpes*	Least Concern	Least Concern	No	No	Resident	Commensal with people, in variety of habitats	Common
Sand Cat	*Felis margarita*	Least Concern	Vulnerable	No	No	Resident	Restricted to sandy desert	Rare

Swamp Cat	*Felis chaus niloticus*	Least Concern	Least Concern	No	Endemic	Resident	Marshes, agricultural areas, anywhere with long grass	Common
Wild Cat	*Felis silvestris*	Least Concern	Least Concern	No	No	Resident	True desert areas	Common
Egyptian Mongoose	*Herpestes ichneumon*	Least Concern	Least Concern	No	No	Resident	agricultural fields, grassy areas with water	Common
Striped Hyena	*Hyaena hyaena*	Near Threatened	Least Concern	No	No	Resident	Desert and semi-desert areas	Common
Dorcas Gazella	*Gazella dorcas*	Vulnerable	Vulnerable	No	No	Resident	Sand plains and wadies	Rare

E. Avifauna

During the transect surveys only 8 birds species were recorded. These were exclusively found at vegetated sandy depressions along the site survey. Crowned sandgrouse (*Pterocles coronatus*) was the most abundant species with 37 individuals, while the most widely observed species in the Project site was Greater Hoopoe Lark (*Alaemon alaudipes)* which recorded at 7 line transects, followed by Clamorous reed warbler (*Acrocephalus stentoreus)* which was recorded at 4 line transects along the study area. All recorded species are of Least Concern according IUCN conservation status, while only one bird species – Common Kestrel (*Falco tinnunculus*) observed from the project alignment, was listed in CITES.

According to Checklist of the Birds of Egypt, Goodman (1989), eBird, Birdlife international, global distribution maps and the habitats present on site, along with and previous studies in the closest sites of Benban, Fars, and Abydos I Solar Farm projects, 19 bird species listed as Near Threatened may be expected to be observed in the general area of the Project site. These species belongs to 7 orders and 9 families. The most abundant orders are Accipitriformes and Charadriiformes which are represented by 5 species each. No suitable terrestrial habitat suitable to support species of conservation concern is present on site, and only one species (African Houbara (*Chlamydotis undulata*) – IUCN VU) has been identified in the desk study as having potential to be present in the habitat types observed. The list of these species observed at the project site and surrounding area is shown below in the table below.

The results of the survey showed that, along the 9 fixed width line transects of the project site area, only 8 species were present, none of which are species of conservation concern (table below). The observed species belong to 4 orders and 6 families which represented by (6 resident and 2 migratory), the most abundant order is Passeriformes which represented by 3 families and 4 species. This scarcity of birds' species observations reflected the scarcity of resources in the arid habitats of the Project site. Also, all observations were at the small dry vegetation patches of annual shrubs in sandy drainage depressions along the study area. Given the specific geographical location and ecological characteristics of the Project site, it is hypothesized that no bird species of significant conservation concern are likely to inhabit the area at other times of the year. The likelihood of observing a threatened species at the Project site is limited to migratory birds passing through/over the area. Given the current habitat conditions and topographic features, the Project site is not considered a suitable resting or roosting area for these species.

Also, the project alignment does not pass near or through Important Bird Area (IBA) or any another key biodiversity areas. The closest distance between the project site and the Lake Nasser IBA (13) is about 48 km to South of the project site, and 62 km to North with the Upper Nile (12) Important Bird Area (IBA), locations of Important Bird Area (IBA) in relation to the project site are shown in figure above.

In terms of IUCN conservation status, all 32 species observed in the general area of the southwestern desert region were classified as "Least Concern." Regarding CITES, two bird species from the general study area were identified: the Kestrel (Falco tinnunculus) and the Little Owl (Athene noctua).

Table 31: Bird species with potential to be present in the Project area and surrounds considered by the IUCN as Near Threatened or greater

Common Name	Scientific Name	Global IUCN	Resident/ Migratory	Observed on site	Suitable terrestrial habitat present on site
Egyptian Vulture	*Neophron percnopterus*	Endangered	Migratory	N	N

Steppe Eagle	*Aquila nipalensis*	Endangered	Migratory	N	N
Saker Falcon	*Falco cherrug*	Endangered	Migratory	N	N
Common Pochard	*Aythya ferina*	Vulnerable	Migratory	N	N
European Turtle-dove	*Streptopelia turtur*	Vulnerable	Migratory	N	Y
Greater Spotted Eagle	*Clanga clanga*	Vulnerable	Migratory	N	N
Eastern Imperial Eagle	*Aquila heliaca*	Vulnerable	Migratory	N	N
Red-footed Falcon	*Falco vespertinus*	Vulnerable	Migratory	N	N
Sooty Falcon	*Falco concolor*	Vulnerable	Migratory	N	N
African Houbara	*Chlamydotis undulata*	Vulnerable	Nomadic	N	Y
Marbled Teal	*Marmaronetta angustirostris*	Near Threatened	Migratory	N	N
Ferruginous Duck	*Aythya nyroca*	Near Threatened	Migratory	N	N
Great Snipe	*Gallinago media*	Near Threatened	Migratory	N	N
Black-tailed Godwit	*Limosa limosa*	Near Threatened	Migratory	N	N
Curlew Sandpiper	*Calidris ferruginea*	Near Threatened	Migratory	N	N
Northern Lapwing	*Vanellus vanellus*	Near Threatened	Migratory	N	N
Black-winged Pratincole	*Glareola nordmanni*	Near Threatened	Migratory	N	N
Pallid Harrier	*Circus macrourus*	Near Threatened	Migratory	N	N
Woodchat Shrike	*Lanius senator*	Near Threatened	Migratory	N	Y

Table 32: Observed Bird Species, Count, And Number Of Transects In Which They Were Recorded, During The Survey Along The Project Alignment

Common Name	Scientific Name	Global IUCN	Resident/ Migratory	Total Count	Total Count Transects
Hooded crow	*Corvus cornix*	Least Concern	Resident	2	1
Common Kestrel	*Falco tinnunculus*	Least Concern	Resident	2	1
Crowned sandgrouse	*Pterocles coronatus*	Least Concern	Resident	37	2
Clamorous reed warbler	*Acrocephalus stentoreus*	Least Concern	Resident	4	4
Greater Hoopoe Lark	*Alaemon alaudipes*	Least Concern	Resident	9	7
Desert Wheatear	*Oenanthe deserti*	Least Concern	Resident	1	1

Common redstart	*Phoenicurus phoenicurus*	Least Concern	Migratory	1	1
Whinchat	*Saxicola rubetra*	Least Concern	Migratory	1	1

Figure 73: Observed Reptiles During The Survey Of The Project Area, A) *Pterocles coronatus*, B) *Falco tinnunculus*, C, D) *Alaemon alaudipes*, E) *Acrocephalus stentoreus*, F) *Phoenicurus phoenicurus*., G) *Oenanthe deserti* And H) *Saxicola rubetra*.

F. Bird Migrations and Site Sensitivity

According to the literature and available satellite tracking information on the migratory soaring birds Migratory Soaring Birds (MSB) (as shown in the figure below), it demonstrates that the Project site is not located within the main migration routes of the MSB species which mainly follows the southern parts of

the Nile River and its valley and the western coast of the Red Sea (Buechley et al., 2018a, 2018b; Phipps et al., 2019), but also may pass accidentally over adjacent barren areas such as the Project site (Meyburg et al., 2012).

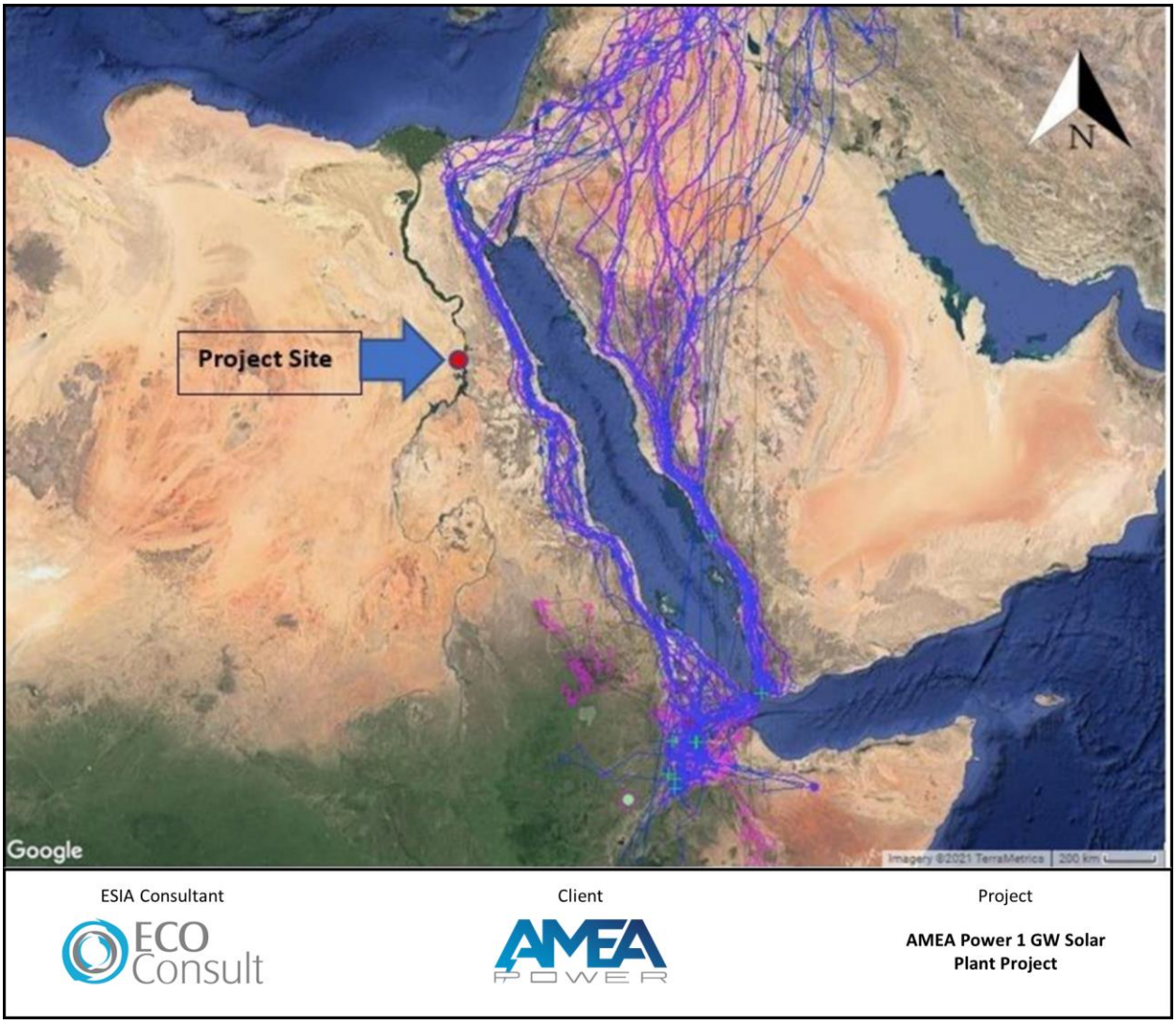

Figure 74: Satellite Map of the Main Migration Routes of Egypt

The only considerable secondary data, however, was available on Birdlife International soaring birds' sensitivity mapping tool for the project site and 5 km of its surrounding buffering area, the site potential sensitivity according to this tool is zero, while there were only 15 species of migratory soaring birds already observed pass accidentally over the study area, all recorded species of "Least Concern" according IUCN red list, while 6 bird species of them were listed in CITES as presented in the table below.

Table 33: All Birds Species Have Already Been Observed At The Study Area According To Birdlife International Soaring Birds' Sensitivity Mapping Tool

English Name	Latin name	Global IUCN	Resident/ Migratory	Breeding Status	CITES
Osprey	*Pandion haliaetus*	Least Concern	Resident	Breeding	Not listed
White stork	*Ciconia ciconia*	Least Concern	Migrant	Non-Breeding	Not listed

Black stork	*Ciconia nigra*	Least Concern	Migrant	Non-Breeding	II
Common kestrel	*Falco tinnunculus*	Least Concern	Resident/ Passenger	Breeding	II
Lanner falcon	*Falco biarmicus*	Least Concern	Resident/ Passenger	Breeding	II
Peregrine falcon	*Falco peregrinus*	Least Concern	Resident/ Passenger	Breeding	I
Common crane	*Grus grus*	Least Concern	Migrant	Non-Breeding	II
Great white pelican	*Pelecanus onocrotalus*	Least Concern	Migrant	Non-Breeding	Not listed
Eurasian Spoonbill	*Platalea leucorodia*	Least Concern	Migrant / wintering	Non-Breeding	II
Glossy ibis	*Plegadis falcinellus*	Least Concern	Resident	Breeding	Not listed
Black-winged kite	*Elanus caeruleus*	Least Concern	Resident	Breeding	Not listed
Black Kite	*Milvus migrans*	Least Concern	Resident/ Migratory	Non-Breeding	Not listed
Marsh harrier	*Circus aeruginosus*	Least Concern	Resident/ Migratory	Non-Breeding	Not listed
Hen harrier	*Circus cyaneus*	Least Concern	Migrant / wintering	Non-Breeding	Not listed
Eurasian sparrowhawk	*Accipiter nisus*	Least Concern	Migrant / wintering	Non-Breeding	Not listed

According to Birdlife International soaring birds' sensitivity mapping tool, the migration tracks maps of the project site and 5 km buffer showed that there were only five recorded migration tracks (refer to figure below).

Figure 75: Birdlife International Migration Satellite Tracks Maps Of The Project Site And Its 5 Km Buffering Area.

G. Fatality search

During the site surveys, a rapid carcasses search was conducted along the 10 km of OHTL which is within 2 km of the Project site. This consisted of a line transect covering a length of 10 km and a width of ca. 200 meters on both sides of the surveyor to ensure very high and accurate detection probability, to record any carcasses under the existing line.

Along 10 km of OHTL represented by three Overhead lines in parallel to each other (from the east, Aswan-Naga Hamadi, 500kv, C. 2, then Aswan- Naga Hamadi, 500kv, C. 1, then Benban 3- Toushkey 2, 500kv) and in parallel to the project site as a part of the total length of surveyed transect, there were no carcasses at any part along the 10 km of OHTL of surveyed transect as shown in the figure below.

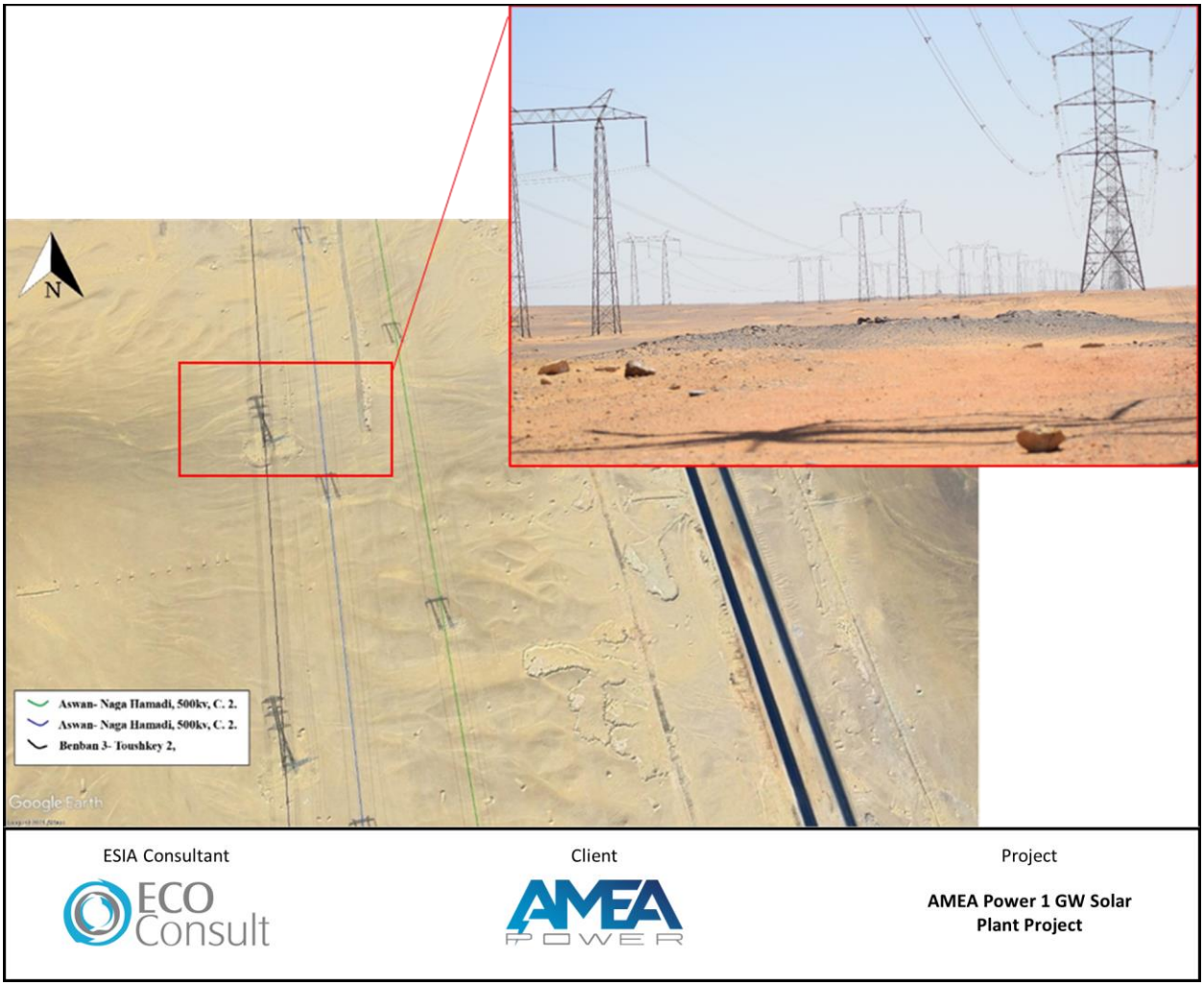

Figure 76: Map Showing OHTL Represented by Three OHT Lines In Parallel To Each Other And To The Project Site

H. Reptiles

Site surveys were conducted, based on active search methodology using transect routes broadly comparable to those displayed earlier, thus covering a good proportion of the Project site.

There was only one reptilian species recorded as a direct observation, belonging to three individuals of Nidua Lizard *Acanthodactylus scutellatus*. In addition, many tracks and burrows of unidentified lizards and snakes were recorded in all vegetation patches along the Project site sandy depressions.

However, generally based on a literature review and according to Saleh (1997) and Baha El Din (2006), there are 25 reptilian species, that have their distribution range covering the Project site general area.

All reptilian species listed as having distribution ranges covering the Project area belonged to 9 families, represented by 4 lizards' families (Gekkonidae which represented by 7 species, Scincidae 3 species, Lacertidae 4 species, and Varanidae represented by only one species) and five snakes' families (Colubridae which represented by 5 species, Elapidae 2 species, while Leptotyphlopidae, Boidae and Viperidae each of which were represented by only one species) refer to the table below.

All those species were evaluated as Least Concern on the global level of the IUCN Red List of Threatened Species except Nubian Pigmy Gecko (*Tropiocolotes nubicus)* which is evaluated as "Data Deficient", and Saharan Ocellated Skink (*Chalcides cf. humilis*) which is not evaluated globally.

Three species are evaluated as threatened according to local conservation status of Egypt IUCN Red List of Threatened Species, these are Theban Sand Boa (*Eryx colubrinus*) and Nile Monitor (*Varanus niloticus*) were listed as "Vulnerable" (VU), and Nubian Spitting Cobra (*Naja nubiae*) which is listed as "Near Threatened" (NT). Nile Monitor is also listed in CITES (2021).

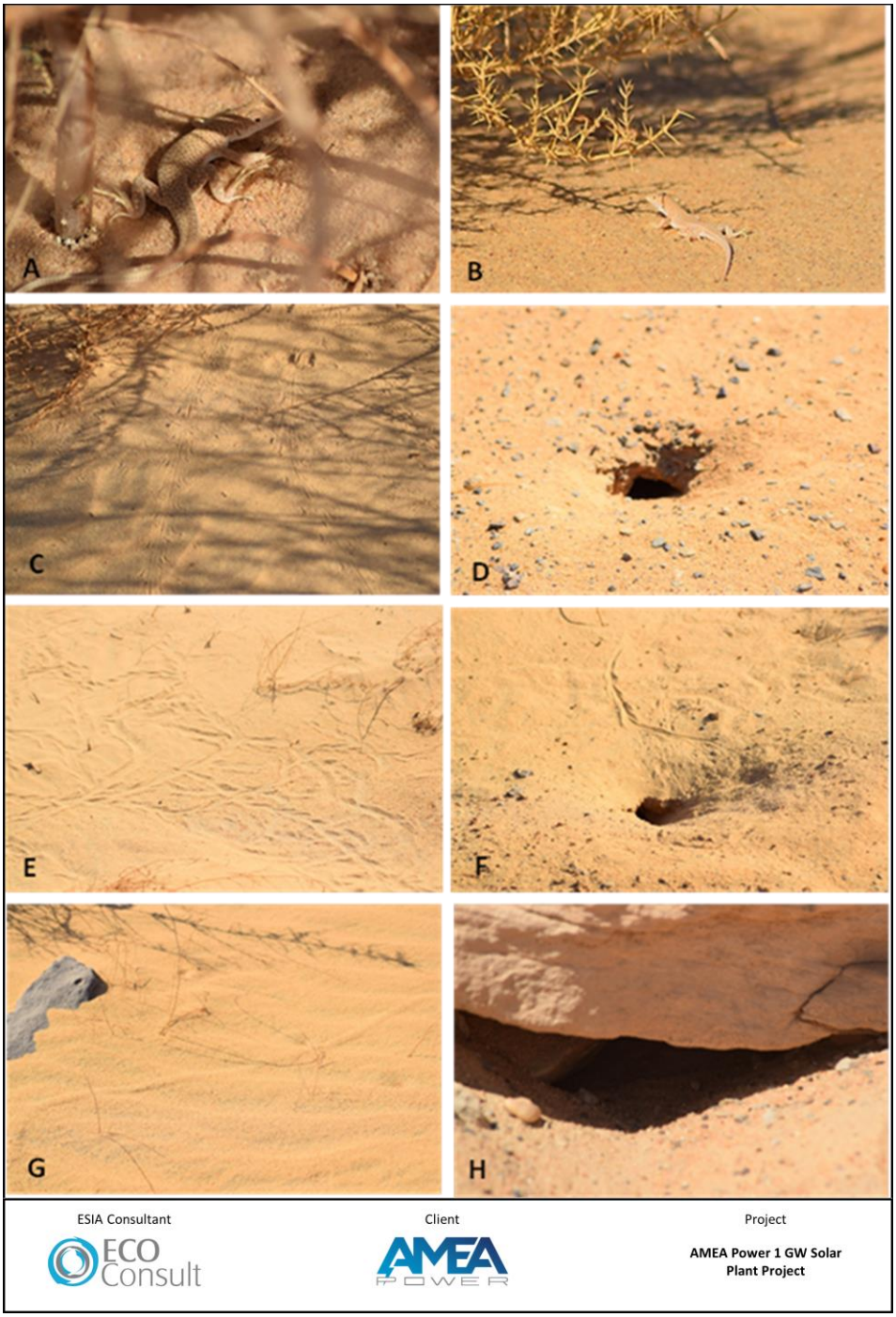

Figure 77: Observed Reptiles During The Survey Of The Project Area, A, B) Nidua Lizard *Acanthodactylus Scutellatus*, C) Nidua Lizard Tracks, D) Nidua Lizard Burrows, E) Tracks Of Unknown Lizards Sp., F) Burrows Of Unknown Lizards Sp., G) Tracks Of Unknown Snake Sp

Table 34: Expected Herpetofauna Species Along the Project Alignment And The Surrounding Area

Family	English name	Latin name	global IUCN	Egypt IUCN	Resident/ migratory	Habitat preference	Abundance in Egypt
Lizards							
Gekkonidae	Turkish Gecko	*Hemidactylus turcicus*	Least Concern	Least Concern	Resident	commensal to man	common
	Elegant Gecko	*Stenodactylus sthenodactylus*	Least Concern	Least Concern	Resident	Gravel and coarse sandy plains and wadis	common
	Egyptian Gecko	*Tarentola annularis*	Least Concern	Least Concern	Resident	Rupestrian habitat	common
	Egyptian Fan-tailed Gecko	*Ptyodactylus hasselquistii*	Least Concern	Least Concern	Resident	wide variety of habitats	common
	Saharan Fan toed Gecko	*Ptyodactylus siphonorhina*	Least Concern	Least Concern	Resident	Hilly lowland country within the Saharan	common
	Nubian Pigmy Gecko	*Tropiocolotes nubicus*	Data Deficient	Least Concern	Resident	Associated with fluvial habitats	common
	Steudner's Pigmy Gecko	*Tropiocolotes steudneri*	Least Concern	Least Concern	Resident	sandy habitats	Uncommon
Lacertidae	Bosc's Lizard	*Acanthodactylus boskianus*	Least Concern	Least Concern	Resident	sandy areas	common
	Nidua Lizard	*Acanthodactylus scutellatus*	Least Concern	Least Concern	Resident	sandy areas	common
	Small-spotted Lizard	*Mesalina guttulata*	Least Concern	Least Concern	Resident	vegetated gravel plains with scattered stones	common

	Red Spotted Lizard	*Mesalina rubropunctata*	Least Concern	Least Concern	Resident	extreme desert, found in open flat sandy and gravelly deserts	Uncommon
Scincidae	Eyed Skink	*Chalcides ocellatus*	Least Concern	Least Concern	Resident	wide variety of mesic habitats	common
	Saharan Ocellated Skink	*Chalcides cf. humilis*	Not Evaluated	Least Concern	Resident	wide variety of mesic habitats	common
	Bean Skink	*Trachylepis quinquetaeniata*	Least Concern	Least Concern	Resident	Gardens and variety of green areas	common
Varanidae	Nile Monitor	*Varanus niloticus*	Least Concern	Vulnerable	Resident	Inhabits wetlands including rivers, canals, lakes and Swamp	common
Snakes							
Leptotyphlopidae	Cairo Worm Snake	*Leptotyphlops cairi*	Least Concern	Least Concern	Resident	Agricultural land and gardens	common
Boidae	Theban Sand Boa	*Eryx colubrinus*	Least Concern	Vulnerable	Resident	Inhabiting desert margins	Uncommon
Colubridae	Flowered Racer	*Platyceps florulentus*	Least Concern	Least Concern	Resident	Found in marginally cultivated lands, fallow fields, on canal banks, wetland margins, ruins and old houses, and semi-desert	common
	Saharan Sand Snake	*Psammophis aegyptius*	Least Concern	Least Concern	Resident	sandy and rocky deserts with little vegetation	common
	African Beauty Snake	*Psammophis sibilans*	Least Concern	Least Concern	Resident	Mesic habitat	common
	Diadem Snake	*Spalerosophis diadema*	Least Concern	Least Concern	Resident	Inhabits a wide variety of habitats in deserts	common

	Egyptian Cat Snake	*Telescopus dhara*	Least Concern	Least Concern	Resident	Inhabits a wide variety of habitats in deserts	Uncommon
Elapidae	Egyptian Cobra	*Naja haje*	Least Concern	Least Concern	Resident	Mesic habitat	common
	Nubian Spitting Cobra	*Naja nubiae*	Least Concern	Near Threatened	Resident	Marginal cultivations	Uncommon
Viperidae	Horned Viper	*Cerastes cerastes*	Least Concern	Least Concern	Resident	inhabiting a wide variety of habitats, typically in wadi systems with some vegetation and sandy soil, but also on gravel plains	common

I. Invertebrates

Invertebrate fauna of the Project site is typical of that of the shallow sandy habitats of the Western Desert. Insects form the most diverse and numerically abundant invertebrate fauna in the Project area. Insects belonging to orders Coleoptera, Homoptera, Hemiptera, Hymenoptera, Orthoptera, Lepidoptera, Neuroptera, Thysanura, Isopterta, diptera and Dictyoptera are represented at the Salsola imbricate habitats in the project site and the neighboring areas.

Arachnids including scorpions, spiders and ticks were recorded in the Project Site and nearby areas. Three scorpion species have been recorded in this part of the Western Desert; namely *Androctonus australis, Leiurus quinquestriatus* and *Orthochirus aristidis*. Only two species of invertebrate *Pimelia angulate* and *Orthetrum chrysostigma* was actually observed during this survey.

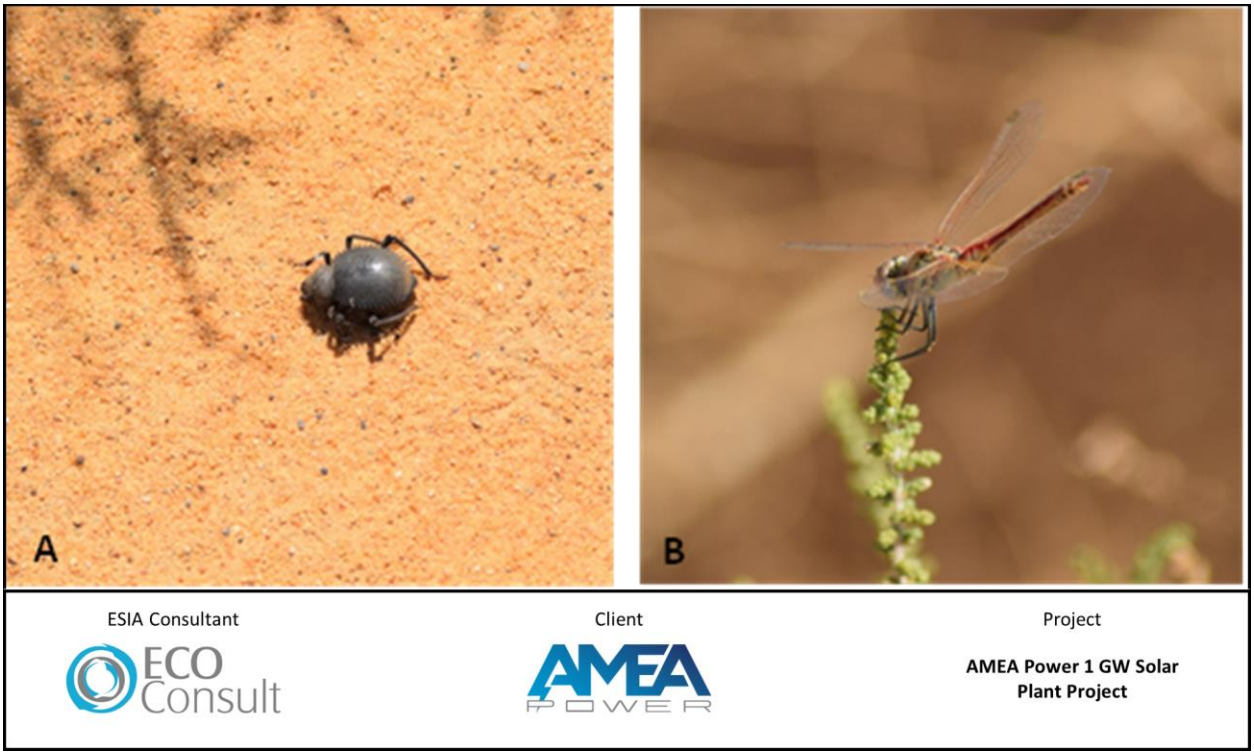

Figure 78: Observed Invertebrate During The Survey Of The Project Area, A) *Pimelia angulate*, B) *Orthetrum chrysostigma*

11.2 Consultations

As discussed in "Section 6.3" earlier, consultations were undertaken with Nature Conservation Egypt (NCE) as part of the scoping process – the key NGO in Egypt concerned with biodiversity protection and Birdlife International's local partner in Egypt. The key outcomes of the consultations are summarized again below:

- The proposed methodology for the ESIA (as presented above) is considered sufficient, but should be monitored and adapted if necessary to address any unforeseen environmental issues over time.
- The Project site is not located in a recognized environmentally sensitive zone, including areas for bird migration, as confirmed by its proximity to the Benban Solar Energy site.
- The survey methodology that was presented is considered sufficient to NCE.

- NCE reviewed and mapped the Project site on their internal system where it showed that the Project site is located within a low biodiversity sensitivity area and away from KBAs.
- If the baseline survey undertaken as per the presented and approved methodology indicates any potential issues of concern or sensitivities within the Project site, it is recommended that a rapid assessment is undertaken during birds' migratory seasons.
- Since the Project site is not a biodiversity hotspot, environmental monitoring during construction is recommended to detect any disturbances to the local ecosystem. Since, methodology is sufficient, any adjustments to the methodology may be necessary if unexpected species are identified
- The Project must implement dust control measures and waste management practices during construction to prevent indirect impacts on surrounding ecosystems.
- Environmental safeguards should be in place during both construction and operational phases, with regular environmental monitoring to ensure compliance with national laws and international guidelines for renewable energy Projects.

11.3 Conclusions and Interpretations

Typical of all desert regions, habitats of the Project Site and the Study Area are limited in diversity and coverage. Habitable areas, even for the hardiest desert species, are restricted locations that have certain topographic features, which allow adequate moisture to be available at or near the ground surface. The Project Site and the surrounding desert land is mostly barren and appears to support very little permanent animal and plant life. In general the habitats and fauna present at the site are typical of the desert region with no rare or significant species noted. One endemic plant species (*Hyoscyamus boveanus*) was found in two locations, with up to nine individuals found in total. Wild fauna of the Project Site is restricted to the furrow-like sandy vegetated depressions in between rocky, hills and gravel plains of the project site, and is limited to few insects and other arthropods, reptiles, typical desert specialist bird species and small and mammals. Transient species are restricted to birds of which a relatively high diversity of species may migrate through the Project area but a lack of suitable habitat means it is unlikely the site is of any importance to these species.

During the site surveys, a total of 13 species from different fauna groups were recorded, the most abundant group was the birds with 8 recorded species which represented by 61.5% of the total fauna which recorded during the site survey; followed by both mammals and invertebrates with only two recorded species each of which were represented 15.4%, then reptiles with only one species were recorded which represented 7.7%, while the amphibians were the lowest group without any records (figure below). No threatened or protected species were observed in the area during site surveys, although their presence in the general area was stated in the literature.

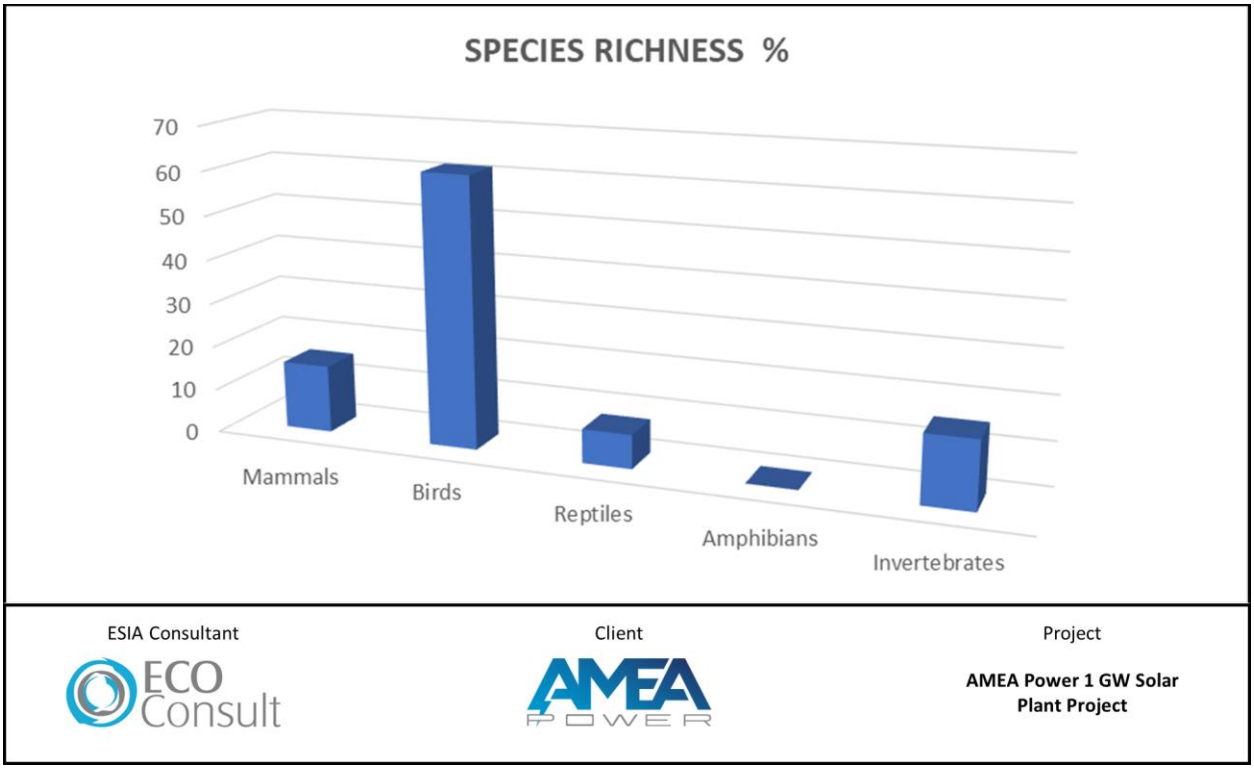

Figure 79: The Observed Diversity Along The Project Alignment, Birds Were The Richness Group Along The Project Site

Along 9 survey grids of the study area of the project site only two wild mammalian species were recorded as indirect observations, namely, Red Fox, and Lesser Egyptian Jerboa, tracks of other unidentified rodents' species were also identified but all present in the area are listed globally and locally as a Least Concern species according to the IUCN red list (Basuony et al., 2010). Also, no evidence of bat roosting sites was noted along surveyed area of the project site. Since the number of mammals recorded was low which represent 7.4 % of 27 mammalian species that expected to be present in the general area of the project, it considered one of the lowest abundant groups during the survey. This deviation from literature can be attributed to the fact that most mammals are nocturnal and therefore require the placement of numerous different types of traps in the various habitats of the study area, in addition to the setting of camera traps to capture images of the mammals in that area.

Birds were the most abundant group by the 57 individuals observed during the surveys. Of these, Crowned sandgrouse was the most abundant species with 37 individuals, while the most dominant species in the project site was Greater Hoopoe Lark which recorded at 7 line transects then Clamorous reed warbler which recorded at 4 line transects along the study area, all recorded species of Least Concern according IUCN conservation status, While only one bird species Kestrel observed from the project alignment, was listed in CITES.

Given the specific geographical location and ecological characteristics of the Project site, it is hypothesized that no bird species of significant conservation concern are likely to inhabit the area. The likelihood of observing a threatened species at the Project site is limited to incidental occurrences of migratory birds passing through the area. Given the current habitat conditions and topographic features, the Project site is not considered a suitable resting or roosting area for these species and is unlikely to be a significantly important site for local breeding species when compared to the surrounding areas.

In addition, the project alignment does not pass near or through Important Bird Area (IBA) or any another key biodiversity areas. The closest distance between the project site and the Aswan Reservoir IBA and Lake Nasser IBA is about 48 km to South of the project site, and 62 km to North with the Upper Nile Important Bird Area (IBA).

According to the literature and available satellite tracking information on the migratory soaring birds MSB, the Project site is not located within the main migration routes of the MSB species which mainly follows the southern parts of the Nile River and its valley, but also may pass accidentally over adjacent barren areas such as the Project site. However, according Birdlife International soaring birds' sensitivity mapping tool for the project site and 5 km of its surrounding buffering area, the site potential sensitivity is zero, while there were only 15 species of migratory soaring birds already observed pass accidentally over the study area, all recorded species of "Least Concern" according IUCN red list, the migration tracks maps of the project site showed that there were only five migration tracks were recorded at the project site and its 5 km buffering area.

During fauna survey there was only one reptilian species recorded as a direct observation of three individuals of Nidua Lizard, and many tracks and burrows of unidentified lizards and snake were recorded in all vegetation patches along the project site vegetated sandy depressions but no reptile species of global conservation concern were identified as being likely to be present during the desk study. Three locally listed species of conservation concern were identified as having potential to be present, these are Theban Sand Boa (VU), Nile Monitor (VU) and Nubian Spitting Cobra (NT).

In term of IUCN conservation status, Globally, only two mammalian species are listed as threatened according to IUCN's Red List of Threatened Species (IUCN, 2020), which include Dorcas Gazelle which is listed as "Vulnerable", and Striped Hyena which is listed as "Near Threatened". While there are three mammalian species anticipated to be present in the study area which are locally listed as being of conservation concern, these species are, Greater Mouse-tailed Bat, Sand Cat and Dorcas Gazella which are "Vulnerable" according to the local IUCN red list (Basuony et al., 2010).

In terms of CITES, three mammalian species were identified as having potential to be present: the Egyptian Swamp, the Sand Cat, and the Wild Cat. Additionally, two bird species from the general study area were identified: the Kestrel and the Little Owl. Only one reptilian species from the vicinity, the Nile Monitor was listed in CITES (2021).

Along the study area, only one known endemic sub-species was Swamp Cat, while two mammalian species classified as near endemic were Christie's Long-eared Bat, and Greater Egyptian Gerbil.

11.3.1 Receptors

Table 35: Ecology - Receptor Sensitivity

Receptor	Receptor Sensitivity	Justification
Habitats	Low	Site habitats are common for the wider region in Egypt, and are considered to be 'Natural', with no specific importance, vulnerability or potential for consideration as a critical habitat.
Flora	Medium	Flora is very limited, dry and sparse on the site comprising four species of common vegetation for this region of Egypt. One regionally endemic species was found within the Project area (*Hyoscyamus boveanus*)

Receptor	Receptor Sensitivity	Justification
Fauna	Low	Very little fauna has been observed on the site. All fauna observed and known to occur in the study area of Least Concern status, without other special protection or designation in Egypt.

11.4 Assessment of Impacts

This section identifies and assesses the anticipated impacts from the Project activities on biodiversity during the construction and operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

11.4.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor for installation of PV arrays and the various Project components to include to include central inverters, underground transmission cables, internal road network, buildings, etc. are expected to include land clearing activities, excavation, grading, etc.

Such construction activities could result in the alteration of the site's habitat and thus potentially disturb existing habitats (flora, fauna, and avi-fauna) and result in the displacement of exclusion of species particularly threatened, endemic, or endangered species which might be present within the Project site and surrounding areas. This could also result in habitat loss due to the removal of vegetation (which as discussed earlier is very limited). Other impacts on the biodiversity of the site are mainly from improper management of the site which could include improper conduct and housekeeping practices by workers (i.e. hunting of animals, discharge of hazardous waste to land, etc.). Finally, such construction activities including in particular movement of vehicles and machinery into the site could result in the introduction of invasive alien plant species.

However, based on the biodiversity baseline assessment conducted, it was concluded that the site's habitat in general is considered of low ecological significance although the habitats present are considered Natural. Generally, all recorded species within the Project site are considered of least concern and common to such habitat areas, apart from one regionally endemic species was found within the Project area (*Hyoscyamus boveanus*). In addition, the Project site is not located within areas of critical environment concern.

The table below provides an overall summary of the impacts of improper management during the construction phase. The overall impact assessment will be of Moderate significance.

Operation Phase		
Type	Negative	
Duration	Long term	Construction activities would result in a permanent change in the natural biodiversity of the site
Magnitude	Medium	Change in the natural biodiversity of the site will be noticeable in limited individual footprints
Reversibility	Irreversible	N/A

Sensitivity	Medium	The site is considered of low ecological significance but due to the presence of one regionally endemic species (*Hyoscyamus boveanus*).
Likelihood	High	Due to the nature of construction activities
Extent	Low	Limited to actual footprint of Project activities
Significance	**Moderate**	

Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC Contractor during the construction phase and which include:

- The Developer should consider to the extent possible, the following:
  - Option 1: altering site boundary to avoid the regionally endemic species (*Hyoscyamus boveanus*). Those are located in very small patches and within the northern parts of the Project site;
  - Option 2: if this is not a viable option, then avoiding through design the areas of the endemic species should be considered.
  - Under both Option 1 and 2 appropriate buffer distance should be considered appropriate fencing should be established with an appropriate buffer to ensure they are not impacted by dust or other construction activities; and (ii) proper induction training workers to emphasize importance of these plants and ensure they avoid them at all time;
  - Option 3: if both options above are considered not viable, then the Developer should undertake seed collection from existing specimens of *Hyoscyamus boveanus* at the appropriate time of year (October-December) form micropropagation of existing specimens within the Project site upon completion of construction activities. Any seeds which are collected must be stored in appropriate conditions and any specimens collected for micropropagation should be managed and maintained by appropriately experienced botanists. **Note: seed collection is currently being undertaken by an experienced botanist to account for a worst-case scenario in case Option 1 and 2 cannot be considered, in order not to miss the seeding period (October to December).**
- Implement proper management measures to prevent damage to the biodiversity of the site. This could include establishing a proper code of conduct and awareness raising / training of personnel and good housekeeping which include the following:
  - Prohibit hunting at any time and under any condition by construction workers onsite
  - Ensure proper storage, collection, and disposal of waste streams generated as discussed in detail in 'Section 10.2.2'.
  - Restrict activities to allocated construction areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances
  - Avoid unnecessary elevated noise levels at all times. In addition, apply adequate general noise suppressing measures as detailed in 'Section 13.2.2'.
- Limit disturbance of topsoil to the extent possible and during excavations, separate topsoil and subsoil and reinstate in correct order, this will allow there to be negligible net loss of habitat as a result of the development.

- Preventing the introduction, movement and spread of invasive species on and off the construction site, for example through cleaning vehicles before they enter the site.

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

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor during the construction phase and which include:

- Submission of final detailed design demonstrating avoidance of regionally endemic species (Option 1 and 2 earlier). If this option is not possible, submission of seed collection, micropropagation and translocation report once completed. In addition, undertake monthly monitoring of translocated *Hyoscyamus boveanus* plants
- Inspection of the works should be carried out at all times.

11.4.2 Potential Impacts during the Operation Phase

The key impacts during the operation phase of the Project include the following:

Management

Improper management of the site as discussed earlier. This could include improper conduct and housekeeping practices by workers (i.e. hunting of animals, discharge of hazardous waste to land, etc.).

Lake Effects

According to the "*Guidelines to Minimize the Impact of Solar Facilities and Associated Infrastructure in South Africa*" (BirdLife International), the most important impact of solar facilities on avifauna is the displacement of critical species and loss of habitat from construction activities – which were discussed earlier. According to such Guidelines, impacts from PV projects are considered not applicable as PV panels are considered less reflective, especially when compared to other technologies such as Concentrated Solar Power (CSP). Similarly, the "*Solar Energy Guidance V.1 – Birds and Solar Energy within the Rift Valley/Red Sea Flyway*" also developed by BirdLife International also states that such impacts are considered to have limited data and require further study.

However, further recent publications by BirdLife International Guidelines state that "in addition, recent findings at facilities in North America suggest that collision mortality impacts may be underestimated at solar PV plants, with collision trauma with PV panels, perhaps associated with polarized light pollution and/or with waterbirds mistaking large arrays of PV panels as wetlands–the so-called 'lake effect'".

Taking the above into account, there is very limited research and scientific literature on this subject and to date, there is no empirical evidence that PV facilities lead to significant avian mortality or large-scale collision impacts resulting from contact or collision with PV panels or from reflective surfaces.

Nevertheless, putting things into perspective there is some risk of avifauna mortality and which could occur with most human development (ranging from buildings to large scale industrial projects). However, with regards to the Project in specific it is highly unlikely that avian mortality levels would be of any concern due to the following:

- The Project site in general is considered of a low sensitivity due to its natural setting and does not support endangered or rare species or sensitive avifauna habitats, while all recorded avifauna species are generally common to such habitats.
- With regards to migratory birds in specific, the site sensitivity is also considered low and not within areas area of intensive passage or traffic of migratory soaring birds during migration seasons.
- Project site not located within an IBA or KBA

The table below provides an overall summary of the impact on from improper management and Lake Effect during the operation phase. The overall impact assessment will be not significant.

Operation Phase		
Type	Negative	
Duration	Long-term	During entire operation period of 25 years
Magnitude	Low	No key and formal scientific evidence is available for lake effect impacts at this point.
Reversibility	Reversible	N/A
Sensitivity	Low	The site is considered of low ecological significance
Likelihood	Low	The site is considered of low ecological significance
Extent	High	Due to the lake effect of PV panels
Significance	**Not significant**	

Following the implementation of the mitigation measures specified below, the significance of the residual impact is categorized as not significant.

Microclimate Changes

Based on desktop research, several scientific studies have been reviewed which are identified below.

Solar Park microclimate and vegetation management effects on grassland carbon cycling	https://www.researchgate.net/publication/305309893_Solar_park_microclimate_and_vegetation_management_effects_on_grassland_carbon_cycling
The Influence of Solar Power Plants on Microclimatic Conditions and the Biotic Community in Chilean Desert Environments	https://www.researchgate.net/publication/317849616_The_Influence_of_Solar_Power_Plants_on_Microclimatic_Conditions_and_the_Biotic_Community_in_Chilean_Desert_Environments
Effects of photovoltaic panels on soil temperature and moisture in desert areas	https://www.researchgate.net/publication/348237738_Effects_of_photovoltaic_panels_on_soil_temperature_and_moisture_in_desert_areas
Solar photovoltaic panels significantly promote vegetation recovery by modifying the soil surface microhabitats in an arid sandy ecosystem	https://onlinelibrary.wiley.com/doi/abs/10.1002/ldr.3408
Microclimate under Agri voltaic systems: Is crop growth rate affected in the partial shade of solar panels?	https://www.sciencedirect.com/science/article/abs/pii/S0168192313000890
Environmental impacts from the installation and operation of large-scale solar power plants	https://www.researchgate.net/publication/227421587_Environmental_impacts_from_the_installation_and_operation_of_large-scale_solar_power_plants
Effects of solar park construction and solar panels on soil quality, microclimate, CO2 effluxes, and vegetation under a Mediterranean climate	https://onlinelibrary.wiley.com/doi/epdf/10.1002/ldr.4101#accessDenialLayout
Effects of Photovoltaic Solar Farms on Microclimate and Vegetation Diversity	https://www.mdpi.com/2071-1050/14/12/7493

Simulated solar panels create altered microhabitats in desert landforms	https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ecs2.3089
Partial shading by solar panels delays bloom, increases floral abundance during the late-season for pollinators in a dryland, Agri-voltaic ecosystem	https://www.nature.com/articles/s41598-021-86756-4
Ecohydrological effects of photovoltaic solar farms on soil microclimates and moisture regimes in arid Northwest China: A modelling study	https://www.sciencedirect.com/science/article/abs/pii/S0048969721050 21X

According to research, solar PV projects alter the biodiversity and dynamics of the microclimate in which they are placed by intercepting sunlight, lowering soil temperature, and redirecting rainfall. Because soils and organisms underneath solar panels are exposed to variable light gradients that shift with the movement of the sun, introducing alterations in such factors might possibly impact carbon cycling, soil water retention, erosion, and the existing ecosystem.

The key conclusions include the following:

- The areas that could be affected by PV Solar Panels are divided into two (2) zones: (i) area under the solar PV panels "Zone 1" (presented in red in the figure below); and (ii) area in between the rows of solar PV panels "Zone 2" (presented in yellow in the figure below). Reports have studied these areas in comparison with a reference point usually in the same vicinity as their respective PV plant.

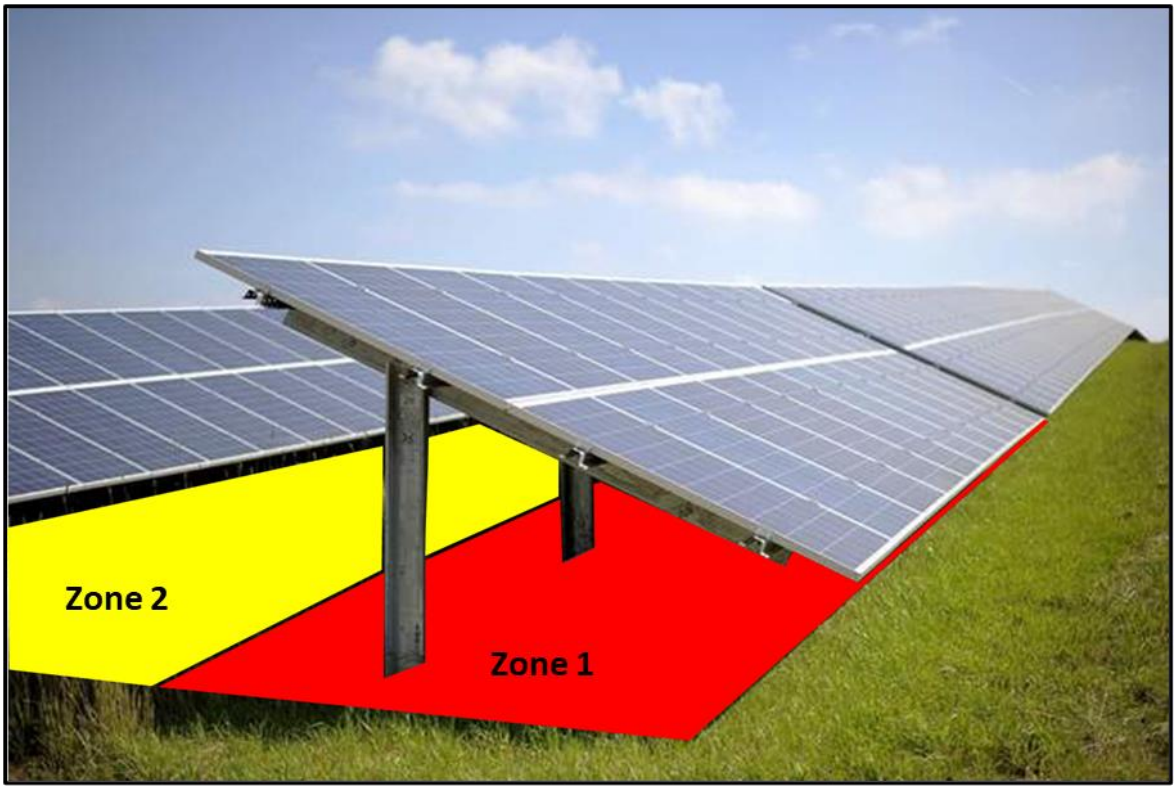

Figure 80: Zones Studies for Zone 1 in Red and Zone 2 in Yellow

- The most commonly occurring effects in the sampled research are variations in soil temperature under the PV Panel's shading, resulting in a cooler and more humid micro-climate than the conditions under the sun throughout the day. The studies concluded that the effect of Solar PV Panels on soil moisture and temperature in both Zones 1 and 2 varied from one place to another. However, a clear trend in soil characteristics was noticed. The soil Zone 1 & 2 showed that the PV panels had seasonal effects on soil temperature. Soil in Zone 1 & 2 was cooler during the spring, summer and autumn seasons and warmer during the winter season in comparison with the reference points. Nevertheless, soil

temperatures were cooler in Zone 1 during Spring/Summer/Autumn and warmer during Winter than in Zone 2.

- The overall area in Zone 1 and Zone 2 had larger cooling and humidification effects than the reference point - therefore greater soil moisture and reduced soil temperature under PV panels in the summer. This could be advantageous to desert ecosystem management and protection. The area in Zone 1 usually has higher soil water content than in Zone 2.
- Increased soil moisture and decreased evaporation result in improved water conditions, which in turn will be the primary elements in enhancing the biological environment in sandy, desert-like areas. In addition, the PV Panels could reduce heat stress by regulating the air and ground temperatures in both Zone 1 and Zone 2 during the vegetation growth season.
- PV panels alter surface microhabitats to a certain degree, and positive vegetation–microhabitat feedback could assist ecological restoration in arid sand regions. In turn, the hydrological cycle and the change in temperature conditions provided by the shading of the PV Panels can promote plant growth and increase vegetation regeneration which might effectively shield soil against wind erosion. The combined effects of the PV panels may also result in an increase in biomass and species diversity.

However, to date, there is few empirical research to quantify the microhabitat impacts of solar arrays, and no studies are done that compare panel effects on ecological processes and communities across habitat types.

Based on the above, the potential impacts on biodiversity would of a long-term duration throughout the operation phase of the Project. Such impacts could be of positive nature however the degree and importance of such impacts need further investigation and studies.

Mitigation Measures

The following identifies the mitigation measures to be applied by the Project Operator during the operation phase and which include:

- Maintain a gap between the base of the fence and the ground. This could occur across the full extent of, or at regular intervals, along the fence line to allow reptiles and small mammals to pass beneath.
- Implement proper management measures to prevent damage to the biodiversity of the site. This could include establishing a proper code of conduct and awareness raising / training of personnel and good housekeeping which include the following:
    - Prohibit hunting at any time and under any condition by workers onsite;
    - Ensure proper storage, collection, and disposal of waste streams generated as discussed in detail in "Section 14.1.3".; and
    - Restrict activities to allocated areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances.
- Implement a chance-finds bird mortality program for one year after which it will be reevaluated based on the outcomes and results. Throughout the year, a complete bird fatality search survey of the Project site will be undertaken through dividing the site into sections and it will be ensured that the entire Project site is covered at least once every two weeks. For each fatality found, all information should be entered on to the 'bird fatality search survey recording form', see sample below. Photographs of

each fatality should be numbered and be cross referenced on the recording form. The state of each carcass will also be recorded using the following condition categories:

- Intact – a fatality that is intact, is not badly de-composed and shows little or no sign of being damaged.
- Damaged – a fatality that is whole but shows signs of being damaged or a dismembered fatality with body parts (e.g. wings, skeletal remains, legs, pieces of skin, etc.) found at a single location.
- Feather patch – ten or more feathers at one location indicating damage. If only feathers are found, 10 or more total feathers or two or more primaries must be discovered to consider the observation a casualty.

All signs of injuries for any fatality encountered should be noted, identifying the affected part of the bird body. Fatalities will be labelled and recovered from site. The above can be undertaken through one or more dedicated staff members from the Project Operator team. However, specimens and photographs of fatalities should be examined by an ornithologist to allow the species to be identified to the finest taxonomic level possible. In addition, based on the outcomes of the program in one year, the ornithologist should prepare a report with the details and outcomes and identify any further requirements or mitigation measures to be implemented (if required).

Sample fatality search survey recording sheet

Start Time:				**Section No.**	
End Time:				**Temperature:**	
Incident #	**Time**	**Species**	**Condition**	**Coordinates (decimal degrees)**	**Photograph No.**

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

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Project Operator during the operation phase and which include:

- Inspection of the works should be carried out at all times.
- Chance-finds records (for the first year of operations)

12. ARCHEOLOGY AND CULTURAL HERITAGE

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to archaeology and cultural heritage. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

12.1 Assessment of Baseline Conditions

12.1.1 Methodology for Assessment

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

A. Literature Review

Literature review included a comprehensive review of archives, publications, and studies on previous archaeological and cultural heritage work and surveys undertaken in the area, and which are available through desktop review as well as through the Aswan Antiquities Inspection Office and Nubia Antiquities Inspection Office. Such literature review included information available through the Head of Information Exchange department, Ministry of Tourism and Antiquities.

B. Stakeholder Consultation and Engagement

Stakeholder consultation and engagement activities were undertaken with key entities involved in archaeology and cultural management. This included the entities below. Refer to "Section 6.3.1" earlier for addition details.

- Ministry of Antiquities of Egypt;
- Directorate of Antiquities of Aswan Governorate

In addition, as part of the FGD undertaken with the local communities, specific discussions were undertaken in relation to cultural heritage sites within the Project area. Refer to "Section 6.3.2".

C. Site Survey

A field survey was undertaken by an archaeology and cultural heritage expert in October 2024. The objective of the field survey was to ascertain the presence of any surface archaeological or cultural heritage remains within the Project site. The survey was undertaken to cover the entire Project site boundary. The surface area was walked by the expert in order to inspect the entire ground surface.

The objective of the field survey was to ascertain the presence of any surface archeological or cultural heritage sites or remains. If any site were noted the following was recorded:

- Sketch plans

- Photograph as appropriate
- GPS coordinates for the area
- Undertake an analysis to categorize the sites and archaeological features and making an assessment of their significance;
- Identify whether the site can be relocated or removed and if so, identify requirements that should be undertaken and considered; and
- If site cannot be relocated / removed identify the requirements to be considered for Project design (e.g. buffer distances, fencing, etc.).

12.1.2 Results

A. Literature Review and Stakeholder Engagement

Based on the literature review, the assessments confirm the absence of any archaeological findings at the Project site. Furthermore, the site is not referenced in any known archaeological records or studies. The closest recognized archaeological site is located approximately 15 km northeast of the Project site, the Kom Ombo Temple. This site includes remains of a Roman temple of sandstone. The discovered temple can be dated to the second century AD from the Roman era, which is evident through cartridges existing in the temple, which are related to a number of Roman emperors, both Domitian (81-96 AD), Hadrian (117-138 AD), and Antonius Pius (138-161 AD).

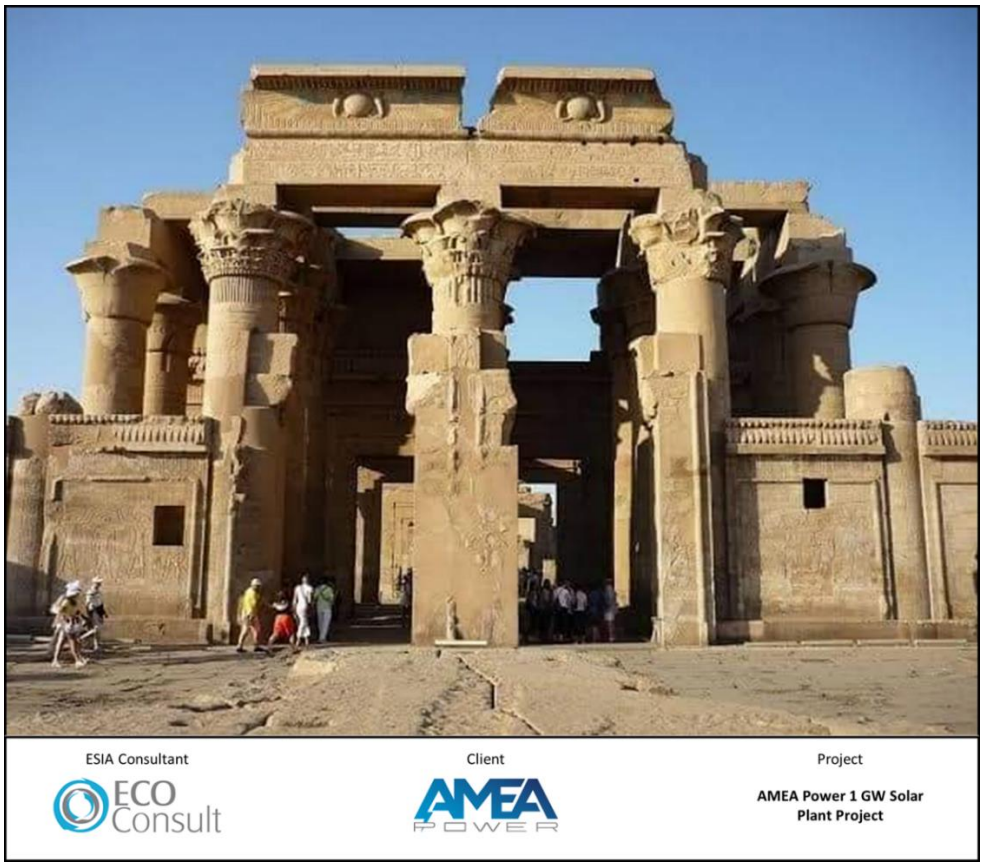

Figure 81: Kom Ombo Temple

B. *Stakeholder Consultation and Engagement*

Consultations with relevant governmental entities indicated that there are no known archaeological or cultural heritage sites within the Project site, and no significant findings are expected to be uncovered. In addition, it was indicated that the Project area is not under any protection directives from the Supreme Council of Antiquities, in alignment with Antiquities Protection Law No. 117 of 1983 and its amendments.

Additionally, the discussions with local communities indicated that there are no sacred or cultural heritage sites within the Project site or its vicinity.

C. *Site Survey*

Based on a general site walkover across the entire site, no archaeology and cultural heritage sites were identified or recorded within the Project site, nor any evidence for such sites.

To further assess the site in more details, the expert examined soil layers through selected excavation points strategically distributed across the Project site. This aimed to identify any potential artifacts or indicators of cultural heritage. The excavated soil was closely inspected, but no archaeological evidence was found but rather only natural layers of soil.

Overall, the site survey, including the inspection of 26 specific points both within and around the Project area, confirmed the absence of any archaeological evidence, indicating that the Project site shows no signs of any historical/cultural significance.

The table below presents the locations of the 26 inspection points along with sample photos of these sites that were inspected within the Project site.

Table 36: Coordinates of the Inspection points within the Project Site

Point No.	Point coordinates	Point No.	Point coordinates
1	N 24 20 49.4" E 32 46 63.0"	14	N 24 19 92.7" E 32 47 05.9"
2	N 24 20 34.3" E 32 46 94.3"	15	N 24 20 64.0" E 32 47 07.4"
3	N 24 20 30.3" E 32 46 22.6"	16	N 24 21 00.3" E 32 46 67.4"
4	N 24 19 36" E 32 47 00"	17	N 24 21 31" E 32 48 56"
5	N 24 19 31" E 32 47 07"	18	N 24 20 55" E 32 48 49"
6	N 24 19 40" E 32 47 29"	19	N 24 21 19" E 32 48 23"
7	N 24 19 96.7" E 32 48 16.9"	20	N 24 21 30.1" E 32 48 36.2"
8	N 24 19 29.3" E 32 48 66.8"	21	N 24 20 50" E 32 49 09"
9	N 24 19 57.8" E 32 48 82.1"	22	N 24 21 22" E 32 47 50"
10	N 24 19 49" E 32 49 30"	23	N 24 21 06" E 32 47 27"
11	N 24 20 31.9" E 32 49 29.9"	24	N 24 21 04" E 32 46 47"
12	N 24 20 23" E 32 48 13"	25	N 24 19 04" E 32 46 34"
13	N 24 20 06.8" E 32 47 06.6"	26	N 24 17 36" E 32 49 54"

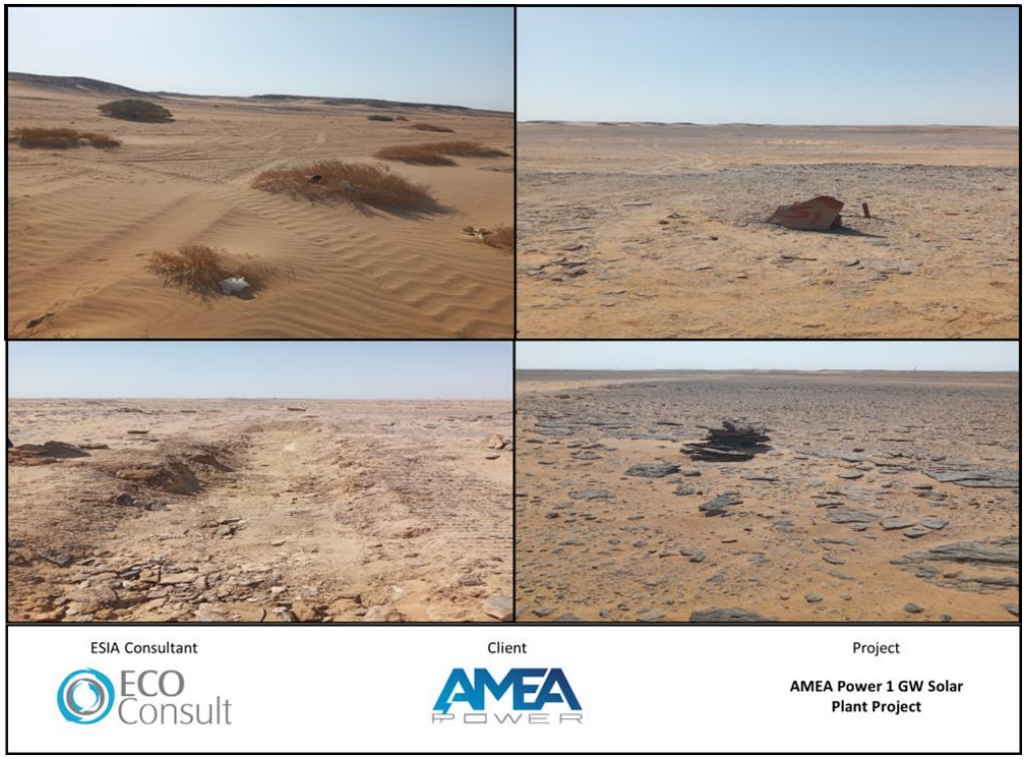

Figure 82: Inspection Points Sample Images

12.2 Assessment of Impacts

This section identifies and assesses the anticipated impacts from the Project activities on archeology and cultural heritage during the construction and operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

It is important to note that there are no anticipated impacts during the operational phase of the Project.

12.2.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor for installation of PV arrays and the various Project components to include central inverters, underground transmission cables, internal road network, buildings, etc. are expected to include land clearing activities, leveling, excavation, grading, etc.

Such activities could damage or disturb potential archaeological remains which might be present on the surface of the Project site and which could potentially be of importance. However, the archaeological baseline assessment discussed earlier concludes that there are no archaeological sites or remains within the Project site. Therefore, there are no anticipated impacts from the Project on surface archaeological remains within the Project site.

In addition, there is a chance that throughout such construction activities, archaeological remains buried in the ground are discovered. Improper management (if such sites are discovered) could potentially disturb or damage such sites which could potentially be of importance.

The table below provides an overall summary of the impact on archeology and cultural heritage during the construction phase. The overall impact assessment will be of minor significance.

Construction Phase		
Type	Negative	N/A
Duration	Short-term	Limited to construction period only which is 17 months
Magnitude	Medium	If a site of importance is unearthed and is improperly managed it could be damaged or destroyed
Reversibility	Irreversible	
Sensitivity	Low	
Likelihood	Low	Chance finds in general are of low probability
Extent	Low	Limited to actual footprint of Project activities
Significance	**Minor**	

Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC during the construction phase and which include:

- Consult with Ministry of Tourism and Antiquities to determine if an expert should be present during excavation activities.
- Develop and implement a chance find procedure. Throughout the construction phase, and as the case with any Project development that entails such construction activities, there is a chance that potential undiscovered archaeological remains may impacted. To mitigate such impacts, a chance find procedure must be develop and implemented in accordance with "Egyptian Archaeological Law 117/1983". The procedure should take into account the following requirements:
    - In case any remains are discovered construction activities must be halted and the area along with an appropriate buffer should be fenced along with proper signage installed in both Arabic and English language.
    - In this case, the Ministry of Tourism and Antiquities/Aswan Antiquities Inspection Office should be immediately notified through formal communication.
    - Announce through appropriate channels to all construction staff that such a site has been discovered and no entry under any circumstance is allowed by any personnel. In addition, no collection of any remains or disturbance to the site is allowed.
    - No additional work will be allowed before the Ministry assesses the found potential archaeological site and grants a clearance to resume the work.
    - Construction activities can continue at other parts of the site if no potential archaeological remains were found. If found, same procedures above apply.
    - Ensure induction training that will be implemented for all employees includes a module on chance find procedure requirements.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor during the construction phase and which include:

- Submission of formal letter on whether Ministry of Tourism and Antiquities requires an expert during excavation activities.
- In the case that a suspected site is discovered, a report should be prepared that includes the following to be submitted to Ministry of Tourism and Antiquities:
    - Photo documentation of the site including photos for delineation markers and signage
    - Location (GPS coordinates)
    - Site estimate
    - Topographical description
    - Description of nature and conditions of the site
- After the Ministry of Tourism and Antiquities/Aswan Antiquities Inspection Office concludes their assessment of the discovered site, the above report should be updated with the findings of the Inspection Office with supporting formal letters to include: (i) formal letter with mitigation to be implemented as required by the Inspection Office (if required and applicable); (ii) formal letter from the Inspection Office granting permission to commence with construction work within the discovered site.
- Submission of Induction Training records of workers that includes archeology and cultural heritage model.

13. AIR QUALITY AND NOISE

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to air quality and noise. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

13.1 Assessment of Baseline Conditions

The baseline assessment of the Project site was based on an air quality and noise monitoring program. Additional details are discussed below.

13.1.1 Methodology for Assessment

A. Selection of Parameters

Monitoring was undertaken for the following parameters: (i) gases to include Carbon monoxide (CO), Sulphur Dioxide (SO_2) and Nitrogen Dioxide (NO_2), (ii) Suspended Particulate Matter to include Particulate Matter smaller than 10.0 (PM10) and 2.5 microns (PM2.5) in diameter; and (iii) Noise Pressure Levels (NPL).

These parameters were selected based on the following rationale:

- Such parameters are likely to be present within the Project site given its characteristics and attributes. Suspended particulate matter is expected given the desert nature of the site. On the other hand, pollutants (such SO_2, NO_2,) are expected onsite but rather at minimal concentrations as the site is in a remote area; nevertheless, motor emissions particularly from vehicles passing on the nearby Aswan – Luxor highway as well as casually through the site could be a source of such pollutants. Finally, noise levels are expected from the windy nature of the site and possibly casual vehicular movement.
- Such parameters are likely to be affected mainly during the Project's construction activities. All air pollutant parameters selected are expected to be slightly impacted and increase specifically during the Project's construction activities. Emissions from vehicles and machinery used onsite and their movement onsite will increase gaseous emissions, suspended particulate matter, as well as noise pressure levels.

It is worth noting that based on a scoping site visit undertaken by the 'E&S Team' for the Project site, no key sources of anthropogenic air/pollutant or noise emissions were noted.

B. Selection of Locations

To assess air quality and noise baseline conditions within the Project area, one (1) monitoring point was selected as shown in the figure below. The location of the monitoring point was selected within the central parts of the Project site and therefore assumed to represent conditions for the entire Project site.

Monitoring was undertaken for 24 hours at monitoring point. The coordinates for the monitoring point along with its location is presented in the table and figure that follows.

Table 37: Location for Noise and Air Quality Monitoring Points

Station Name	Coordinates		Noise and Air Monitoring (24 hrs.)	
	Latitude	Longitude	Day Monitoring	Night Monitoring
Monitoring Point at the Project's Area	24°20'0.96"N	32°47'51.21"E	√	√

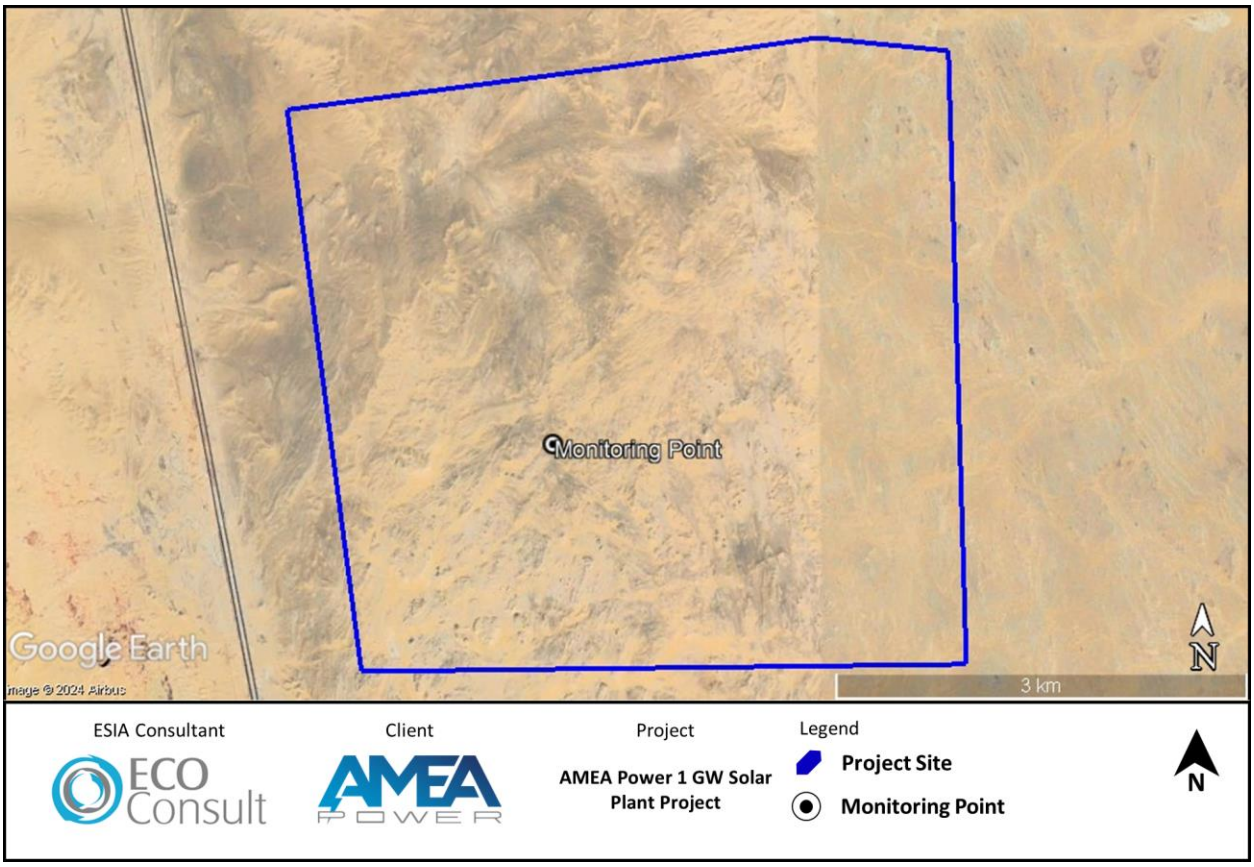

Figure 83: Noise and Air Quality Measuring Point Location

C. *Legislative Requirements*

With regards to air quality, the results of the measurements were compared to the national limits as set within Annex 5 of the Executive Regulation (D1095/2011) for ambient air quality. The table below identifies the corresponding applicable national ambient air quality permissible limits. The limits included for 'urban' areas were used for comparison given the nature of the site that does not include any industrial activities and therefore cannot be classified as such.

Table 38: Applicable National Ambient Air Quality Permissible Limits

Pollutant	Location	Maximum Limit (µg/m³)			
		1 Hour	8 Hours	24 Hours (daily)	1 Year (Annually)
Sulfur Dioxide (SO_2)	Urban	300	-	125	50
	Industrial	350	-	150	60
Carbon Monoxide (CO)	Urban	30 mg/m³	10 mg/m³	-	-
	Industrial	30 mg/m³	10 mg/m³	-	-
Nitrogen Dioxide (NO_2)	Urban	300	-	150	60
	Industrial	300	-	150	80

Total Suspended Particles (TSP)	Urban	-	-	230	125
	Industrial	-	-	230	125
Respirable Particulates (PM_{10})	Urban	-	-	150	70
	Industrial	-	-	150	70
Solid Particulates < 2.5 µm	Urban	-	-	80	50
	Industrial	-	-	80	50

With regards to noise, the results were compared to the national limits set in Annex 7 of the Executive Regulation (D710/2012) for the 'Day' and 'Night' intervals. The table below lists the different area classifications and their corresponding applicable permissible limits for noise. Out of the areas below, it is believed that the following classification best describes the Project site "Residential suburb with low traffic activity and limited activities service". In such area limits are set at 55 dB(A) and 45 dB(A) for both day and night respectively.

Table 39: Applicable National Permissible Limits for Noise

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

Results were also compared with the IFC General EHS Guidelines for air quality and noise as presented in the table below.

Table 40: IFC EHS General EHS Guideline Noise and Air Quality Limits

Parameter	**Limit**
Sulfur Dioxide (µg/m^3)	125 (Interim target-1) 24-hour
Nitrogen Dioxide (µg/m^3)	200 1-hour
Particulate Matter PM10 (µg/m^3)	150 (Interim target-1)24-hour
Noise one-hour LAeq (dB(A)	Daytime 07:00 - 22:00 = 55; Nighttime 22:00 – 07:00 = 45

13.1.2 Results

Noise

The table below presents the analysis results of ambient (24-hour) noise levels for the measurement point, compared with the maximum permissible limits specified in Egyptian law standards.

Table 41: 24-Hour Ambient Noise Level Measurements and Comparison with National Standards

Start Time	**LAeq**	**LAF90.0**	**National Standards**	**IFC Limits**
7:01:00 AM	56.94	24.49	55	55

8:01:00 AM	51.63	43.69		
9:01:00 AM	50.31	34.8		
10:01:00 AM	48.17	41.8		
11:01:00 AM	44.5	28.85		
12:01:00 PM	43.55	16.62		
1:01:00 PM	48.23	49.12		
2:01:00 PM	47.82	45.63		
3:01:00 PM	46.09	34.14		
4:01:00 PM	41.53	33.92		
5:01:00 PM	44.98	39.52		
6:01:00 PM	52.22	50.52		
7:01:00 PM	56.87	50.56		
8:01:00 PM	47.96	49.84		
9:01:00 PM	45.69	42.42		
Daytime Average	48.43	39.06		
10:01:00 PM	52.93	35.68	45	45
11:01:00 PM	49.92	27.44		
12:01:00 AM	47.84	27.85		
1:01:00 AM	44.44	30.22		
2:01:00 AM	53.99	32.23		
3:01:00 AM	52.91	33.48		
4:01:00 AM	58.35	31.74		
5:01:00 AM	50.95	44.99		
6:01:00 AM	59.64	33.96		
Nighttime Average	52.33	33.07		
Total Minimum	41.53	16.62	-	-
Total Maximum	59.64	50.56		
Total Average	49.89	36.81		

As noted in tables above, the results (i.e. LAeq average) indicated that the noise levels are within the maximum permissible limits in accordance with both national and international regulations during daytime, while the nighttime results exceeded allowable limits – however this is attributed to natural reasons (mainly wind) as no anthropogenic sources were identified during the monitoring period. All measurements complied with the limits set forth in Egyptian Environmental Law No. 4 of 1994, as amended by Law No. 9 of 2009, and its executive regulations.

Air Quality

The table below presents the analysis results of ambient (24-hour) air quality levels for this point, compared with the limits specified in national and international standards.

Table 42: Air Quality Analysis Results (24 Hours)

Air Quality Measurements Results (µg/m³)								
Date	**Time**	**CO**	**Sox**	**Nox**	**SO2**	**PM2.5**	**PM10**	**TSP**
11/10/2024	12:01:00 PM	0.1	0.4	18.1	4	3	18	25
11/10/2024	1:01:00 PM	0.4	1.6	8.8	4	3	21	29

11/10/2024	2:01:00 PM	0.2	0.8	3.3	4	3	28	40
11/10/2024	3:01:00 PM	0.1	0.4	3.3	4	3	27	38
11/10/2024	4:01:00 PM	0.2	0.8	6.4	4	4	26	37
11/10/2024	5:01:00 PM	0.6	2.4	4.1	4	4	24	33
11/10/2024	6:01:00 PM	0.2	0.8	4.2	4	4	18	25
11/10/2024	7:01:00 PM	0.3	1.2	4	4	5	23	31
11/10/2024	8:01:00 PM	0.4	1.6	10.5	4	5	20	27
11/10/2024	9:01:00 PM	0.3	1.2	7.2	4	5	18	24
11/10/2024	10:01:00 PM	0.8	3.2	7.9	4	5	20	26
11/10/2024	11:01:00 PM	0.3	1.2	3.1	4	5	19	25
12/10/2024	12:01:00 AM	0.5	2	5.5	4	5	22	30
12/10/2024	1:01:00 AM	0.5	2	3.1	4	6	22	29
12/10/2024	2:01:00 AM	0.4	1.6	3.6	4	5	23	30
12/10/2024	3:01:00 AM	0.6	2.4	2	4	5	23	31
12/10/2024	4:01:00 AM	0.4	1.6	4.2	4	6	20	26
12/10/2024	5:01:00 AM	0.3	1.2	10.3	4	8	25	32
12/10/2024	6:01:00 AM	0.2	0.8	7.3	3	8	21	32
12/10/2024	7:01:00 AM	0.3	1.2	13.8	4	7	18	28
12/10/2024	8:01:00 AM	0.2	0.8	6.1	4	4	18	26
12/10/2024	9:01:00 AM	0.1	0.4	4.1	4	3	16	26
12/10/2024	10:01:00 AM	0.1	0.4	7.5	3	3	22	23
12/10/2024	11:01:00 AM	0.2	0.8	3.8	4	3	22	23
Maximum (µg/m³)		**0.8**	**3.2**	**18.1**	**4**	**8**	**28**	**40**
Minimum (µg/m³)		**0.1**	**0.4**	**2**	**3**	**3**	**16**	**23**
Average (µg/m³)		**0.3**	**1.3**	**6.3**	**3.9**	**4.7**	**21.4**	**29.0**
Egyptian Limit		**-**	**-**	**150**	**125**	**-**	**150**	**230**
IFC Limit			**200 (1h)**	**-**	**125 (24h)**	**-**	**150 (24h)**	**-**

As noted in the table above, all measured parameters comply with both Egyptian legislative requirements as set within Annex 5 of the Executive Regulation (D1095/2011) for ambient air quality as well as IFC limits.

13.2 Assessment of Potential Impacts

This section identifies and assesses the anticipated impacts from the Project activities on air quality and noise during the various phases to include planning and construction phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

It is important to note that there are no anticipated impacts during the operational phase of the Project.

13.2.1 Potential Impacts during the Construction Phase on Air Quality

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the PV arrays and the various Project components to include transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, leveling, excavation, grading, etc.

The above activities will likely result in an increased level of dust and particulate matter emissions, which in turn will directly and temporarily impact ambient air quality. If improperly managed, there is a risk of nuisance and health effects to construction workers onsite and to a lesser extent to the nearby surrounding receptors from windblown dust (such as the Luxor-Aswan Highway – although unlikely due to its distance from the Project site). In addition, construction activities will likely entail the use of vehicles,

machinery and equipment (such as generators, compressors, etc.) which are expected to be a source of other pollutant emissions (such as SO_2, NO_2, etc.) which would also have minimal direct impacts on ambient air quality.

It is important to note that the generation and dispersion of dust depends on weather conditions; dry conditions with high wind speeds would cause excessive dust generation, while wet conditions and low wind speeds wouldn't. Given the characteristics of the site (its arid desert nature with frequent dry/windy conditions) sandstorms are probable. However, this is not within the control of the EPC Contractor and hence impacts from such events are not within their responsibility.

The table below provides an overall summary of the impact on air quality during the construction phase. The overall impact assessment will be of minor significance.

Construction Phase		
Type	Negative	
Duration	Short-term	Limited to construction period only which is 17 months
Magnitude	Medium	Dust and noise will be noticeable but dispersed
Reversibility	Reversible	Baseline restored after completion of construction works
Sensitivity	Low	There are no sensitive receptors impacted
Likelihood	High	Limited to construction period only which is 17 months
Extent	Medium	Around 2km from active areas due to wind influence
Significance	**Minor**	

Mitigation Measures

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

- Undertake dust monitoring on a quarterly basis for TSP and PM10 to verify the dust levels and to define and implement on a case-by-case basis measures and systems in order to maintain dust levels within allowable limits. This will include at least two monitoring points which represent activities undertaken (i.e. one point for areas with construction activities and one point at nearest receptor to include at nearby highway). If dust or pollutant emissions were found to be excessive due to construction activities (i.e. higher than allowable limits specified within Egyptian legislations for ambient air quality or IFC standards as included within the General EHS Guidelines, whichever is more stringent), the source of such emissions should be identified and adequate control measures must be implemented;
- Comply with the Occupational Safety and Health Administration (OSHA) requirements and the Egyptian Codes as well as IFC standards as included within the General EHS Guidelines to ensure that for activities associated with high dust levels, workers are equipped with proper Personal Protective Equipment (e.g. eye glasses, breathing masks, etc.);
- Apply basic dust control and suppression measures which could include:
    - Regular watering of roads for dust suppression;
    - Proper planning of dust causing activities to take place simultaneously in order to reduce the dust incidents over the construction period.
    - Proper management of stockpiles and excavated material (e.g. watering, containment, covering, bundling).

- Proper covering of trucks transporting aggregates and fine materials (e.g. through the use of tarpaulin).
- Adhering to a speed limit of 15km/h for trucks on the construction site.

- Develop a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment to be used throughout the construction phase for early detection of issue to avoid unnecessary pollutant emissions.

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

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor during the construction phase and which include:

- TSP and PM10 quarterly monitoring program at least two monitoring points which represent activities undertaken (i.e. one point for areas with construction activities and one point at nearest receptor to include at nearby highway).
- Inspection and visual monitoring of the works should be carried out at all times.
- Submission of quarterly dust monitoring report; and
- Reporting of any excessive levels of pollutants/dust and the measures taken to minimize the impact and prevent it from occurring again.

13.2.2 Potential Impacts during the Construction Phase on Noise

Site preparation activities which are to take place onsite by the EPC Contractor for installation of PV arrays and the various Project components to include central inverters, underground transmission cables, internal road network, buildings, etc. are expected to include land clearing activities, excavation, grading, etc.

All the above activities will likely include the use of machinery and equipment such as hammers, compressors, etc. and which are expected to be a source of noise and vibration generation within the Project site and its surroundings. If improperly managed, there is risk of nuisance and health affects to construction workers onsite and to a lesser extent to the nearby surrounding receptors (such as the Luxor-Aswan Highway – although unlikely due to its distance from the Project site).

The table below provides an overall summary of the impact from noise during the construction phase. The overall impact assessment will be of minor significance.

Construction Phase		
Type	Negative	
Duration	Short-term	Limited to construction period only which is 17 months
Magnitude	Medium	Noise will be noticeable but dispersed
Reversibility	Reversible	Baseline restored after completion of construction works
Sensitivity	Low	There are no sensitive receptors impacted
Likelihood	High	Limited to construction period only
Extent	Medium	Around 2km from active areas due to wind influence

Significance	Minor

Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC Contractor during the construction phase and which include:

- Undertake noise monitoring on a quarterly basis to verify levels and to define and implement on a case-by-case basis measures and systems in order to maintain noise levels within allowable limits. This will include at least one monitoring points which represent activities undertaken. If noise levels were found to be excessive due to construction activities (i.e. higher than allowable limits specified within Egyptian legislations or IFC standards as included within the General EHS Guidelines, whichever is more stringent), the source of such exceedances should be identified and adequate control measures must be implemented;
- Apply adequate general noise suppressing measures. This could include the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery, developing a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.;
- Comply with the Occupational Safety and Health Administration (OSHA) requirements and the Egyptian Codes to ensure that for activities associated with high noise levels, workers are equipped with proper Personal Protective Equipment (e.g. Earmuffs).

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor during the construction phase and which include:

- Quarterly noise monitoring program at one monitoring points which represent activities undertaken;
- Inspection of the works should be carried out at all times; and
- Reporting of any excessive levels of noise and the measures taken to minimize the impact and prevent from occurring again.

14. INFRASTRUCTURE AND UTILITIES

This section first provides an assessment of baseline conditions within the Project site and surrounds in relation to infrastructure and utilities and then assesses the anticipated impacts from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

14.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of baseline conditions in relation to infrastructure and utilities and presents the outcomes and results of the assessment.

14.1.1 Methodology of Assessment

Assessment of baseline conditions was based on a site visit by the 'E&S Team' to the Project site and surrounding area in October 2024. The site visit aimed to identify any key visible infrastructure and utility elements within the Project site or surrounding areas (e.g., electricity infrastructure lines, water infrastructure lines, etc.).

Desktop review as well as consultations were undertaken with key governmental entities to better understand and characterize infrastructure and utility element services required for the Project development as discussed further throughout this section. This includes water supply, waste management services, traffic and transport, etc. The consultation activities were previously discussed in "Chapter 6" and are discussed again in the sections below as applicable and relevant.

14.1.2 Telecommunication, Radio and TV

As part of the site survey undertaken, no infrastructure elements in relation to telecommunications, radio or TV were noted within the Project area (e.g. broadcasting towers).

However, a telecommunication tower is located on the Luxor – Aswan Highway at around 1.9 km to the northwest of the Project site as shown in the figure below.

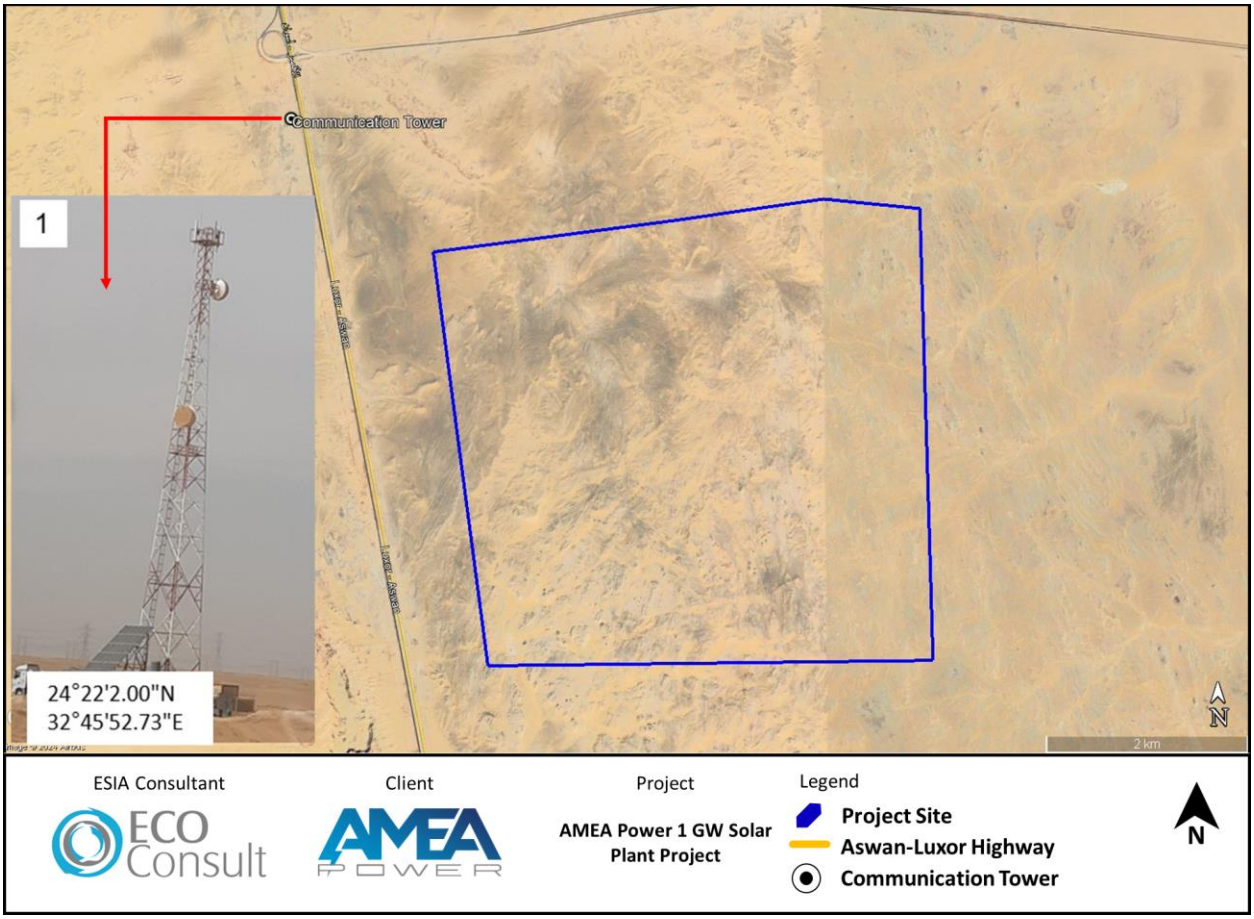

Figure 84: Telecom Tower Near the Project Site

14.1.3 Waste Management (Solid Waste, Wastewater, and Hazardous Waste)

As discussed earlier in "Section 6.3.1" consultations were undertaken to obtain information on municipal and construction waste disposal facilities, Wastewater Treatment Plants (WWTPs), and hazardous waste landfills with the following entities:

- Aswan Solid Waste Management Department which is the relevant entity that is responsible for handling solid waste in Aswan Governorate;
- Environmental Affairs Department of Aswan Governorate, which is the relevant entity that is responsible for handling hazardous waste in Aswan Governorate; and
- National Aswan Water and Wastewater Company (NAWWCo), which is the relevant entity that is responsible for handling wastewater in Aswan Governorate.
- Municipal and Construction Waste Disposal Facilities

In accordance with the Waste Management Law No.202 of 2020 which came into force in February 2022, the Aswan Solid Waste Management Department was established, where previously solid waste management was under the responsibility of the Environmental Affairs Department of Aswan. Based on consultations undertaken with the Aswan Solid Waste Management Department, the closest approved

solid waste disposal facility in Aswan Governorate is the El Alaqi solid waste disposal facility which is located around 34 km to the southeast of the Project site as shown in the figure below.

Currently, the area of the Project along with the closest communities and other surrounding communities rely on the El Alaqi Landfill, where the landfill operates according to Waste Management Law No.202 of 2020, ensuring compliance with Egyptian requirements and standards. The El Alaqi Landfill accepts the handling of solid waste as well as demolition and construction waste.

The Aswan Solid Waste Management Department confirmed that the El Alaqi Landfill would be able to handle waste quantities generated from the Project without affecting existing capacities. The Department was provided with estimates of waste expected for the construction and operation phase as presented later in "Section 14.2.2".

In addition, a new solid waste disposal facility has been constructed in Aswan and is expected to be completed by October 2024 known as Edfu Facility. This facility will have an area of around 5 acres and consists of a secure burial cell and a lined evaporation pond, both enclosed by a stone fence. Additionally, a surrounding service road network enhances access and management. The Edfu Facility represents the latest initiative in the governorate's waste management strategy, specifically designed to meet local waste disposal needs.

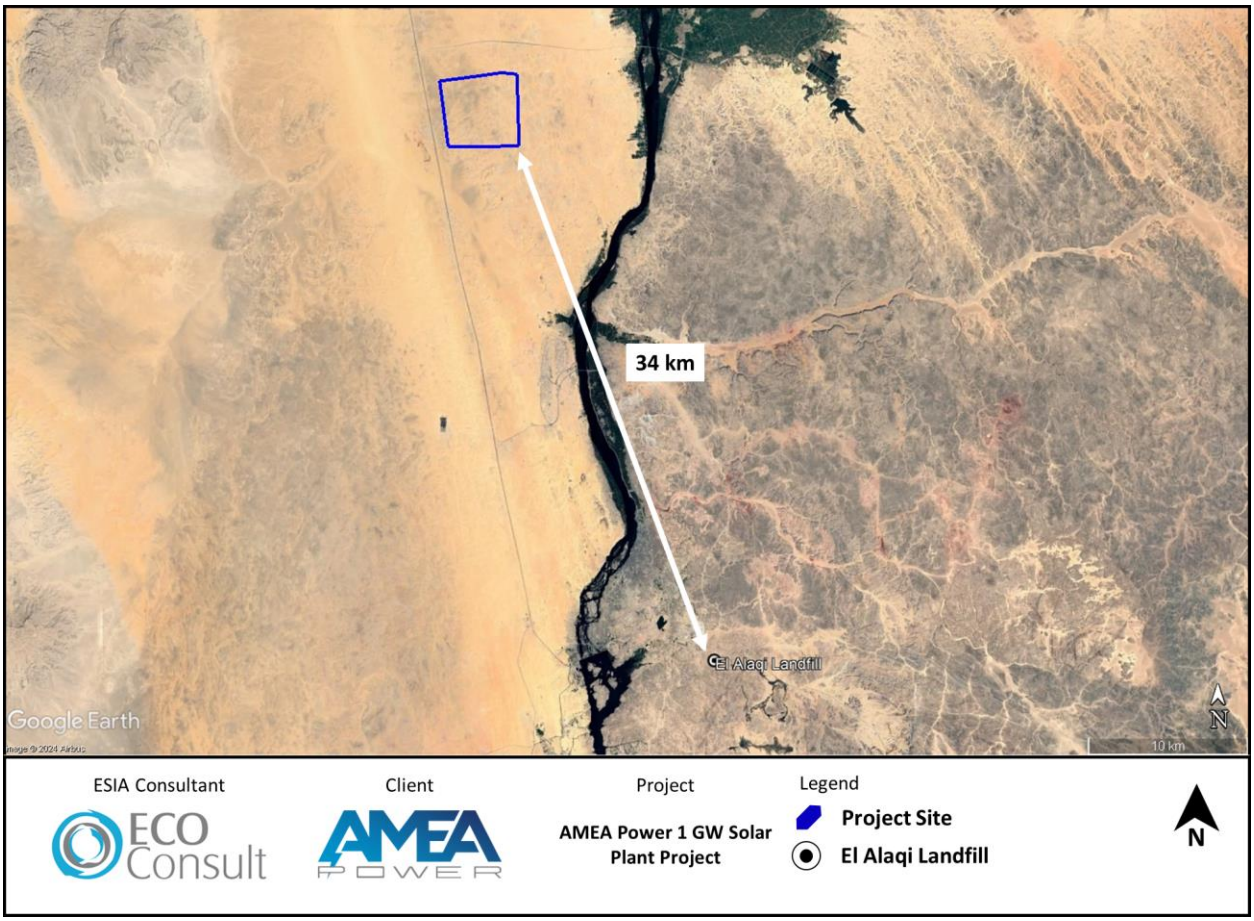

Figure 85: Project Site Relative to the Closest Landfill

Wastewater Treatment Plants

According to consultations with the National Aswan Water and Wastewater Company, it was indicated that the Governorate of Aswan has several Wastewater Treatment Plants (WWTPs) that serve different regions, with the largest located in Aswan City.

The closest WWTP to the Project site is located around 20 km away in Daraw District. However, it cannot meet the Project's needs due to its limited capacity. The WWTP operates in compliance with Egyptian wastewater standards.

In addition, it was provided that the WWTP in New Aswan City has sufficient capacity, yet prior coordination with its management is necessary through the Developer. The "E&S Team" has provided NAWWCo with the Project's projected wastewater quantities, where it was confirmed that such quantities can be accommodated, but close coordination with plant management is essential to avoid capacity issues.

Nevertheless, the Project can also utilize a licensed tanker for transporting the wastewater to this treatment plant

Hazardous Waste Landfill

In Egypt, the Nasreya Hazardous Waste Treatment Center in Alexandria Governorate is currently the only certified government facility for hazardous waste disposal, located around 800 km from the Project site. According to consultations with the Environmental Affairs Department of Aswan Governorate, transportation of Hazardous Waste to Nasreya Hazardous Waste Treatment Center must be handled by a certified company. Nasreya Hazardous Waste Treatment Center operates according to Egyptian law.

14.1.4 Water Resources

It is important to note that the section below is based on consultations with NAWWCo as well as secondary data available through a desktop review on water supply and demands within Aswan Governorate.

In addition, as noted within "Section 14.2.1" later, the water requirements for the Project were estimated and provided to NAWWCo to confirm that they would be able to provide such requirements without impact existing resources or requirements.

Water Supply

The water situation in Egypt is a complex situation, characterized by a critical reliance on the Nile River, which is the primary source of freshwater for drinking, agriculture, and industry. With the majority of the country's water resources of freshwater is derived from the Nile River around 93% as shown in the table below (CAPMAS, 2023).[13]

The main source of water supply in Aswan is surface water, particularly from the Nile River, which plays a crucial role in meeting the region's water needs. The total annual water production for Aswan is 121.8 million m^3, with no contribution from desalination or well desalination processes, and an insignificant

[13] CAPMAS. (2023). Bulletin: Drinking water and drainage statistics 2022/2021. Central Agency for Public Mobilization and Statistics

contribution from artesian sources, as shown in the table below. The vast majority comes from the Nile River.

Table 43: Total water produced by source in Aswan Governorate (CAPMAS, 2023)

Governorate	Total water produced by source				
	Total	Desalination	Well desalination	Artesian	Surface (mainly from the Nile River)
Aswan	121,800,00 m^3	0 m^3	0 m^3	~ 2,000,000 m^3	120,000,000 m^3

Despite the large volume of water generated, Aswan still has a rather significant water loss of around 27.0%, shown in the table below. According to the Annual bulletin of Pure Water and Sanitation Statistics year 2022/2021[14], the key reason for this water loss is from the distribution network (e.g. leakage), and such losses are estimated for Aswan Governorate at 9469.6 m^3/km. This loss is crucial because it represents a significant part of generated water that is not being used properly. Addressing this loss is critical for improving water management and making a higher proportion of generated water available for consumption and usage.

Table 44: Total Quantity of Produced, Consumed Water and Loss Rate (CAPMAS, 2023)

Governorate	Loss (non-refundable water) %	Quantity of consumed water	Quantity of water produced
Aswan	27.0	97,200,000 m^3	121,800,000 m^3

As discussed earlier in "Section 6.3.1", consultations were undertaken with NAWWCo. Consultation indicated that due to the relatively limited water requirements of such a Project, they will be able to provide the such water requirements easily without affecting water services and requirements in Aswan Governorate.

The following table was provided by NAWWCo where it presents statistical data for the 2022/2023 period regarding the number of stations, design capacity, actual capacity, and quantities produced for pure water stations operated by water companies across various governorates.

Table 45: Water Supply Data in Aswan Governorate

Indicators		Total in Egypt	Aswan Governorate
Surface Water Stations	Number of Stations	1108	114
	Design Capacity (mil m^3)	28725	617
	Actual Capacity (mil m^3)	22109	329
	Water Quantity (mil m^3)	8069.7	120
Artesian Water Stations	Number of Stations	1559	3
	Design Capacity (mil m^3)	6229	28
	Actual Capacity (mil m^3)	2632	5
	Water Quantity (mil m^3)	968	1.8
Wells Desalination Stations	Number of Stations	37	0
	Design Capacity (mil m^3)	70	0
	Actual Capacity (mil m^3)	23	0
	Water Quantity (mil m^3)	8.3	0
Desalination Stations	Number of Stations	48	0
	Design Capacity (mil m^3)	472	0
	Actual Capacity (mil m^3)	229	0

[14] Annual bulletin of Pure Water and Sanitation Statistics year 2022/2021

	Water Quantity (mil m^3)	83.4	0
Total	Number of Stations	2752	117
	Water Quantity (mil m^3)	9129.4	121.8

Water Demand

In terms of water demand, the table below present the general water demand in Aswan Governorate where the Project is located. The general water demand includes the municipal, agricultural and industrial sectors. As seen in the figure below, the agricultural sector accounts for the majority of water demand in Egypt in general.

As noted in the table and figure below, the quantity of water produced (as discussed previously) is able to supply the Governorate's demand.

Table 46: Average Per Capita of Produced and consumed Water at the Level of Governorates in 2022/2023 (CAPMAS, 2023)

Governorate	Average per capita of consumed water (mil m^3)	Average per capita of produced water (mil m^3)	Population Estimates	Quantity of consumed water (mil m^3)	Quantity of produced water (mil m^3)
Aswan	59.6	80.2	1,670,122	99.6	134
Total	84	106.6	105,914,499	8,892.1	11,287.5

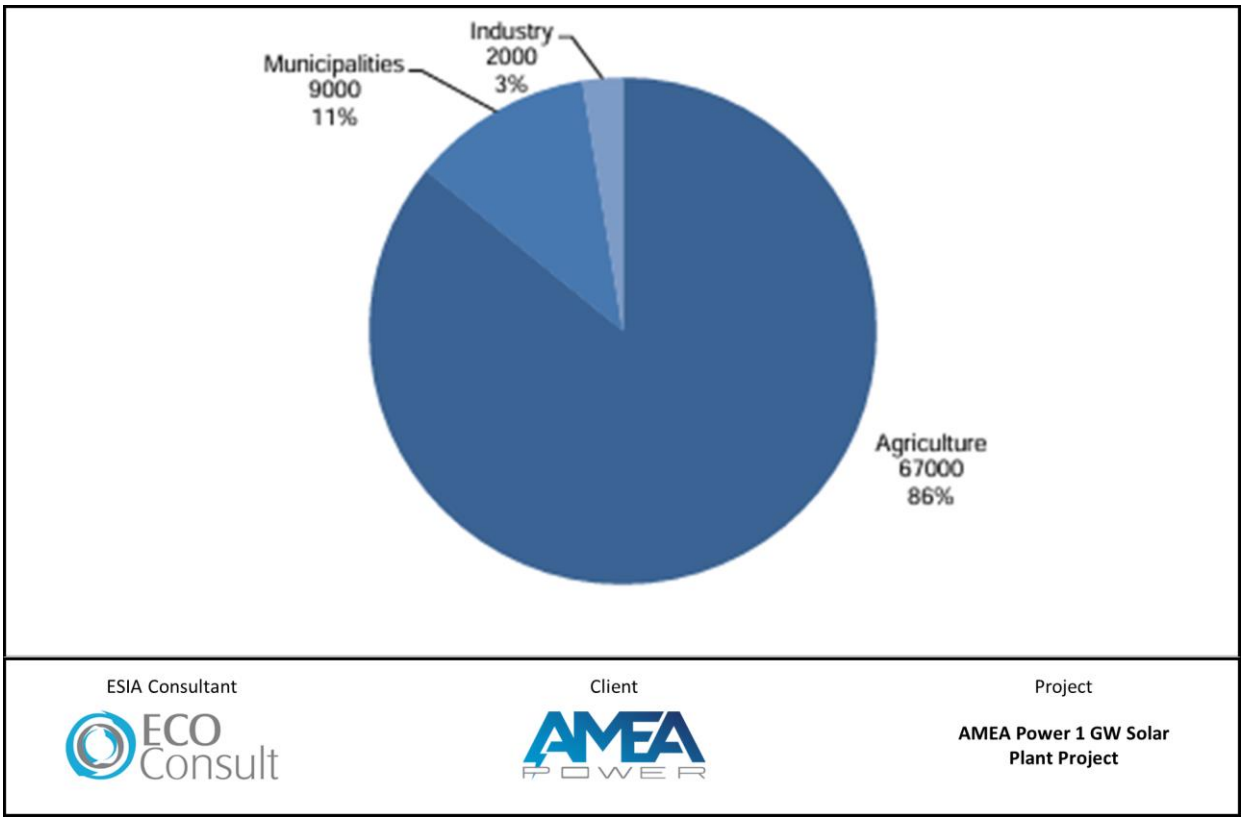

Figure 86: Water Demand Distribution in Egypt

According to discussions with NAWWCo, water demand in Aswan Governorate has been increasing over the past five years, driven primarily by population growth, agricultural expansion, and limited industrial needs as described in the following:

- Household Demand: Daily per capita consumption is estimated at 100-150 Liters, reflecting a growing population that necessitates more water for domestic use.
- Agricultural Demand: Agriculture accounts for a significant portion of water demand, heavily reliant on Nile irrigation systems. The last five years have seen a rise in water usage due to expanded agricultural activities, particularly in southern Aswan and reclamation projects in Toshka.
- Industrial Demand: Although limited, industrial water demand is gradually increasing.

Overall, Aswan Governorate, Daraw District, and Al Raqaba Local Unit primarily depend on Nile River water, supplemented by groundwater for local needs. Water supply volumes have steadily increased to meet the rising demand, especially during the summer months.

14.1.5 Traffic and Transport

The Project site is located around 1 km east of the Aswan – Luxor Highway. This is the major highway in Egypt along the Nile River in Aswan Governorate and which connects with other governorates in the north. The highway has a width of 12 m and has moderate traffic of vehicles including transportation of heavy goods vehicles. From this highway, an access road will be required to connect with the Project site. This access road will be less than 1km in length.

In addition, from the Aswan – Luxor Highway there are 4 access secondary roads which connect with nearby villages and areas, and which are known as Fares road, Al Mansourieh road, El Karabla road and Benban road as noted in the figure below.

According to consultations undertaken with the Roads and Bridges Directorate in Aswan Governorate as described in "Section 6.3.1" above, it was discussed that a new road, the Daraw Axis, is currently under construction about 2 km to the north of the Project site. Once completed, this axis is expected to enhance connectivity between the Aswan – Luxor Highway and other major routes. Its proximity to the Project site could provide alternative access options, potentially alleviating traffic on the Aswan – Luxor Highway as also shown in the figure below.

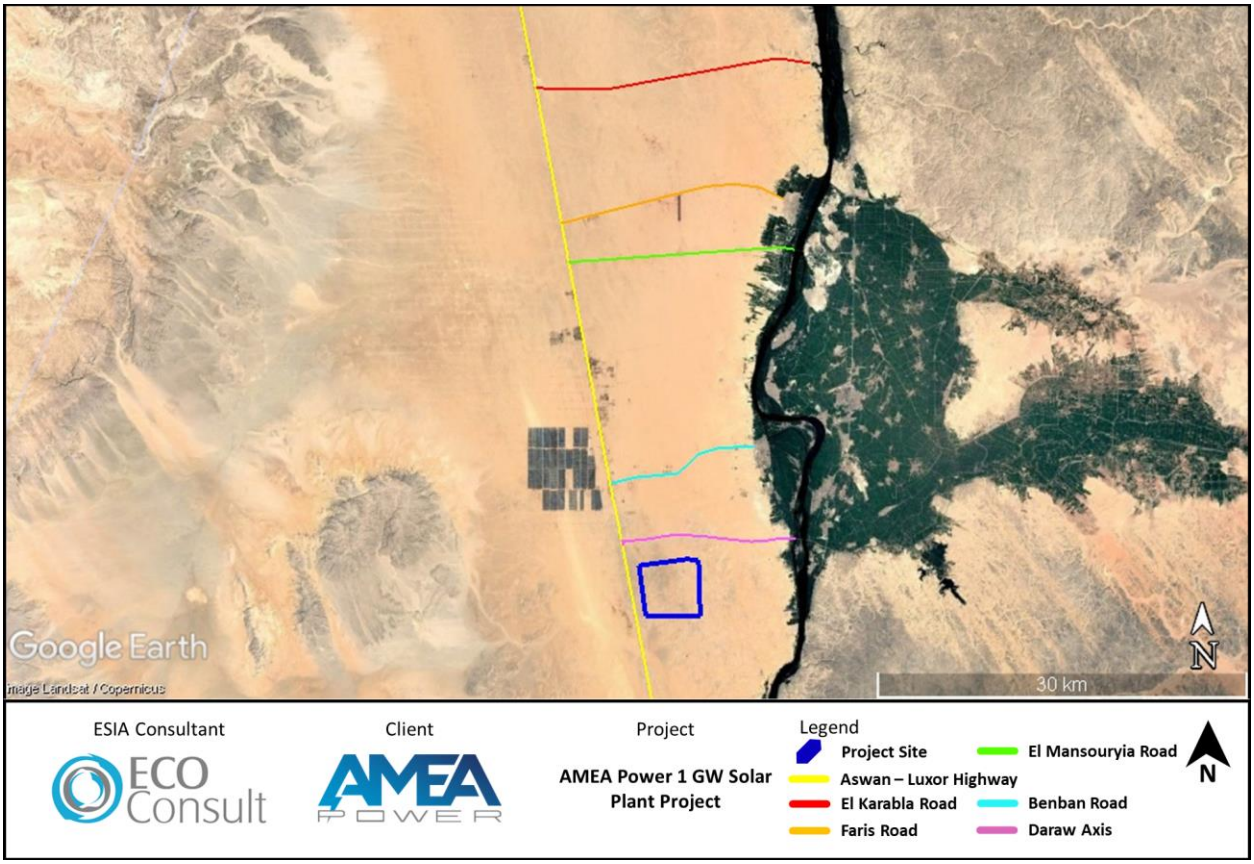

Figure 87: Road Networks in Project Area

14.1.6 Gas Infrastructure

Based on a site visit undertaken by the "E&S Team" for the Project site, a natural gas pipeline that runs parallel to Aswan – Luxor Highway was observed at a distance of around 800 m to the west of the Project site as presented in the figure below.

In addition, a natural gas pumping station that is located around 2 km to the southwest of the Project site that the natural gas pipeline goes through as shown in the figure below.

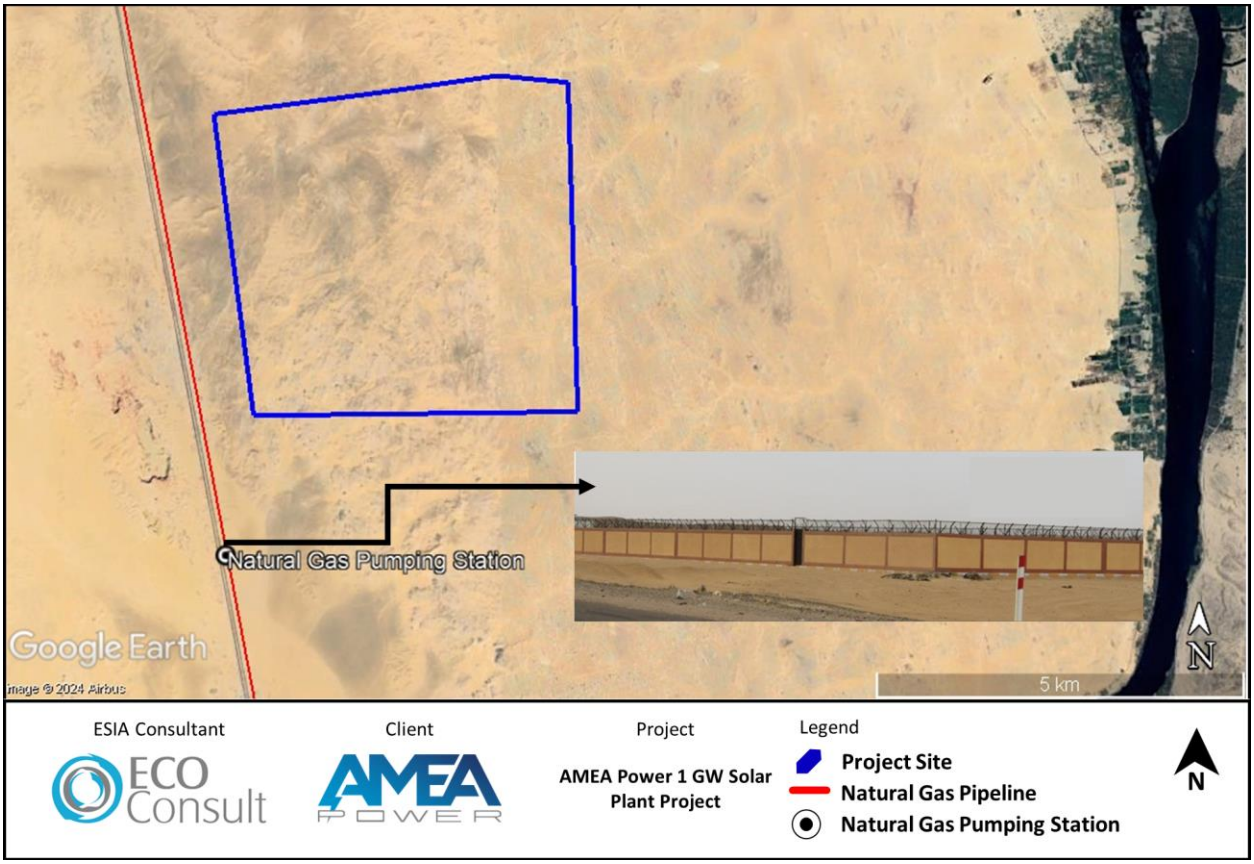

Figure 88: Natural Gas Pipeline and Pumping Station in Relation to the Project Site

14.1.7 Electricity Networks

Three high voltage OHTLs were observed around 1.4 km to the west of the Project site and runs parallel to the Aswan – Luxor Highway as shown in the figure below. Such transmission lines are under the responsibility of the Egyptian Electricity Transmission Company (EETC).

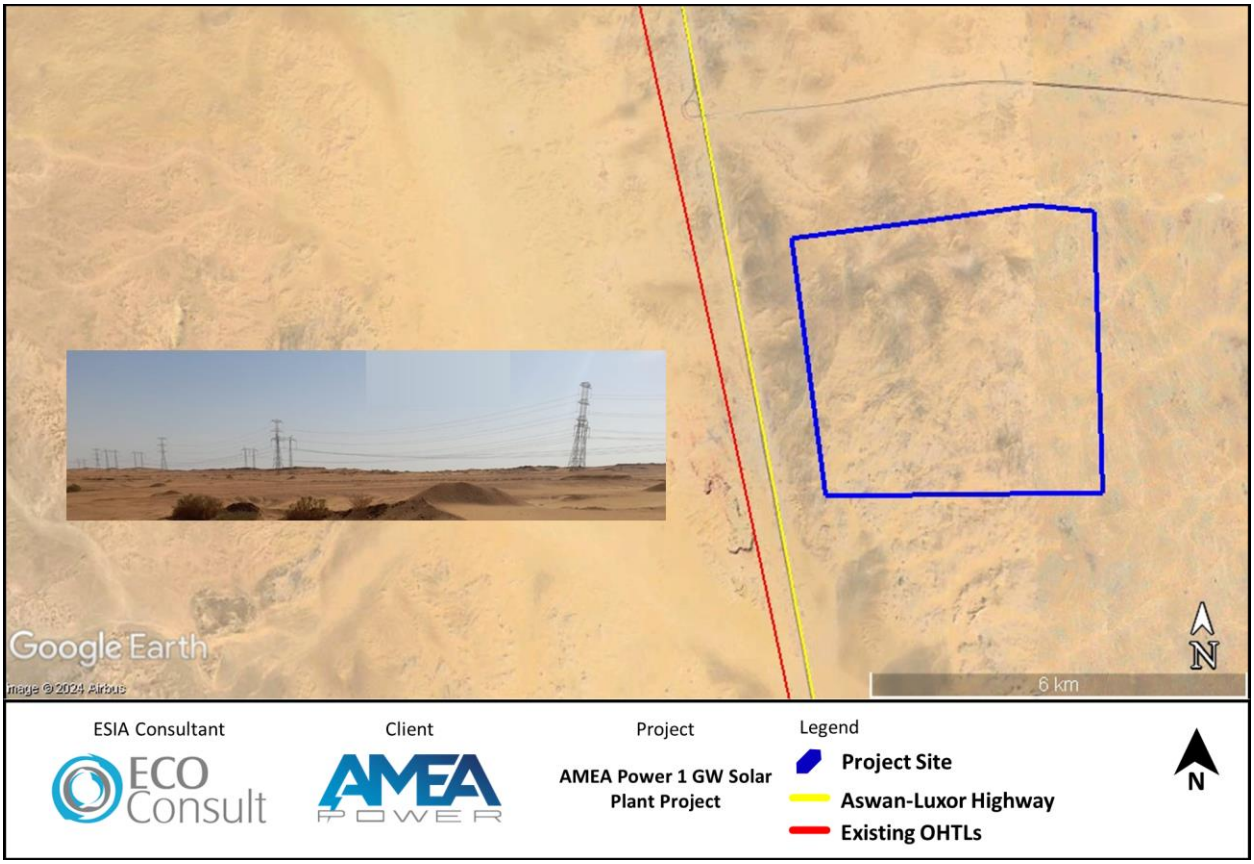

Figure 89: Existing OHTLs Near the Project Site

14.2 Assessment of Potential Impacts

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

14.2.1 Potential Impacts on Water Resources during the Construction and Operation Phase

It is expected that the Project throughout the construction and operation phase will require water for potable usage (drinking, showering, etc.) and non-potable usage (e.g. cleaning of machinery and vehicles).

The potable water requirements for a maximum of 4,000 workers at peak onsite is not expected to exceed 50 liters per capita per day for a duration of 17 months. Thus, the daily water consumption at peak is likely to be around 200,000 liters per day – or 200 m^3 per day. As a worst-case scenario, taking into account construction timeline (17 months), this is equivalent to 102,000 m^3.

In addition, water for non-potable usage will be mainly used for minimizing fugitive dust emissions and this will greatly depend on weather conditions throughout the construction period (as well as other factors) and cleaning of machinery and vehicles, but has been estimated to be around 200 m^3/ day.

Thus, total water requirements during the construction phase are likely to be around 400 m^3/ day. The water requirements throughout the construction phase will be required temporary (for construction period only) and are considered minimal and not significant.

In addition, water will be required during the operation phase and mainly for drinking and other personal use of onsite staff (a maximum of 90 personnel). Similarly, potable water requirements for the onsite workers are not expected to exceed 50 liters per capita per day – thus a daily water consumption is likely to be around 4,500 liters per day – or 4.5 m^3 per day.

As discussed earlier, the PV modules will be cleaned on a regular basis to prevent dust build-up which could affect their performance. However, it is important to note that with regards to cleaning of the PV modules during operation, priority will be given to cleaning through a dry brush cleaning program which does not entail the use of water. However, it is expected that there will be certain situations where water will still be required (e.g. when dust becomes adhesive from rain or humidity). Nevertheless, in such circumstances the maximum required water for cleaning of the panels is not expected to exceed 4 times per year where each cleaning cycle will require approximately 5,000 m^3 of water – therefore the maximum total annual water requirements for cleaning is not expected to exceed 20,000 m^3 per year or 55 m^3 per day.

Therefore, the total maximum water consumption during operation is likely to be around 60m^3 per day or around 21,700 m^3 per year.

As discussed earlier, consultations were undertaken with Aswan Water and Wastewater Company which indicated that they will be able to provide such water requirements easily without affecting water services and requirements in Aswan Governorate. Such water requirements can be supplied through water tankers delivered to the site.

The table below provides an overall summary of the impact on water resources during the construction phase and operation phase. The overall impact is considered to be of minor significance during the construction phase and not significant during the operation phase.

Construction Phase			**Operation Phase**		
Type	Negative		Type	Negative	
Duration	Short-term	Relevant for construction period which is 17 months	Duration	Long-term	Relevant for operation period
Magnitude	Medium	Amounts of water required is considered medium level	Magnitude	Low	Amounts of water required is considered low level
Reversibility	Reversible	N/A	Reversibility	Reversible	N/A
Sensitivity	Low	Given that the amounts can be supplied without straining any existing resources	Sensitivity	Low	Given that the amounts can be supplied without straining any existing resources
Likelihood	High		Likelihood	High	
Extent	Medium	Could impact all resources / users relying on such water source which could	Extent	Medium	Could impact all resources / users relying on such water source which could be more than 5 km away

		be more than 5 km away			
Significance	**Minor**		**Significance**	**Not Significant**	

Additional Requirements

The following identifies additional requirements to be applied by the EPC Contractor and Project Operator during the construction and operation phase respectively and which include:

- Coordinate with Aswan Water and Wastewater Company to determine the most feasible and practical approach for securing the water requirements of the Project. In the case tankers will be used, list of authorized tankers will have to be obtained from the Company.
- If Project utilizes a local water well, a baseline analysis should be undertaken that indicates the water level, production capacity and water quality of the groundwater and nearby wells within the area. In addition, during the operation phase, regular reporting (e.g. annually) on groundwater monitoring and groundwater situation should be provided.
- Document water consumption of the Project during construction (monthly) and during operation (annually)

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements to be applied by the EPC Contractor and Project Operator during the construction and operation phase respectively and which include:

- Submit report with proof of coordination with authorities discussed above
- Submit water consumption report.
- If local water well is used, regular reporting to potentially impacted users should be undertaken to include but not limited to National Aswan Water and Wastewater Company, and relevant Agriculture associations.

14.2.2 Potential Impacts on Waste Utilities during the Construction and Operation Phases

The Project is expected to generate the following waste streams during the construction and operation phases:

- Wastewater during construction and operation to include black water (sewage water from toilets and sanitation facilities) and grey water (from sinks, showers, etc.). Wastewater during the construction phase can be assumed by taking into account an 80% wastewater generation factor for potable water requirements which will amount to around 160 m^3 per day. Wastewater generated during operation is expected to be minimal and insignificant. Wastewater will be stored onsite though enclosed collection tanks and collected by licensed tankers from the Project to the closest WWTP.
- Solid waste during construction and operation will include construction waste (mainly during construction to include dirt, rocks, debris, etc.) as well as general municipal waste (such as food, paper, glass, bottles, plastic, etc.). The approximate estimated municipal solid waste to be generated from the Project can accounted as follows. Throughout the construction phase, a maximum of 4,000 construction workers are expected at peak. The expected municipal solid waste generation per worker is around 0.5 kg/capita/day. Thus, the anticipated municipal solid waste is estimated to be around

2,000 kg/day. In addition, construction waste is likely to be around 1,000 kg/day to include waste such as cables, metal, wood, etc. Therefore, the total estimated solid waste to be generated during the construction phase is around 3,000 kg/day.

- Similarly, during operation solid waste will mainly include municipal waste. A maximum of 90 workers are expected and therefore the estimated municipal solid waste is around 45 kg/day.
- Hazardous waste during construction and operation from the will include routine waste generated from such activities to include spent oil, lubricants, paint cans, solvents, etc. Hazardous waste quantities generated are not expected to be significant and are likely to be easily handled by closest authorized facility. However, from previous experience in other solar PV development projects, hazardous waste generated can be estimated at around 20 kg/day during construction and 2 kg/day during operation.

The table below provides an overall summary of the impact on waste utilities during the construction phase and operation phase. The overall impact is considered to be not significant.

Construction Phase			**Operation Phase**		
Type	Negative	N/A	Type	Negative	N/A
Duration	Short-term	Limited to construction phase which is 17 months	Duration	Long-Term	Throughout entire operational period
Magnitude	Low	Given waste quantities above	Magnitude	Low	Given waste quantities during operation are minimal
Reversibility	Reversible	N/A	Reversibility	Reversible	N/A
Sensitivity	Low	Given waste quantities above	Sensitivity	Low	Given waste quantities during operation are minimal
Likelihood	High	Given nature of activities expected	Likelihood	High	Given nature of activities expected
Extent	Medium	Could impact all resources / users relying on such waste utilities which could be more than 5 km away	Extent	Medium	Could impact all resources / users relying on such waste utilities which could be more than 5 km away
Significance	**Not Significant**		**Significance**	**Not Significant**	

Additional Requirements

The following identifies the additional requirements to be applied by the EPC Contractor during the construction phase and Project Operator during the operation phase respectively and which include:

- Coordinate with the National Aswan Water and Wastewater Company and obtain list of authorized contractors for collection of wastewater from the site to the New Aswan City WWTP.
- Coordinate with Aswan Solid Waste Management Department for the collection of solid waste from the site to El Alaqi Sanitary Landfill (or obtain list of authorized private contractors).
- Coordinate with Environmental Affairs Department in Aswan Governorate to obtain list of authorized contractors for collection of hazardous waste from the site to the closest approved facility for final disposal.

14.2.3 Potential Impacts on Hazardous Waste Disposal Utilities during Decommissioning Phase

A key consideration for the Project's decommissioning phase is the disposal of both the PV panels and Battery Energy Storage Systems (BESS) at the end of their operational lifetimes, which is expected to be approximately 25 years. For the PV panels, disposal would ideally be managed through recycling programs such as PV CYCLE, an industry-led initiative that facilitates the take-back and recycling of end-of-life PV modules. This program's comprehensive process allows for the recovery of most materials, including glass, semiconductor materials, and metals, for reuse in new products. However, if recycling proves unfeasible, a **worst-case scenario** (although highly unlikely) would involve disposing of the approximately 2,000,000 PV panels in a landfill.

Similarly, BESS disposal presents challenges, as they are classified as hazardous waste or e-waste. In the absence of a recycling solution, these units would also be sent to landfill. With both PV panels and BESS, the long-term disposal and recycling prospects remain uncertain given the Project's timeline.

The table below provides an overall summary of the impact on hazardous waste disposal utilities during the decommissioning phase. The overall impact is considered to be not significant.

Decommissioning Phase		
Type	Negative	Prospects of PV Panels and BESS disposal and management is not clear at this stage, taking into account the Project timeline of 25 years.
Duration	Long-term	
Magnitude	Low	
Reversibility	Reversible	
Sensitivity	Low	
Likelihood	High	
Extent	Low	
Significance	**Not Significant**	

Additional Requirements

Given that at this stage there is a great deal of uncertainty at the decommissioning phase of the Project (with regards as to whom is the responsible party, prospects on waste disposal facilities in Egypt, etc.), it is recommended that before any decommissioning activities take place a Disposal Plan for the PV Panels and BESS is prepared by the responsible entity undertaking decommissioning activities. The plan should consider the following options and compare the costs/benefits of each:

- It is recommended that the Plan first opt for disposing the panels at the end of their lifetime as part of international recycling programs for PV Panels (such as PV CYCLE's recycling program);
- Evaluate recycling options for E-waste, including the identification of appropriate licensed waste processing facilities for this type of waste within the country, if available.
- Cost estimation for recycling and collecting at the end of lifetime at least but not limited the following components:
    - Power Conversion System
    - Battery System
    - Electronic components
    - Electric components
    - Buildings and enclosures

- Hazardous, toxic, ozone depleting and/or greenhouse gases
- Hazardous and/or toxic liquids
- Hazardous and/or toxic solid materials

- Provide suitable proof that the recycling concept is in compliance with Basel Convention. In addition, Project Operator should specifically state which materials will be recycled or disposed locally. If exported internationally, Project Operator should specify which materials will be exported and to which location.
- Include a written confirmation by the Original Equipment Manufacturer (OEM) of the BESS that the following works regarding the Battery System are included:
  - Check-up of the Battery System regarding safe transport
  - Decommissioning and disassembly
  - Safe packaging and transport to the designated recycling site
  - Recycling and disposal according to the state of the art of technology
- If the above could not be achieved, as a last option the plan must investigate the disposal of the Panels at existing waste facilities in Egypt through coordination with EEAA.

Monitoring Measures

- Submission of Disposal Plan along with proof of coordination with the authorities discussed above for works required as part of the Study.

Note: the above requirements are also considered applicable for broken/damaged panels and BESS components during the construction and operation phase of the Project.

14.2.4 Potential Impacts on Road Networks during the Construction Phase

The section below has been developed based on the following:

- Review of secondary data to include mainly the "Traffic Management Plan – Construction Phase for the Solar PV Plant Benban Site" (Rina Consulting, 2017)
- Collection of secondary data on traffic and transportation as available from FMC as well as General Authority for Roads, Bridges and Land Transport (GARBLT)
- Consultations with HSE Manager at the FMC of the Benban Park

(i) Sources of Traffic

The principal sources of traffic generated by Project construction are listed as follows:

- Delivery of Equipment, Machinery and Materials: this will include vehicles that will be utilized for the delivery of equipment, machinery and materials to the Project site and that are required for the construction phase. This will include but not limited to: (i) haulage container trucks (to supply PV panels, inverters, transformers, etc.), (ii) site machinery required (excavators, rollers, etc.); (iii) construction material (e.g. concrete), and (iv) and other as applicable. Such vehicles will be using key

national highway and roads from ports and other locations where such materials are sourced.

- As the EPC Contractor has not been assigned yet, no details are available at this stage on the number of vehicles requires for delivery of material and equipment, routes, sources of materials, etc. Therefore, for this figure the numbers have been estimated for a 1GW project mainly from data available from the Benban Management Plan titled "Traffic Management Plan – Construction Phase for the Solar PV Plant Benban Site" (Rina Consulting, 2017).

The Benban Traffic Management Plan estimates the maximum daily container delivery at peak at 200 for a 1,800MW capacity. Based on that, for a 1,000MW Project the daily maximum number could be estimated at around 111.

- ***Transport of project workers***: as discussed earlier, no details are available at this stage on whether there will be onsite or offsite accommodation facilities for workers. Nevertheless, it is expected that Project staff and local workers will be transported to and from the construction site by buses as well as smaller vehicles from hotels and other accommodation units in Aswan city and Al Raqaba Local Unit (for local community workers).

- Similar to the above, given that no details are available at this stage on accommodation, the number of vehicles required for delivery of Project workers has been estimated for a 1,000MW project mainly from data available from the "Traffic Management Plan – Construction Phase for the Solar PV Plant Benban Site" (Rina Consulting, 2017).

The Benban Traffic Management Plan estimates the maximum daily worker delivery at peak at 291 for an 1,800 MW capacity. Based on that, for a 1,000MW Project the daily maximum number could be estimated at around 161.

- ***Service Contractors***: contractors assigned to provide regular services for the Project to include water tankers, wastewater haulers, hazardous waste haulers, food/catering suppliers, that will be through trucks and large vans.

The daily maximum number of trucks at peak in relation to this can be estimated at 8 (assuming they all are onsite on the same day) to include water supply tankers, wastewater hauler, hazardous waste hauler and food supply/catering trucks.

- **Other**: this will include other minor traffic and transportation requirements such as: (i) construction monitoring visits by entities (e.g. lenders, auditors, etc.); (ii) emergency response vehicles in case of an incident onsite (e.g. fire trucks, ambulance, etc.); (iii) other visitors to the site. Those will not generate additional traffic to the sire and can be considered negligible.

Summary of Peak Vehicle Numbers

The table below provides a summary of the peak maximum daily number of vehicles that could access the site during a single day. *However, it is important to note that the figure is based on peak numbers assuming all peak traffic requirements occur on the same day*. In reality, actual peak numbers are likely to be much lower given that peak number of workers and peak delivery of materials is not expected to be on the same day or week.

Table 47: Summary of Peak Vehicles

Traffic Source	Maximum Number of Vehicles
Delivery Vehicles	111

Buses	161
Service Contractors	8
Total	280

(ii) Traffic Route

As noted above, one of the key and main traffic requirements are related to the imported equipment (i.e. PV panels, electrical equipment, etc.). Ain Sokhna Port has been selected for the Project's components delivery to Egypt, however, the exact associated traffic route is not known at this stage.

However, based on review of the "Traffic Management Plan – Construction Phase for the Solar PV Plant Benban Site" (Rina Consulting, 2017), The expected delivery routes from Ain Sokhna Port to the Project site include four (4) potential options as presented in the table and figure below. This has been based on information from "Traffic Management Plan – Construction Phase for the Solar PV Plant Benban Site" (Rina Consulting, 2017).

Table 48: Traffic Route

Port	Route Length	Conditions
Ain Sokhna	West of Nile River: (i) 75km Ain Sokhna-Cairo; (ii) 80km regional ring road; (iii) 530km Cairo-Luxor; and (iv) 160km Luxor-Aswan. TOTAL = 845 km.	Generally, all roads are considered to be in good conditions with no or minor urban crossings.
	East of Nile River: (i) 75km Ain Sokhna-Cairo; (ii) 40km regional ring road; (iii) 520km Cairo-Qena; (iv) 85km Qena-Luxor; and (iv) 160km Luxor-Aswan. TOTAL = 880 km.	Generally, all roads are considered to be in good conditions with no or minor urban crossings with the exception of significant urban interface on Cairo-Qena Eastern Highway.
	South/East of Nile River: (i) 255km Sokhna-Safaga-Zaferana-Qouniat; (ii) 470km Cairo-Qena; (iv) 85km Qena-Luxor; and (iv) 160km Luxor-Aswan. TOTAL = 970 km.	Generally, all roads are considered to be in good conditions with no or minor urban crossings with the exception of significant urban interface on Cairo-Qena Eastern Highway.
	Along Red Sea: (i) 510km Safaga-Qena; (ii) 470km Cairo-Qena; (iv) 85km Qena-Luxor; and (iv) 160km Luxor-Aswan. TOTAL = 1,225 km.	Generally, all roads are considered to be in good conditions with no or minor urban crossings.

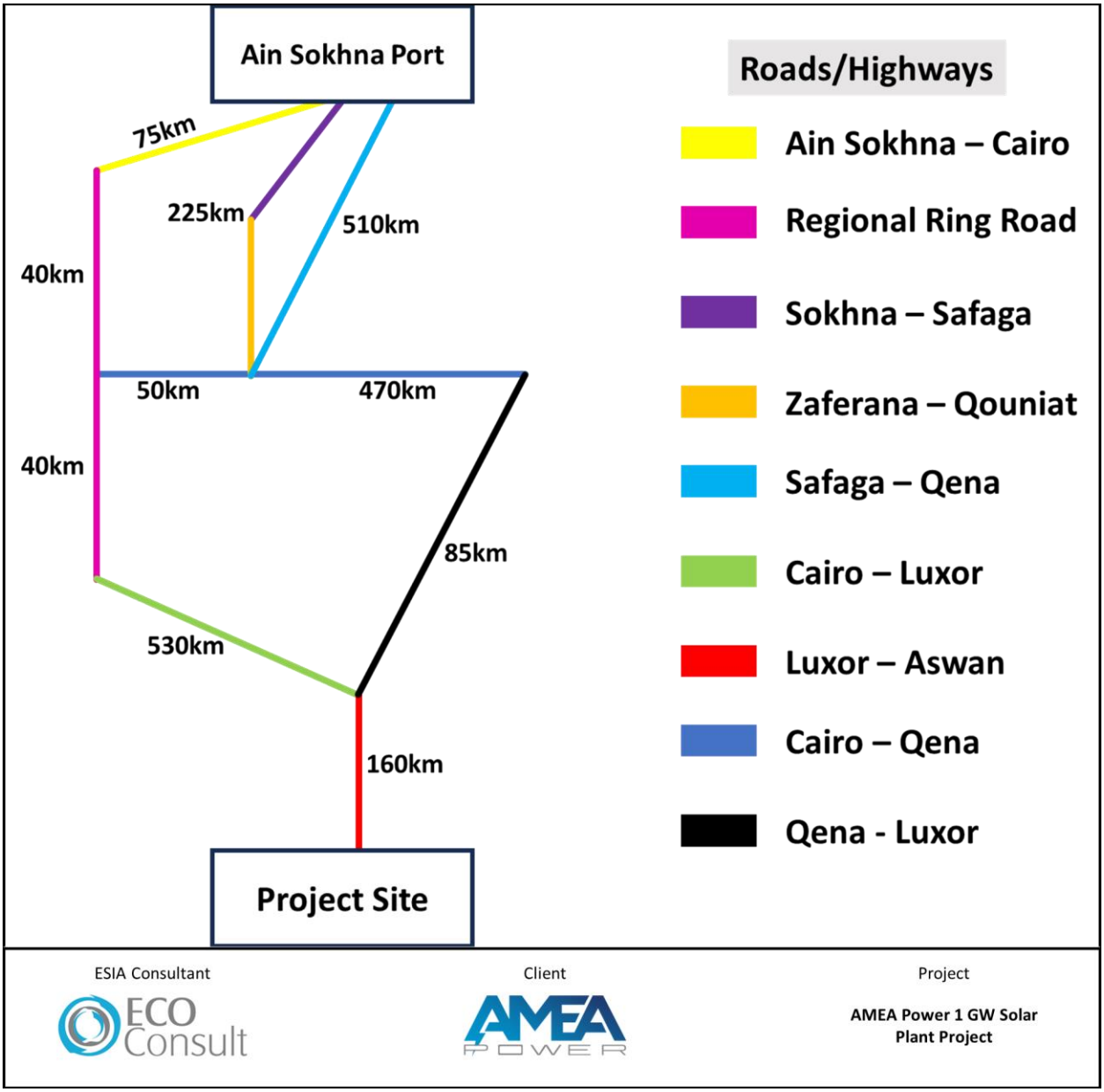

Figure 90: Transport Routes for Project Site

The highway network to be used for delivery journeys to the north of Luxor is well established, generally with more than one lane in each direction, and accustomed to high levels of existing traffic.

All Project delivery traffic will converge onto the Luxor – Aswan highway for the final 160 km of the southward journey. In general, previously, this highway in specific included several points that are in poor repair, where reflective signs and road demarcations are absent. This entails drivers encroaching onto the opposite lane, rather than slowing down, to avoid potholes and uneven surfaces; giving rise to 'accident hotspots' in areas where road conditions are poor.

However, rehabilitation works on the Luxor-Aswan highway has been undertaken since 2020. The highway was upgraded into a 4-lane highway (2 in each direction) as opposed to a 2-lane highway as it previously was.

Consultations with Roads and Bridges Directorate in Aswan Governorate indicated that according to the latest assessments after the rehabilitation works have been done to the Luxor – Aswan highway, the highway condition is generally classified as "good" with some sections undergoing currently some maintenance works to enhance safety. Nevertheless, the sections that are undergoing maintenance works have not been provided to date.

Impact Assessment on Traffic and Road Capacity

The "Traffic Management Plan – Construction Phase for the Solar PV Plant Benban Site" (Rina Consulting, 2017) concludes that *the Project delivery routes to the north of Luxor in general are currently well used and delivery of equipment to the Project is not anticipated to significantly increase traffic levels on these routes or require further assessment or monitoring*. It concludes that project related traffic has no significant impact on the traffic of main national highway can be generally expected and considerably lower than road capacity.

Regarding the Luxor-Aswan Highway, the study also undertook a traffic baseline survey over 2 days (14th October and 17th October 2017). Based on the study, the average number of vehicles per hour recorded were with peak values lower than 150 (October 14th) and 170 (October 17th) for equivalent vehicles per hour.

The study concludes that based on this data the actual traffic on the Luxor-Aswan highway can be considered negligible assuming that the theoretical road capacity for a one-highway is estimated at 2,000 equivalent vehicles per hour. It is important to note that the rehabilitation works of the Luxor – Aswan highway was undertaken and was upgraded to a two-lane highway, however, during the period of the study discussed above, the highway still had one lane highway.

In addition to the above and with regards to the Luxor-Aswan highway in specific, latest statics available (2019) were obtained from the GARBLT (note statistics below are average traffic counts before rehabilitation works were completed as discussed earlier). ***Note: consultations were undertaken with GARBLT which indicated that the data on traffic counts from 2019 is the latest traffic count statistics available to date. No updated traffic counts have been undertaken since then.***

Table 49: Traffic Count Luxor-Aswan Highway

Time	Vehicle statement						
	Private Owned	Microbus	Transportation 1/2 Transportation 3/4	Single heavy transport	Heavy transport trailers or trucks	Autobus	Other
12:00 AM	20	10	8	4	9	2	0
1:00 AM	14	10	8	4	9	3	0
2:00 AM	10	10	8	4	9	1	0
3:00 AM	8	8	6	2	7	0	0
4:00 AM	8	8	6	2	7	4	0
5:00 AM	5	8	6	2	7	0	0
6:00 AM	15	10	8	4	9	2	0
7:00 AM	20	6	4	0	5	3	0

Time	Vehicle statement						
	Private Owned	Microbus	Transportation 1/2 Transportation 3/4	Single heavy transport	Heavy transport trailers or trucks	Autobus	Other
8:00 AM	90	6	4	0	5	5	0
9:00 AM	80	8	6	2	7	5	0
10:00 AM	70	20	18	14	19	0	0
11:00 AM	50	24	22	18	23	0	0
12:00 PM	50	22	20	16	21	6	0
1:00 PM	63	30	28	24	29	6	0
2:00 PM	53	24	22	18	23	5	0
3:00 PM	44	16	14	10	15	2	0
4:00 PM	61	20	18	14	19	2	0
5:00 PM	71	26	24	20	25	6	0
6:00 PM	50	18	16	12	17	0	0
7:00 PM	42	22	20	16	21	0	0
8:00 PM	20	30	28	24	29	6	0
9:00 PM	15	16	14	10	15	2	0
10:00 PM	10	14	12	8	13	0	0
11:00 PM	11	6	4	0	5	0	0
Total	880	372	324	228	348	60	0
Total Eq*	880	372	648	684	1,740	60	0
Total equivalent per hour		170					

Assuming half/single/double trucks equal to 2/3/5 equivalent vehicles respectively

Similar to the above, the numbers are considered negligible assuming that the theoretical road capacity for a two-lane highway is estimated at 3,500 equivalent vehicles per hour.

As noted in the table below, with regards to the Luxor-Aswan Highway, the Project related traffic is also considered negligible taking into the existing traffic condition and highway capacity.

Table 50: Project and Existing Traffic

Traffic Source from Project	Maximum Number of Vehicles per day	Equivalent Vehicles*	Equivalent Vehicles per hour	Existing Traffic & Project Traffic	Highway Capacity
Delivery Vehicles	111	555	30	170 + 30 = 200	3,500
Buses	161	161			
Service Contractors	8	24			
Total	**280**	**740**			

Assuming half/single/double trucks equal to 2/3/5 equivalent vehicles respectively

The table below provides an overall summary of the impact on road networks during the construction phase. The overall impact is considered to be not significant.

Construction Phase		
Type	Negative	
Duration	Short-term	Limited to construction period only which is 17 months
Magnitude	Low	Given a slight increase only in traffic
Reversibility	Reversible	Baseline restored after completion of construction works
Sensitivity	Low	Given a slight increase only in traffic
Likelihood	High	Limited to construction period only
Extent	High	Impacts could have an affect up to 10 km radius
Significance	**Not Significant**	

Impact Assessment on Health and Safety

Health and safety in relation to traffic and transport is mainly related to potential for accidents occurring on roads and highways which in turn could affect the health and safety of users on the roads, workers and other. Road accidents can derive from a number of causes, to include but not limited to the following:

- Violating traffic rules such as speed limits
- Bad driving behavior such as overtakes, sudden lane changes, misuse of direction indicators, low level of attention, awareness condition of the driver and other
- Road characteristics and conditions. As discussed earlier, all roads are considered to be in good conditions.
- Vehicle maintenance (brakes, suspensions, etc.)
- Project components mainly related to abnormal loads (if applicable) which if inappropriately managed could entail health and safety risks on users on the roads
- Inappropriate traffic management at the Project area which could pose a hazard – for example this could include entry/exit into the Project site by slow-moving vehicles with slow acceleration enter the highway, where traffic is generally travelling at higher speed. In relation to this point in specific and from similar projects in the area, the following is undertaken:
    - A separate entry/exit road must be developed from the main highway into the Project site at the northern and southern areas (a schematic on this is provided in the figure below)
    - Include a U-turn north of the Project site from the main highway to prevent entry into the Project site through bypassing from the opposite lane at the Project entry point
    - The above should be coordinated with NREA through submitting a request to the GARBLT with the detailed design and proposal for traffic management measures as noted above for review and approval.

Based on discussions with FMC it was stated that during construction phase of the Benban Solar PV Park, which was mainly between 2018 -2020 the following is noted in relation to accidents in particular:

- No traffic and transport accidents were noted or reported in relation to delivery of equipment to the site to include in particular the PV panels. This is mainly due to the fact that such transportation

activities were undertaken by specialized companies with proper logistical arrangements in place;

- There were traffic and transport accidents mainly related to transport of workers from accommodation in Aswan/Luxor/Benban to/from the Project site.

The table below provides an overall summary of the impact on health and safety during the construction phase. The overall impact is considered to be of minor significance.

Construction Phase		
Type	Negative	In extreme cases could entail permanent impacts (e.g. permanent disability) however such impacts are controlled through implementation of general best practice.
Duration	Short term	
Magnitude	Low	
Reversibility	Reversible	
Sensitivity	medium	
Likelihood	medium	
Extent	Low	
Significance	**Minor**	

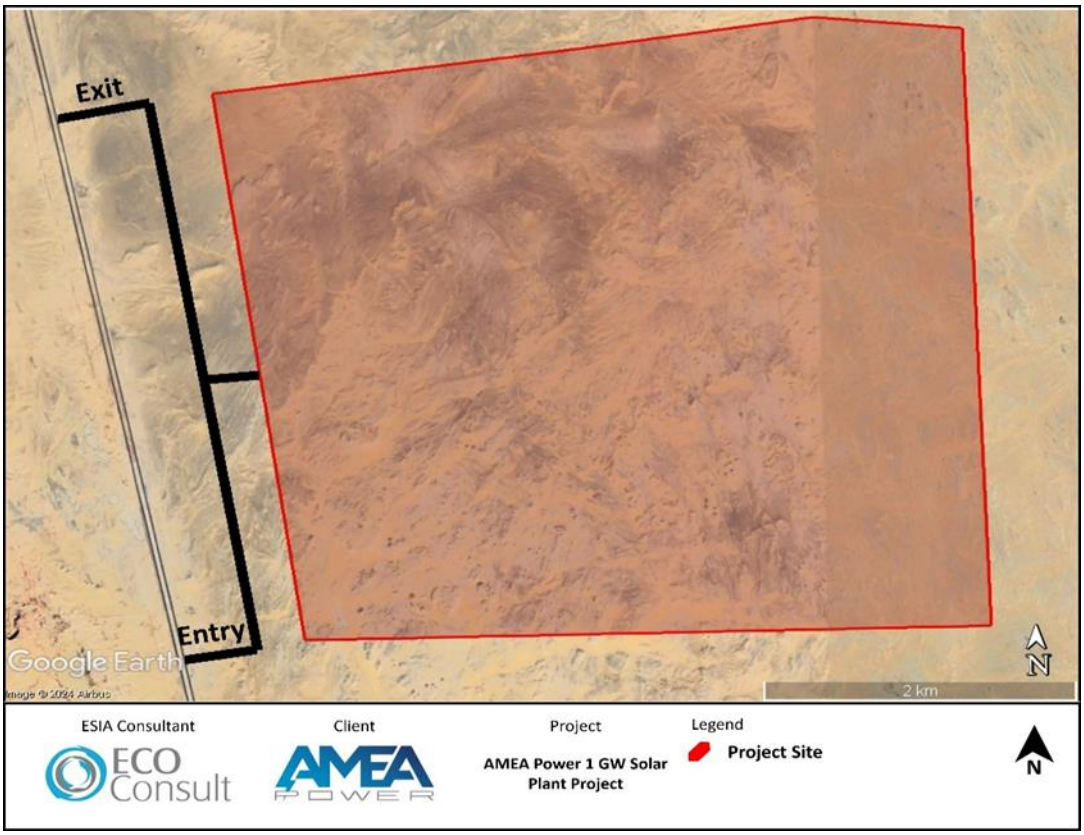

Figure 91: Concept Schematic of Entry/Exit Route

Additional Requirements

The Developer should obtain an approval on the traffic management requirements onsite in consultation with GARBLT related to entrance/exit to the north and south of the site and constructing a U-turn north of the site. This should be through submission of an application for approval through NREA.

In addition, the EPC Contractor and Project Operator are required to develop a Traffic and Transport Plan before commencement of any transportation activities to ensure that the transportation process is properly and adequately managed. The Plan must take into account the following:

- The plan must adhere to the relevant local legislations related to traffic and transport to include: (i) Traffic law 66/1973 amended by law 121/2008 and updated in 2018; (ii) Law 140/1956; and (iii) Law 84/1968;
- Identify the traffic requirements of the Project related to materials, equipment, machinery, project workers, services, etc. where for each the number of vehicles, weight loads, schedule, route/duration and other as appropriate must be identified;
- Identification of types of vehicles to be utilized
- As required by local communities, the plan must emphasize prohibition of use of Al Raqaba internal roads for any transportation activities for the Project with the exception of transportation of local community workers from/to Project site/villages. In any case, there is no need for the EPC Contractor and Project Operator to utilize or use such roads for any Project related transportation activities.
- Identify in detail procedures for onsite management of traffic. This could include but not limited to: (i) optimization of internal traffic layout so that delivery and other vehicles will be able to access site easily; (ii) identification of requirements for controlling access to the site (e.g. security checkpoint, registration, etc.); (iii) providing appropriate lighting for roads and pedestrian walk and ensure they are segregated; (iv) utilization of appropriate and sufficient traffic signs onsite (e.g. speed limits); (v) barricading of open trenches and excavated pits; (vi) utilization of banksmen and flaggers and other.
- Identify requirements to be adhered to and enforced on all haulage suppliers such as licensing, driving instructions and code of conduct, speed limits, accident management, monitoring and reporting, etc.
- Identification of a code of conduct to be adhered to and enforced on all drivers in the Project
- Identification of speed limits onsite and identification of all traffic signage requirement onsite
- Identification of a procedure for management of onsite/offsite traffic accidents
- Reflect the procedural actions for traffic management in: (i) induction training material; and (ii) repeated/refresher Toolbox Talks (TBT)
- Identify Key Performance Indicators (KPI) for implementation of plan
- Identify roles and responsibilities for implementation of plan
- Identify if any abnormal loads are required and obtain permits to carry these loads on highways from GARBLT accordingly
- Ensure all vehicles are subject to a regular inspection / maintenance program
- Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to <u>not significant.</u>

<u>Monitoring and Reporting Requirements</u>

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor and Project Operator during the construction and operation phase and which include:

- Submission of Traffic and Transport Plan
- Regular (daily) visual monitoring of speeds and density of project traffic onsite and on highway near the site entrance and exit

- Ongoing monitoring of delivery vehicle tracking data from port to site (as applicable)
- Maintaining vehicle inspection / maintenance log
- Recording and documenting of any incidents of non-compliance with plan
- Report all project related onsite/offsite traffic accidents and complaints. Report should identify the cause of accidents or complaints and corrective measures undertaken to ensure such incidents are not repeated gain

14.2.5 Assessment of Potential Impact on Electricity, Gas and Telecom Infrastructure during Construction

Inappropriate management of the various construction activities (to include but limited to transportation and traffic of vehicles in/out of the site, worker code of conduct, etc.) could damage or disturb the various nearby infrastructure and utility elements. This includes but not limited to the electricity overhead transmission lines, gas pipeline and telecommunication tower.

The table below provides an overall summary of the impact on electricity, gas and telecom infrastructure during the construction phase. The overall impact is considered to be of minor significance.

Construction Phase		
Type	Negative	
Duration	Short-term	Limited to construction period only which is 17 months
Magnitude	Low	Given the nature of construction activities
Reversibility	Reversible	Baseline restored after completion of construction works
Sensitivity	Medium	Given the nature of construction activities
Likelihood	Low	Limited to construction period only
Extent	Medium	Impacts could have an affect up to 5 km radius
Significance	**Minor**	

Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC Contractor during the construction phase and which include:

- Implement proper management measures to prevent damage or disturbance of nearby infrastructure and utility elements. This could include establishing a proper code of conduct and awareness raising / training of personnel to: (i) emphasize the presence of nearby infrastructure and utility elements; (ii) restricting activities to allocated construction areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances

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

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor during the construction phase and which include:

- Inspection of the works should be carried out at all times.

15. WORKER WELFARE, HEALTH AND SAFETY

This chapter presents the assessment of potential impacts during the various Project phases on worker welfare, health and safety. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

15.1 Assessment of Baseline Conditions

Assessment of baseline conditions with regards to worker welfare, health and safety is considered irrelevant. In addition, although an EPC Contractor has been assigned for the Project, no details are available at this stage on the workforce and working conditions – this includes breakdown, nationalities, worker accommodation, etc.

15.2 Assessment of Potential Impacts

15.2.1 Occupational Health and Safety Impacts during Construction and Operation

This section presents the assessment of potential impacts on occupational health and safety collectively during the construction and operation phase, given that they are similar in nature during both phases.

Throughout the construction and operation phase there will be generic occupational health and safety risks to workers, as working onsite increases the risk of injury or death due to accidents. The following risks are generally associated with solar PV development projects:

- Slips and falls;
- Working at heights;
- Working with powered and hand-held tools;
- Struck-by objects;
- Moving machineries;
- Working in confined spaces and excavations;
- Exposure to chemicals, hazardous or flammable materials and fire;
- Working in sunny conditions and extreme heat as well as windy conditions with high dust;
- Exposure to electric shocks and burns when touching live components; and
- Infectious and airborne diseases.

The table below provides an overall summary of the impact on occupational health and safety during the construction and operation phases. The overall impact is considered to be of moderate significance.

Construction Phase			**Operation Phase**		
Type	Negative	In extreme cases could entail permanent impacts (e.g.	Type	Negative	In extreme cases could entail permanent impacts (e.g. permanent disability)
Duration	Short-term		Duration	Long-term	
Magnitude	Medium		Magnitude	Medium	

Reversibility	Irreversible	permanent disability) however such impacts are controlled through implementation of general best practice.	Reversibility	Irreversible	however such impacts are controlled through implementation of general best practice.
Sensitivity	Medium		Sensitivity	Medium	
Likelihood	Medium		Likelihood	Medium	
Extent	Low		Extent	Low	
Significance	**Moderate**		**Significance**	**Moderate**	

Mitigation Measures

Following the implementation of the requirements below, the significance of the residual impact can be reduced to not significant.

Occupational Health and Safety Management Plan

It is expected that the EPC Contractor will prepare an Occupational Health and Safety Plan (OHSP) regarding the Project's construction, installation and commissioning works as well as the general construction site operations. In addition, the Project Operator is expected to develop an OHSP tailored to the Project's operation phase.

The objective of the OHSP is to ensure the health and safety of all personnel in order to concur and maintain a smooth and proper progress of work at the site and prevent accident which may injure personnel or damage property of the EPC Contractor and all involved sub-contractors, as well as the Project Operator.

The OHSP for the construction and operation phase should be Project and site specific and must take into account the national requirements mainly the Law 4/1994 and Law 12/2003 on Labor and Workforce Safety and Book V on Occupational Safety and Health (OSH) and assurance of the adequacy of the working environment. In addition, it must also be compliant with IFC PS2 (Labor and Working Conditions) which recognize the importance of avoiding or mitigating adverse health and safety impacts on workers and require the development of a project-specific health and safety plan that is in accordance with Good International Practice (GIP).

The objective of the OHSP should be as follows:

- Prevent all occupational incidents to the greatest extent possible for all workers.
- Zero fatal accidents, injuries and lost time accidents.
- Zero occupational disease.
- Zero major incidents.
- Providing a place of work that is safe for workers and communities.
- Full compliance with legal and contractual requirements related to occupational health and safety.
- Maintain safe working areas and good housekeeping.

In general, the OHSP should address the following components:

- Risk assessment and job safety planning procedure.
- Permit to Work (PTW) system procedure.
- Lock Out/Tag Out (LOTO) Procedure.

- Site control occupational health and safety procedure to include requirements for: Personal Protective Equipment (PPE), requirements for site risks (fall protection, powered and hand tools, compressed air / gas cylinders, fire prevention, hot works, electrical works, material handling, machinery use and safety, excavation/concrete works/civil works, confined space activity, storage, medical requirements, and communicable disease management).
- Occupational health and safety signage requirements.
- Identify OHS training requirements to include but not limited to induction training, specialized trainings, and other as appliable. Specialized trainings will be required for the following:
    - Safe rigging and lifting
    - Welding and Hot Works
    - Ladders and scaffolding
    - Electrical works
    - Fall protection
    - Lock-out/tag-out
    - Excavation
    - Hot Works
    - Power and Hand Tool Safety
    - Extreme weather conditions (e.g. sand storms, windy conditions, hot and cold weather and conditions and low/high temperatures
    - Heat Stress
    - Permit to work
    - Defensive driving
    - Lifting and rigging safety
    - Banksman
    - Manual handling
    - Confined Spaces
    - Excavations
    - Working at heights
- Identify monitoring and reporting requirements.
- Identify roles and responsibilities of the personnel involved in implementation of the plan.
- Exposure and risk of transmission of infectious diseases throughout the workforce and measures to reduce such risks (e.g., awareness session on symptoms, isolation measures for confirmed cases, utilizing masks and sanitizers, social distancing where applicable, etc.).
- A worker grievance mechanism should be implemented and that should handle any grievances related to OHSP. Requirement for worker grievance mechanism is included within "Section 16.2" below.

The EPC Contractor and Project Operator are expected to adopt and implement the provisions of the OHSP throughout the Project construction and operation phase.

Emergency Preparedness and Response Plan (EPRP)

The EPC Contractor and Project Operator must submit a project and site-specific Emergency Preparedness and Response Plan (EPRP). The objective should be as follows:

- Identify emergency response procedure to be implemented with the objective of establishing a series of organization, operational and preventive measures in, which in turn will ensure the safety of workers and property within the specific Project site.
- Identify emergency control measures for key expected emergency incidents.
- The plan for the construction and operation phase should be Project and site specific. In general, the EPRP should address the following components:
  - Identify of a communication and management process with external authorities to include in particular firefighting services and health providers
  - Identify an emergency procedure is and onsite notification process
- Identify emergency control measures for key expected emergency incidents to include but not limited to fire, accidents, spillage, traffic accidents, natural disasters and other. Of particular importance within the Project area is also risk from extreme hot weather conditions and high temperatures as well as sandstorm risks.
- Identify requirement for emergency kits.
- Identification of onsite assembly points.
- Identification of emergency signs.
- Identify training requirements to include but not limited to induction training, emergency responders training, and emergency drills.
- Identify monitoring and reporting requirements.
- Identify roles and responsibilities of the personnel involved in implementation of the plan.
- A worker grievance mechanism should be implemented and that should handle any grievances related to emergency preparedness and response. Requirement for worker grievance mechanism is included within "Section 16.2" below.

The EPC Contractor and Project Operator are expected to adopt and implement the provisions of the EPRP throughout the Project construction and operation phase.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor and Project Operator during the construction and operation phase:

Inspection to ensure the implementation of the provisions of the OHSP and assess compliance with its requirements;

- Inspections and audits on OHSP requirements identified earlier.
- Submission of training records.
- Submission of worker grievances related to OHSP and grievances close-out forms.

- Reporting on the following: (i) number of near misses per month; (ii) number of injuries per month; (iii) number of medical evacuations per month; (iv) number of working condition complaints per month; (v) lost working hours per month; (vi) number of working days since the last accident; (vii) number of HS audit/inspections; (viii) number of HS training/toolbox talks; (ix) number of HS meetings per month; (x) number of unsafe acts/conditions per month.

Inspection to ensure the implementation of the provisions of the EPRP and assess compliance with its requirements;

- Inspections and audits on EPRP requirements identified earlier.
- Submission of drill reports and TBT training records.
- Submission of worker grievances relate to EPR and grievances close-out forms.
- Reporting on the following: (i) number of emergency responders assigned with required certification; (ii) number of ambulances; (iii) number of clinics; (iv) number of fire extinguishers; (v) number of fire alarms; (vi) number of doctors / nurses; (vi) number of emergency drills conducted; (vii) number of emergency incidents triggered.

15.2.2 Worker Accommodation Impacts during Construction and Operation

In relation to worker accommodation, as discussed earlier the EPC Contractor and Project Operator have not been selected yet (nor any other sub-contractor which might be involved in the Project). Therefore, it is not clear at this point whether there will be any onsite accommodation for workers, or whether they will be accommodated at the closest villages/cities. However, based on information from the Developer and from previous experience on another nearby solar PV project (i.e. Abydos 1), it was indicated that most likely workers that are not from the local community will be accommodated within Aswan city.

In general, inappropriate accommodation facilities entail impacts on worker welfare that could include but not limited to:

- Workers could be provided with accommodation facilities that do not meet basic services. This includes security arrangements, appropriate work temperature, safe food, drinking water, access to safe exit in emergency conditions, segregated toilets, washing facilities and sleeping areas for women and men, and access to means of communication with areas outside the project boundary.
- Disturbance issues arising from construction, including traffic (dust, noise and vibration).
- Workers could be provided with accommodation that does not account for social and cultural considerations, which would have major consequences for those affected.

The table below provides an overall summary of the impact on worker accommodation during the construction and operation phases. The overall impact is considered to be of moderate significance.

Construction Phase			**Operation Phase**		
Type	Negative	Such impacts are controlled through implementation of general best practice.	Type	Negative	Such impacts are controlled through implementation of general best practice.
Duration	Short term		Duration	Long term	
Magnitude	Medium		Magnitude	Medium	
Reversibility	Reversible		Reversibility	Reversible	
Sensitivity	Medium		Sensitivity	Medium	
Likelihood	Medium		Likelihood	Medium	

Extent	Medium		Extent	Medium	
Significance	**Moderate**		**Significance**	**Moderate**	

Mitigation Measures

The EPC Contractor and Project Operator must prepare an Accommodation Management Plan. The objective of the plan is to identify the required management standards and specifications for accommodation that shall be met for the workforce.

The Plan must include the following components:

- Identify the workforce requirements including all subcontractor requirements.
- Identify workforce transportation requirements to/from accommodation facilities.
- Identify accommodation procedures to ensure that workers are provided with a decent accommodation which meets the basic worker's needs. In specific, accommodation must be compliant with good international industry practices – mainly the "Workers' accommodation: process and standards" (EBRD/IFC Guidance Note, 2009). The document provides guidance notes on general living facilities, room facilities, medical facilities, management of accommodation units, etc.
- Worker accommodation must take into account climatic conditions of the area given the location (e.g. extreme heat and extreme cold) and it must be equipped with suitable measures such as air conditioning, heating, etc.
- The accommodation should consider the social and cultural backgrounds of the workers, providing spaces that respect cultural practices and promote social interaction in a positive manner. This includes considerations for gender segregation where culturally appropriate and facilities for religious practices.
- In relation gender requirement the following should be considered:
- Separate sleeping rooms for men and women will be provided in shared accommodations;
- Means of securing bedroom doors from inside and out will be provided; and
- Finally, female sanitary and toilet facilities will be kept separate from men.
- Identify housing rules and regulations including code of conduct.
- Identify training requirements.
- Identify monitoring and reporting requirements.
- Identify roles and responsibilities of the personnel involved in implementation of the plan.
- A worker grievance mechanism should be implemented and that should handle any grievances related to worker accommodation. Requirement for worker grievance mechanism is included within "Section 15.2.3" below.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor and Project Operator during the construction and operation phase:

- Inspection on workers accommodation to ensure its compliance with the requirements of "EBRD/IFC's Guidance Note – Workers' accommodation: process and standards" to include the following.
- Inspections and audits on standards of worker accommodation to include but not limited to room/dormitory facilities sanitary and toilet facilities, canteen, cooking and laundry facilities, medical facilities, leisure and social facilities.
- Inspections and audits on management of worker's accommodation to include management of staff, health and safety, security, etc.
- Reporting on: (i) worker accommodation incidents/accidents; (ii) health conditions to include epidemic outbreaks, diseases or infections; and (iii) worker accommodation grievances and complaints.
- Submission of worker grievances and worker grievance close-out forms.

15.2.3 Worker Human Rights Impacts during Construction and Operation

Inappropriate management of the workforce during both the construction and operation phase could entail several human right risks and violations by employing entities such as the EPC Contractor and Project Operator. This could include but not limited to violations against core labor standards (e.g. engaging child workers, confiscation of passports of foreign workers, unsuitable working hours, and other),

In addition, it is expected that the workforce will include a team from various backgrounds, ethnicities, nationalities and cultures. Therefore, there could be risks and impacts within the workforce related to discrimination, harassment, abuse and other based on ethnicities, cultures, and nationalities.

Please note that a standalone gender and human rights risk assessment has been undertaken for the Project which is presented in "Section 19". Please refer to the section for additional details.

The table below provides an overall summary of the impact on worker human rights during the construction and operation phases. The overall impact is considered to be of major significance.

The importance of this is emphasized given that experiences from other solar PV development projects in the area– refer to "Section 17.3" for additional details on key E&S issues faced on previous solar PV development projects in the area.

Construction Phase			**Operation Phase**		
Type	Negative	Such impacts are controlled through implementation of general best practice.	Type	Negative	Such impacts are controlled through implementation of general best practice.
Duration	Short-term		Duration	Long-term	
Magnitude	Medium		Magnitude	Medium	
Reversibility	Reversible		Reversibility	Reversible	
Sensitivity	Medium		Sensitivity	Medium	
Likelihood	High		Likelihood	High	
Extent	Low		Extent	Low	
Significance	**Major**		**Significance**	**Major**	

Mitigation Measures

The EPC Contractor and Project Operator are required to develop and implement a Labor and Working Conditions Management Plan (LWCMP). Objective will be as follows:

- Provide an overview of the labor use on the project throughout the construction phase.
- Provide a Human Resources (HR) policy.
- Identify an HR management procedure for the workforce that will ensure decent and humane working conditions, worker rights, and enhance constructive work floor relations. This should be guided by the Local Labor Law as well as the IFC PS2 as well as the ILO Fundamental Labor Conventions covering the following in particular:
  - Ensuring all workers onsite are provided with a signed contract, including casual/daily/temporary workers. This is a key issue from previous project developments in the area (refer to "Section 17.3").
  - Providing reasonable working conditions and terms of employment to include but not limited to contract management, working hours, salaries/wages, annual and medical leaves, bereavement leaves, accommodation, etc.
  - Recognizing workers' rights to form and to join workers' organizations of their choosing and to bargain collectively without interference.
  - Prohibition of child labor within the workforce.
  - Overall management of young workers within the labor force. The recruitment of children under the age of 18 should be explicitly prohibited.
  - Prohibition of forced labor and human trafficking including confiscation of employees' passports.
  - Non-discrimination throughout the entire work cycle in all its forms.
  - Providing equal opportunities for all throughout procurement and employment opportunities including women groups.
  - Overall management of daily workers, migrant workers and third-party workers and ensuring they are engaged on similar working conditions to other workers.
  - Ensure the following on wages: (i) wages to be determined on a case-by-case basis and must be must be fair and should meet the basic needs to maintain a safe and decent standard of living; (ii) must be established based on qualifications and competencies, professional experience, job responsibilities, and wages at equivalent positions; (iii) must be for work of equal value should be provided for female and male workers; and (iv) should not be below the nationally established minimum wage.
  - Ensure the following on working hours: (i) working hours should be set to a maximum of 48-hours a week over 5 or 6 days and at least one hour break every 5 hours; (ii) overtime is allowed with appropriate need, but in all cases, working hours should not exceed 10 per day; (iii) workers should have a 24-hour period of rest after 6 days of work; and (iv) all workers will be notified of their schedule for the weekly day's rest, working hours, break periods and any changes introduced to such a schedule.

- Ensure the following on leaves: (i) workers should be entitled to annual and sick leaves as well as any other social benefits as stipulated in the Labor law. These will be included in the worker's contract; and (ii) workers should be entitled to annual and temporary disability leaves as well as any other social benefits as stipulated in the Labor law. These will be included in the worker's contract.
- All workers should be required to read and sign a Worker Code of Conduct which will be explained verbally. The code of conduct should prohibit the following and which is subject to disciplinary action: (i) harassment, and abuse of any kind will not be tolerated; (ii) discrimination based on personal characteristics is prohibited to include but not limited to gender, race, nationality, ethnic, social and vulnerable people, religion or belief, disability, age, or sexual orientation.
- Ensure privacy and protection of workers is maintained at all times. This will include limiting access to the below data and information to the EPC Contractor HR Manager only.

- Contracts
- HR files and databases
- Payment register
- Worker grievance forms and registers
- Disciplinary action register
- This information will be properly handled and stored, saved online through password protected files, and in secured cabinets with a fitted lock in case of hardcopies.
- Identify a disciplinary procedure for the workforce to be implemented;
- Identify a worker welfare procedure related to drinking water, rest areas, sanitary facilities, changing rooms
- Identify a worker grievance procedure to manage all worker related complaints and grievances that should consider the following:
  - Outlining the measures for escalation of grievances by workers
- Identify training requirements related to the plan.
- Identify monitoring and reporting requirements related to the plan.
- Identify roles and responsibilities related to the plan.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor and Project Operator:

- Submit signed contracts for all workers once appointed.
- Submit signed worker code of conduct for all workers once appointed.

- Submit payment register on a monthly basis.
- Submit disciplinary action register on a monthly basis.
- Submit training and TBT records on a monthly basis.
- Submit worker grievance logs with close-out forms on a monthly basis.
- Undertake monitoring, inspection and reporting son all requirements of the plan on a monthly basis during construction and quarterly during operation.
- Reporting on: (it) total number of working hours / total overtime; (ii) % of workers receiving salary payment on time; (iii) % of workforce with written contract; (iv) % of workforce with age verification (child labor); (v) % of workforce above minimum wage; (vi) % of forced labor onsite verified; (vii) number of disciplinary actions issued; (viii) number of drinking water units; (ix) number of rest areas provided; and (x) number of sanitary facilities provided; and (xi) number of worker grievances submitted; (xii) number of outstanding grievances.

15.2.4 GBVH and SEAH Impacts to Workers and Community Members during Construction and Operation

Inappropriate management of the workforce (some of which could be from the local communities) during both the construction and operation phase could entail gender-related issues such as Gender Based Violence and Harassment (GBVH) or Sexual Exploitation, Abuse and Harassment (SEAH).

In addition, inappropriate behavior of workforce within local community settlements could also entail similar risks and impacts. This could be related to worker accommodation within local communities or as part of worker time-off / leisure trips to local community areas.

Please note that a standalone gender and human rights risk assessment has been undertaken for the Project which presents such risks in further detail, and which is presented in "Section 19". Please refer to the section for additional details.

The table below provides an overall summary of the impact on GBVH and SEAH impacts to workers and community members during the construction and operation phases. The overall impact is considered to be of moderate significance.

Construction Phase			**Operation Phase**		
Type	Negative	Such impacts are controlled through implementation of general best practice.	Type	Negative	Such impacts are controlled through implementation of general best practice.
Duration	Medium-term		Duration	Long-term	
Magnitude	Medium		Magnitude	Medium	
Reversibility	Irreversible		Reversibility	Irreversible	
Sensitivity	Medium		Sensitivity	Medium	
Likelihood	Medium		Likelihood	Medium	
Extent	Low		Extent	Low	
Significance	**Moderate**		**Significance**	**Moderate**	

Mitigation Measures

- The EPC Contractor and Project Operator are required to develop and implement a Labor and Working Conditions Management Plan (LWCMP). The Plan should include at a minimum the following: Safe

transport will be provided to female and male workers. The codes of conduct, which prohibit gender-based violence, harassment and abuse, will apply to transportation modes.

- All workers should be required to read and sign a Worker Code of Conduct which will be explained verbally. The code of conduct should prohibit harassment, gender-based violence and abuse of any kind subject to disciplinary action.
- All workers should be provided with a copy of the Gender Based Violence and Harassment (GBVH) Code of Conduct and will be required to sign it.
- Identify a worker welfare procedure related to drinking water, rest areas, sanitary facilities, changing rooms and other that should include take into account the following in particular:
  - Female sanitary, toilet facilities, and prayer rooms will be kept separate from men.
  - All such facilities will have lockable doors with adequate numbers provided.
  - Separate changing rooms and cabinets will be provided for men and women both of which have locking mechanisms.
- Identify a worker grievance procedure to manage all worker related complaints and grievances that should consider the following:
  - Prohibiting gender-based violence and harassment in the workplace and will outline that a suitably trained male and female person is designated to process grievances in which male / female workers might feel uncomfortable discussing with a person of the opposite sex. The grievance mechanism also includes a procedure to deal with Gender Based Violence and Harassment (GBVH) grievances.
- Stakeholder Grievance Mechanism as part of the SEP also includes a procedure for GBVH grievances. This should be implemented entirely to handle any grievances related to GBVH Please refer to the SEP for additional details.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor and Project Operator:

- Submission of signed GBVH Code of Conduct for all workers.
- Undertake monitoring, inspection and reporting son all requirements of the plan on a monthly basis during construction and quarterly during operation.
- Documentation of submitted grievances related to GBVH and SEAH as part of the SEP and worker grievance mechanism and measures undertaken to resolve such grievances.

16. COMMUNITY HEALTH, SAFETY AND SECURITY

This chapter presents the assessment of potential impacts during the various Project phases on community health, safety and security. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

16.1 Assessment of Baseline Conditions

The affected communities have been identified based on a detailed understanding of the Project site location and its administrative setup. The Project is located within Aswan Governorate. More specifically, the Project site is located at the most southern border of Daraw District. The local communities have been defined in Section 2.2 above.

16.2 Assessment of Potential Impacts

This section discusses the potential impacts anticipated from the various Project phases to include the planning and construction phase and the operation phase. For each identified impact, a set of mitigation measures and monitoring requirements have been identified to eliminate the impact or reduce it to acceptable levels.

16.2.1 Potential Impacts from Trespassing of Unauthorized Personnel during Construction and Operation

Potential impacts during construction and operation phase are mainly limited to trespassing of unauthorized personnel into the Project site which could result in potential risks from several hazards of the various Project construction activities as well as the Project's components (e.g. electric shock, thermal burn hazards, exposure to chemicals and hazardous materials, etc.).

During construction this could include but not limited to the following:

- Falls within excavation areas;
- Electric shocks and thermal burns from electrical components and equipment;
- Roads and pedestrian accidents and injuries from internal traffic; and
- Exposure to chemicals and hazardous materials.

Similarly, during operation this could include but not limited to:

- Electric shocks and thermal burns from electrical components and equipment;
- Roads and pedestrian accidents and injuries from internal traffic;
- Other.

The table below provides an overall summary of the impact on trespassing of unauthorized personnel during the construction and operation phases. The overall impact is considered to be of moderate significance.

Construction Phase			Operation Phase		
Type	Negative		Type	Negative	
Duration	Short-term	Limited to construction which is 17 months	Duration	Long-term	During entire operation period of 25 years
Magnitude	Medium	Extreme cases they could entail permanent impacts	Magnitude	Medium	Extreme cases they could entail permanent impacts
Reversibility	Irreversible		Reversibility	Irreversible	
Sensitivity	Medium		Sensitivity	Medium	
Likelihood	Low	No local community activity in the area	Likelihood	Low	No local community activity in the area
Extent	Low	Will have an effect on impacted area only	Extent	Low	Will have an effect on impacted area only
Significance	**Moderate**		**Significance**	**Moderate**	

Mitigation Measures

The EPC Contractor is responsible for preparing the detailed design for the Project. Nevertheless, it is expected that as part of the detailed design the security measures to prevent unauthorized access to the Project site will be identified which in turn will control any such impacts. The detailed design is expected to include security measures such as fencing around the entire perimeter, use of CCTV, utilization of unarmed security guards onsite and other.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor and Project Operator:

- Regular inspection on fence around the facility.
- Reporting of any trespassing incidents and the measures undertaken in such cases to control the situation and prevent it from occurring again.

16.2.2 Potential Impacts from Worker Influx during Construction

During construction the Project a maximum of 4,000 workers will be involved for a duration of approximately 17 months. As discussed earlier, at this point it is still unclear how many of these workers will be expatriates, Egyptian and/or from local communities. Based on information from the Developer and from previous experience on another nearby solar PV project (i.e. Abydos 1), **it was indicated that most likely workers that are not from the local community will be accommodated within Aswan city**.

Nevertheless, the influx of workforce to the area could result in certain community health, safety and security impacts which are discussed below.

Pressure on Infrastructure, Services and Utilities

Influx of workers could entail an increased use, pressure, and demand on roads, waste management systems, electricity, housing, recreational facilities, water and wastewater facilities, and communication networks.

Risk of Diseases

Influx of workers may introduce new reservoirs of diseases such as vector-related diseases, water-borne diseases, etc. In addition, there is also a risk of spreading communicable diseases, included sexually transmitted ones. The risk of catching or exchanging communicable diseases (e.g., Virus B, Virus C, and HIV/AIDS) and the lack of awareness on transmission disease can represent a high risk to workers and community health and safety.

Inappropriate Code of Conduct

Other risks from worker influx include inappropriate code of conduct by workers towards local communities which might result in hostilities and resentment. Such inappropriate conduct could include also disrespecting the traditional culture and social norms of the area and local communities.

Local Inflation of Prices

The arrival of a large labor force can drive up the demand for goods and services, potentially leading to higher local prices and displacing regular consumers in the local community.

Increased Risk of Crime

The influx of workers in communities could lead to a rise in criminal activities or create a feeling of insecurity among local residents. Potential issues may include theft, physical assaults, substance abuse, prostitution and human trafficking. The local police force might be unprepared to handle the surge in population and associated challenges.

Aswan City

Aswan City is considered a key urban center in Egypt, that is a fully serviced hub recognized for its pivotal role in development. This includes, in particular, its critical role in Egypt's renewable energy initiatives, hosting several large-scale solar PV projects.[15] Therefore, Aswan city is considered a key area for worker influx from other villages/hamlets within Aswan Governorate as well as other nearby governorates, seeking better socio-economic opportunities, due to the availability of services and jobs.

In addition to the above, Aswan city is located along the Nile River, where it attracts a consistent influx of visitors and tourists, drawn by its significant cultural landmarks and natural beauty. Notable attractions include the Philae Temple and the Aswan High Dam, alongside the UNESCO World Heritage site of Abu Simbel that is located around 270 km to the southwest of Aswan city but usually accommodates most visitors and tourist exploring Aswan Governorate in general[16].

This above robust development and tourism opportunities have facilitated the development of extensive infrastructure and amenities, ensuring that Aswan is well-equipped to accommodate both short-term visitors and longer-term residents, reinforcing its status as a vital hub for economic growth.

[15] Solar PV Development in Aswan Governorate

[16] The Impact Of The Tourist Market And Tourism Services On Tourism Development In Southern Egypt

As of 2024, Aswan City has a population of approximately 408,800[17]. Considering that the Project will involve a maximum of 4,000 workers over a duration of around 17 months and considering a 40% expatriate worker factor, this represents less than 0.5% of the city's total population.

The table below provides an overall summary of the impact on worker influx during the construction phase. The overall impact is considered to be of minor significance.

Construction Phase		
Type	Negative	
Duration	Short-term	Limited to construction which is 17 months
Magnitude	Low	Given number of workers and population / characteristics of Aswan city
Reversibility	Reversible	Impact limited to construction phase only
Sensitivity	Medium	Worker influx could result in some sensitive impacts on local communities
Likelihood	Medium	Based on current information, worker influx into Aswan is likely
Extent	Medium	Will be limited to Aswan city mainly
Significance	**Minor**	

Mitigation Measures

As noted earlier in "Section 15.2.2" and "Section 15.2.3" the EPC Contractor will be required to prepare and submit an Accommodation Management Plan Accommodation Management Plan and a Labor and Working Conditions Management Plan (LWCMP).

The above plans, should include specific sections on worker influx that should include the following measures:

- It is recommended / preferred to manage workers in a centralized location / approach (e.g. within 1 apartment building or several located next to each other and not several apartments / hotels located in various dispersed areas).
- Medical examination programs. All workers must be subject to a preliminary medical examination before commencement of any job tasks in accordance with local applicable requirements. In addition, routine medical examination for worker (bi-annually) must be undertaken. Such medical examinations must be undertaken at certified centers. Copies of medical examination results of all workers must be retained onsite. Medical examinations should be consistent amongst all worker to ensure no discriminatory implication.
- Details and procedures for ensuring and maintaining hygienic conditions onsite at all times specifically related to the toilet and washing facilities, eating areas, etc. This should be applicable onsite and within worker accommodation.
- Development of a code of conduct and associated disciplinary procedures for workers which takes into account appropriate behaviors by workers at all times, religious customs, traditional cultures and social norms in the area. In addition, it must include specific requirements for social vices including gender-based violence, sexual harassment, alcoholism, drug abuse, etc.
- Induction training and self-awareness raising sessions on risks associated to the most common contagious diseases (e.g. influenza virus), communicable diseases, general measures for hygiene, code of conduct expected to be implemented and other as appropriate.

[17] Estimated population on 1/1/2024

- Stakeholder grievance mechanism should be implemented in relation to any grievances related to worker influx. Any grievances submitted should be handled fully in accordance with the mechanism that is included within the SEP. Please refer to the SEP for additional details.
- Stakeholder engagement activities with local communities must provide information on worker influx expected and measures that will be undertaken to control such impacts. Stakeholder engagement activities are provided in further details in the SEP.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor:

- Inspection to ensure the implementation of the above provisions and assess compliance with its requirements;
    - Documentation of copies of medical examination results and approvals for workers.
    - Inspection, monitoring and reporting on all mitigation measures included within the plan.
    - Documentation of signed code of conduct by workers and associated disciplinary measures as applicable.
    - Documentation of induction training modules and Toolbox Talks on hygiene and code of conduct expected to be implemented.
    - Reporting on the following: (i) worker influx incidents/accidents; (ii) health conditions to include epidemic outbreaks, diseases or infections; and (iii)submitted grievances related to visibility (if applicable) as part of the SEP and measures undertaken to resolve such grievances. This should be done on a monthly basis.
    - Submission of stakeholder engagement log sheets that summarize local community engagement activities and their objectives for the reporting period along with evidence (e.g. photos of sessions or announcements). This should be done on a monthly basis.

16.2.3 Potential Impacts from Security Personnel during Construction and Operation Phases

There could be interactions between security guards and personnel of the Project with local communities. Inappropriate management of security issues and incidents by security personnel towards local communities could result in resentment, distrust and escalation of events.

The table below provides an overall summary of the impact from security personnel during the construction phase. The overall impact is considered to be of moderate significance during the construction phase and minor significance during the operation phase.

Construction Phase			**Operation Phase**		
Type	Negative		Type	Negative	
Duration	Short-term	Limited to construction which is 17 months	Duration	Long-term	During entire operation period of 25 years

Magnitude	Medium	Due to previous experiences from local community on such development projects, inappropriate management /handling of security officers could occur resulting in some impacts	Magnitude	Medium	Due to previous experiences from local community on such development projects, inappropriate management /handling of security officers could occur resulting in some impacts
Reversibility	Irreversible		Reversibility	Irreversible	
Sensitivity	Medium		Sensitivity	Medium	
Likelihood	Low	No local community activity in the area	Likelihood	Low	No local community activity in the area
Extent	Low	Will have an effect on impacted area only	Extent	Low	Will have an effect on impacted area only
Significance	**Moderate**		**Significance**	**Minor**	

Mitigation Measures

A Security Risk Assessment (SRA) should be undertaken to ensure that all likely threats have been accounted for (to include Project and communities) stemming from the Project's presence and activities. This should include the identification of such risks, evaluation of their likelihood to occur, and assess their potential impacts and measures to reduce these risks. In addition, the SRA should identify detailed regarding relations with public security forces and requirements for private security as well and risks and recommendations for both of these issues.

Based on the SRA, the EPC Contractor and Project Operator are expected to prepare a Security Management Plan to be implemented for the construction and operation phase of the Project.

The plan must identify appropriate measures for hiring, rules of conduct, training, equipping, and monitoring of unarmed security personnel to control and manage such issues. The plan must also adhere to IFC PS 4 (Community Health, Safety and Security) in relation to the security guards employed. This require that that the behavior for the security personnel is guided by the Voluntary Principles on Security and Human Rights in terms of hiring, rules of conduct, training, equipping and monitoring of such personnel. It also requires making reasonable inquiries to satisfy itself that those providing security measures are not implicated in past abuses, will ensure they are trained adequately in the use of force (and firearms if applicable) and appropriate conduct towards the workers and the local community. Force should only be used when strictly necessary, and to an extent proportional to the threat.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor and Project Operator:

- Inspection to ensure the implementation of the provisions of the Security Management Plan and asses compliance with its requirements;
  - Documentation of copies of clearance of security guards in past abuses
  - Documentation of signed code of conduct by security workers and associated disciplinary measures as applicable

- Documentation of induction training modules and Tool Box Talks for security personnel to include training on use of force as well as Voluntary Principles on Security and Human Rights
- Visual inspections and investigation on the following: (i) site security arrangements (guards, schedule, uniforms, fencing, etc. (ii) security operating procedures to include access to the site, security force management, etc.

- Reporting on the following: (i) security related incidents/accidents; (ii) submitted grievances related to security incidents as part of the SEP and measures undertaken to resolve such grievances. This should be submitted monthly during construction and operation.

17. SOCIOECONOMICS

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to socioeconomics. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

17.1 Purpose

This section discusses the methodology for the assessment of baseline conditions in relation to socio-economics and presents the outcomes and results of the assessment.

17.1.1 Methodology for Assessment

Assessment of baseline conditions was based on a desktop review of official and published secondary data and statistics from various governmental agencies (such as the Central Agency for Public Mobilization and Statistics – CAPMAS, Aswan Governorate Information Center, Al Raqaba Local Unit, in addition to the data and information mentioned during the meetings with the various stakeholders). Such secondary data was collected and is presented in relation to key socio-economic indicators to include but not limited to demographic dynamics, population characteristics, employment status, community structure, livelihoods, and other data sets.

According to the administrative division of Aswan Governorate, Aswan Governorate consists of 7 administrative centers, 12 cities, and 33 rural local units, which are affiliated with 72 villages and 457 hamlets[18]. The Project is located within Aswan Governorate. More specifically, from an administrative perspective, the Project site is located at the southern border of Daraw District.

Therefore, the affected communities include in particular Daraw District and specifically the Al Raqaba Local Unit, which is considered the closest village to the Project site located around 6.5 km away from the Project to the east (Al Raqaba Local Unit is administratively under Daraw District). Al Raqaba Local Unit is followed by Al Raqaba Foaniyeh Village and Al Raqaba Tahtaniyeh Village along with their associated several Nagaa[19]/ Hamlets. Refer to the figure below which indicates the location of the Project site in relation to the nearby villages.

[18] Aswan Governorate Statistical Yearbook, 2023.

[19] ***Nagaa (نجع)*** is a term used for a limited residential community in the middle or on the edge of the farmland. Nagaa is different from village in terms of size, shape and population. In terms of shape, it is usually unplanned and its size is as small as 20 - 30 houses, and its population usually is no more than 3,000 persons. The term "Nagaa" is used in administrative division only in rural areas in Upper Egypt.

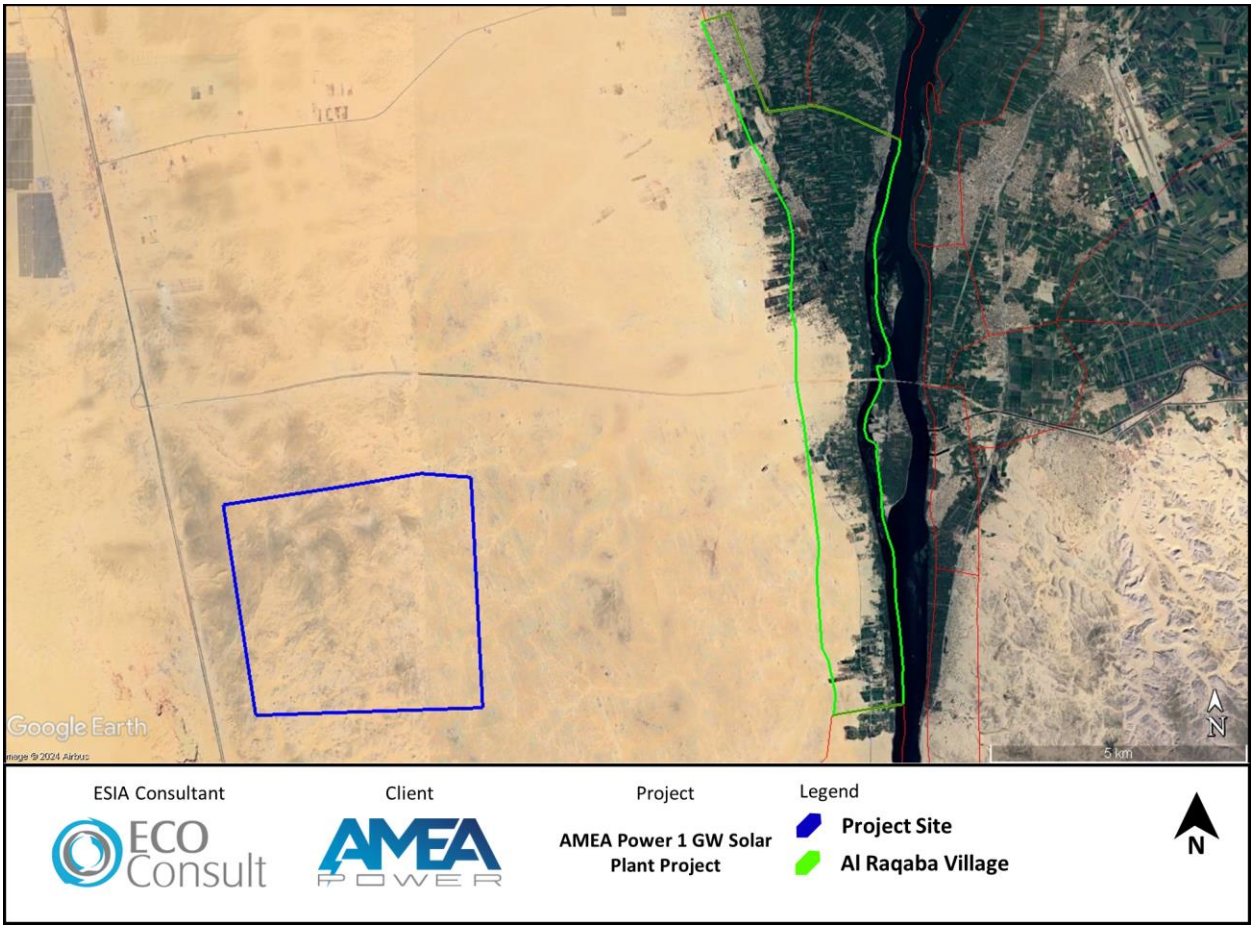

Figure 92: Nearby Local Communities

17.1.2 Results and Outcomes

Population and Demographic Profiles

The population of Aswan Governorate is 1,643,211 (CAPMAS 2023), which represents 1.57% of the total national population of Egypt. About 57% of the total population lives in rural areas (936,630) versus 43% (706,580) living in urban areas, with total population growth rate of 2.3%. The highest residential density is Edfu *Markaz* at the governorate level 31%, followed by Aswan City 29%, then Kom Ombo *Markaz* 25%, and the lowest percentage was for Nasr El Nuba *Markaz* 6%. Aswan city (the capital city of the Governorate) records the highest population concentration during working days due to the availability of services and job opportunities.

More specifically, as noted in the table below, the population of Daraw District is 167,923 (representing 10.2% of the population of Aswan Governorate), while the population of Al Raqaba Local Unit is 11,300 (representing 6.7% of the population of Daraw District and 0.6% of the population of Aswan Governorate).

The table below presents further information in relation to the number of households and breakdown of the population by gender as well as birth rates and mortality rates.

Table 51: Household Demographics around the Project Area[20]

Area	Households	Population		Total Population	Birth Rate (Births per 1,000 persons)	Mortality Rate (Deaths per 1,000 persons)
		Male	Female			
Aswan Governorate	366,788	838,037	805,173	1,643,211	29.6	5.1
Daraw District	40,599	85,640	82,282	167,923	N/A	N/A
Al Raqaba Local Unit	2,568	5,763	5,537	11,300	N/A	N/A

The table below further presents the age distribution of Aswan Governorate. As indicated in the table, the population if predominantly young, where around 50% of the population is under the age of 45.

Table 52: Age Distribution of Aswan Governorate (CAPMAS 2023)

Gender	0-4	5-14	15-44	45-59	60+
Males	13.5	20.3	47.3	12.1	6.8
Females	13.9	19.5	48.1	12.2	6.3
Total	13.7	19.9	47.7	12.2	6.5

In general, Aswan Governorate is characterized by a settled urban community which is represented in the city setting as well as the village setting. The city style is mainly within the capital city of the Governorate (Aswan City) and in spite of that, the simple village life setting is dominant in the villages scattered along the Governorate – including Al Raqaba Local Unit and its affiliated Hamlets (Daraw District) which is characterized by a settled urban community with a village lifestyle. In such areas, local communities in general identify themselves primarily in terms of tribal affiliations. The origins of the families in Al Raqaba Local Unit go back to the Ababidah, Bashari and Jaafara tribes as key tribes within Daraw District, under which there are many sub-tribal affiliations.

An important consideration within the context of the Project area is the presence of the Nubian community. Nubians are descendants of an ancient African civilization, with roots as old as those of Egypt. Their historical homeland, known as Nubia, extends along the Nile River, encompassing regions in present-day southern Egypt and northern Sudan.

Employment and Livelihoods

The most recent data from Aswan Governorate, as provided in the *Sustainable Development Report* of 2022, by the Ministry of Planning and Economic Development, indicates that the employment rate for both men and women in the total labor force of Aswan Governorate stands at approximately 82% (with a workforce of 431,300 individuals). These figures fall below the national average employment rate of around 88%.

Additionally, data from the Daraw City Council shows that the labor force in Daraw District comprises approximately 12,000 individuals.

[20] Central Agency for Public Mobilization and Statistics (CAPMAS), 2023. Aswan Governorate Statistical Yearbook, 2023. Local Unit of Al Raqaba Local Unit, 2024.

The table below presents a detailed breakdown of the workforce registered with the Manpower Office in Aswan Governorate and Daraw District by gender and educational qualifications, based on data available from the Aswan Labor Office (2021).

Table 53: Registered Labor Workers in Aswan Governorate (Gender and Education Qualifications)

Area	Registered by Gender			Registered by educational qualification				
	Male	Female	Total	Higher education	Above Intermediate	Intermediate	Below Intermediate	without a degree
Aswan Governorate	32,100	8,130	40,230	7,901	1,950	15,400	1,779	13,200
Daraw	9,208	3,112	12,320	3,508	908	3,454	800	3,650

As shown in the table above, the majority of registered workers are male and the highest percentage of registered workers includes intermediate and those who do not have an educational degree.

In relation to livelihoods and employment, the table below outlines the distribution of workers across key economic activities. Agriculture remains a primary economic activity within Aswan Governorate, with an even greater concentration in Daraw District, where approximately 43.5% of workers are engaged in this sector.

This distinction is anticipated, as Aswan Governorate and its surrounding communities are generally agriculture-focused. The industrial sector represents the second-largest area of employment, driven by industries such as food processing, sugar extraction, spinning and textiles, and chemicals. Finally, the remaining sectors (comprising approximately 38% in Daraw District) primarily include public sector employment within governmental entities, as well as roles in the service and trade sectors.

The table below, based on data from the 2022 Aswan Governorate Annual Statistical Book, provides general employment percentages for Aswan Governorate and Daraw District. It is important to note that specific data at the village level is unavailable.

Table 54: Economic Activities and the Percentage of Workers

Area	Economic Activities			
	Agricultural Sector	Industrial Sector	Tourism	Other Sectors
Aswan Governorate	30.3%	20.5%	6.2%	43%
Daraw	43.5%	17%	1.5%	38%

Unemployment and Poverty

According to the Ministry of Planning and Economic Development's Citizen Plan 2021-2022 report (latest available data), unemployment rates in Aswan Governorate have declined since 2017-2018. Despite this decrease, unemployment in Aswan remains relatively high and still falls short of the target set for 2030 under the governorate's sustainable development plan.

- The impact of the COVID-19 pandemic on Aswan's economy, particularly during peak unemployment periods reaching 13.7%, has presented ongoing challenges.

- Data from CAPMAS (2022) further highlight gender disparities within the labor force: in the 15 to 64-year age group, male unemployment stands at 5.4%, while female unemployment reaches 53.3% within the governorate.

Discussions with local officials indicate that the labor market faced significant challenges over the past four years, particularly impacting tourism and trade sectors due to COVID-19. These disruptions contributed to elevated unemployment rates and intensified socio-economic hardships for affected families. Officials noted that addressing these challenges required viewing the surge in unemployment as a temporary issue to be mitigated.

Through targeted efforts, such as increasing employment opportunities via major development projects in both urban and rural areas and implementing social welfare and employment support initiatives through the Ministry of Social Solidarity, positive impacts were seen within the labor market, benefiting economically vulnerable families and aiding overall economic recovery.

- According to the CAPMAS report Egypt in Figures Income and Expenditure Indicators, 2022;

  a. The average annual household income in Aswan Governorate is estimated at EGP 22,121.2

  b. The average per capita annual household income: EGP 4,669.4

  c. The average annual household expenditure: EGP 16,251

  d. The average annual household expenditure per capita: EGP 3430.3.

- The child dependency ratio in Aswan is 53.8%, while it reaches 55.3% at the national level according to the 2020 census data[21].

- Reports on the living conditions of Egyptian families, issued by the Cabinet's Council for Decision Support in 2022, highlight a reduction in household spending indicators, particularly to manage essential expenses. Key spending priorities include food commodities, followed by healthcare and education.

Members of the local community in the village of Al Raqaba and its affiliated hamlets emphasized that food and beverage expenditures are the primary daily expense for families, followed by healthcare and medication costs, and then education, especially for children in primary school (under 12 years old).

Local residents also reported that transportation and electricity bills now constitute significant household expenses, often placing additional strain on family budgets.

Although CAPMAS data indicate a rise in average per capita income compared to 2015, inflation over the past three years has intensified poverty rates, counteracting efforts toward sustainable development indicators aimed at poverty reduction in Aswan.

The table below outlines the poverty rate in Aswan Governorate as of 2020 (the most recent data available), with targets set for 2025 and 2030. Aswan Governorate's poverty rate, estimated at 46.2%, remains considerably above the national average of 29.7%. Although poverty levels in Aswan decreased slightly in 2020 compared to 2015, they still exceed the national rate by over 30%. Note that there are no published statistics available on unemployment and poverty levels for Daraw District.

[21] Source: Population Estimates, Egypt in Figures, March 2021.

Table 55: Aswan Governorate Poverty Rate in 2020 and the Target Rate by 2030.

Area	Population Rates Below Poverty Line 2020 (%)	Target by 2030 (%)
Aswan	46.2	28.7
Total Republic	29.7	18.5

Education

According to CAPMAS, Egypt's national illiteracy rate in 2023 for individuals aged 10 and above was approximately 16.1%, reflecting a decrease of 1.4% from the previous year. Illiteracy rates among males and females stood at 11.4% and 21%, respectively, as reported in the 2023 Labor Force Survey. Port Said Governorate recorded the lowest illiteracy rate nationwide at 6.4%, while Upper Egypt governorates exhibited the highest rates, with Minya reaching 37.2%, Beni Suef at 35.9%, and Aswan Governorate reporting the lowest rate in Upper Egypt at 19.1%.[22]

Specific data for Daraw District is unavailable; however, consultations with the local community in Al Raqaba Local Unit revealed a strong commitment among residents to educating their children, despite added transportation costs due to the lack of secondary schools in the village and limited availability in Daraw District.

Community members also reported that the government, through the Hayat Karima (Decent Life) initiative, has launched a plan to develop local schools, including the primary school in the Hajaziya hamlet. However, the project has progressed slowly, resulting in the temporary closure of the hamlet's only school and requiring students to commute to Sheikh Fadl hamlet, adding to their daily challenges.

Al Raqaba Local Unit and its hamlets currently have seven primary and preparatory schools, two Azhar schools, and one agricultural secondary school. However, data on classroom capacity and student enrollment are not available.

Table 56: Educational Services in Aswan Governorate

Type of Education	Item	Daraw	Aswan Governorate
Kindergarten	No. of schools	31	301
	No. of classes	65	767
Primary	No. of schools	39	472
	No. of classes	325	4450
Preparatory	No. of schools	20	284
	No. of classes	177	2170
High School	No. of schools	4	54
	No. of classes	40	583
Industrial Education	No. of schools	4	39
	No. of classes	39	587
Trading Education	No. of schools	2	22
	No. of classes	25	343
Agricultural Education	No. of schools	1	5
	No. of classes	16	142

The table above presents the official data in relation to the educational services in Aswan Governorate and Daraw District.

[22] CAPMAS, 2023

Gender

Despite the absence of comprehensive data regarding the challenges faced by women in Aswan—such as the prevalence of female-headed households, poverty rates, or instances of gender-based violence, particularly sexual harassment—observations made during site visits and consultations with community members in Al Raqaba Local Unit and its hamlets yielded the following insights:

- There is a high level of educational attainment among females, with families demonstrating a strong commitment to educating their daughters through to university level, taking pride in those who achieve higher education. While there are no significant barriers to women's workforce participation, limited job opportunities primarily exist in Daraw and Aswan City.
- Women have the opportunity to voice their opinions regarding the Project and express a desire to participate in consultation activities. They are particularly interested in learning about available opportunities through the Project, including vocational training.
- In some hamlets, community norms do not discourage women from participating alongside men in dialogue sessions and expressing their views publicly, indicating a lack of strict restrictions in this regard.
- Women, especially older women, hold a respected and valued status within the community, reflecting a shared belief in the importance of protecting women's rights.
- Consultation activities indicated that some women, particularly widows and divorcees, represent a vulnerable group within the local community, facing challenges in supporting their families and lacking stable income to meet daily living expenses. However, specific data regarding the number of widows, divorcees, or women living below the poverty line in Al Raqaba Local Unit is not available.

Some reports have identified indicators of social violence against women, including early marriage and female circumcision. The table below presents the percentages of violence indicators against women in Aswan Governorate, as outlined in the 2020 report on localizing the Sustainable Development Goals, published by the Ministry of Planning and Economic Development.

Indicator	Ratio %
Female circumcision; Percentage of females aged 0-19 years who have been circumcised or are expected to be circumcised	86.6
Physical violence; Percentage of ever-married women aged 15-49 who have experienced physical violence	25.4
Early marriage; Percentage of women aged 10-18 who are currently married	1.0

The following indicators regarding women's participation in education are derived from the annual statistical report published by the Aswan Governorate Information Center in 2023:

- The total number of females enrolled in basic education reached 14,799, accounting for 49% of the overall student population in this educational stage.
- In pre-university education, the total number of female students was 365,493, representing 48% of all students at this level. The highest enrollment percentage at the governorate level is observed in the Edfu and Daraw centers, where female participation reached 49%. This is followed by the Aswan and Kom Ombo centers at 48%, and the Nasr Al-Nuba Center at 47%.

Infrastructure Facilities

Electricity

Data from CAPMAS and the Sustainable Development Report indicate that 100% of households in Aswan Governorate are connected to the electricity grid and have access to lighting facilities. During consultation activities, members of the Al Raqaba community confirmed their connection to the electricity grid; however, they reported experiencing intermittent power supply issues, including outages lasting several hours. Moreover, the recent increase in electricity costs has become a significant financial burden for many families. Some community members have advocated for a reduction in electricity tariffs or for additional support, particularly given their proximity to solar energy projects.

Drinking Water

Officials from the Aswan Water and Wastewater Company reported that all cities, villages, and hamlets in Aswan are connected to the national water network. According to feedback from the local community in Al Raqaba Local Unit, all households have access to the water network. Nonetheless, some residents expressed concerns regarding low water pressure and quality, as all hamlets rely on the pumping station located in Hijaziya Hamlet.

The following tables present the number of water stations and quantities of water in Aswan Governorate sourced from various water supplies, along with a comparison to similar metrics at the national level.

Table 57: Quantities of Drinking Water Produced in Aswan Governorate[23]

Area	**Total amount of drinking water produced** million m3	**The total amount of drinking water consumed million m³**	**The Total No.** of stations	**The amount of water lost %**
Aswan Governorate	121.8	97.2	117	27.0%

[23] Source: CAPMAS, Statistical Yearbook, 2023. Aswan Water and Wastewater Company Information Center, 2024.

Table 58: Number of Stations, Design Capacity, Actual Capacity and the Quantities Produced by Pure Water Stations Affiliated with Water Companies, according to their Sources in the Governorates in 2022/2023[24]

Governorates/ Statement	Quantity in million m3 - Capacity in thousand m3/day															
	Surface water stations				Artesian water stations				Well desalination plants				Desalination plants			
	No. of stations	Design capacity	Actual capacity	Amount of water produced	No. of stations	Design capacity	Actual capacity	Amount of water produced	No. of stations	Design capacity	Actual capacity	Amount of water produced	No. of stations	Design capacity	Actual capacity	Amount of water produced
Total in Egypt	1108	28725	22109	8069.7	1559	6229	2632	968	37	70	23	8.3	48	472	229	83.4
Aswan	114	617	329	120	3	28	5	1.8	0	0	0	0	0	0	0	0

Wastewater

The following table shows the number of wastewater treatment plants in Aswan Governorate, their design capacity, and the quantities of collected and treated wastewater compared to their equivalents at the republic level.

Table 59: Number of Wastewater Stations, Design Capacity and Quantities in 2022/2023[25]

Governorates/ Statement	Quantity in million m3 - Capacity in thousand m3/day								
	No. of treated sewage stations	Design capacity of treated sewage stations	Amount of treated sewage	Quantity of sewage according to the type of treatment			Amount of collected sewage	Number of lift stations	Number of sub lift stations
				Primary treatment	Binary treatment	Triple therapy			
Total in Egypt	452	14343	4573.1	839.2	3623.0	110.9	5408	1686	1526
Aswan	17	208	82.2	0.0	36.4	45.8	97.2	24	31

The findings from community consultation activities in Al Raqaba Local Unit indicate that none of the houses are currently connected to the sewage network. Although there is an existing infrastructure for network connections, it remains incomplete. As a result, all households rely on septic tanks, which are regularly emptied by vehicles from the Aswan Water and Wastewater Company. However, residents are responsible for covering the costs associated with the servicing of their septic tanks.

[24] Source: CAPMAS, Statistical Yearbook, 2023. Aswan Water and Wastewater Company Information Center, 2024.
[25] Source: CAPMAS, Statistical Yearbook, 2023. Aswan Water and Wastewater Company Information Center, 2024.

17.2 Nubian Community

An Indigenous Peoples Assessment was undertaken for the Nubian Community in Egypt, more specifically in the Aswan Governorate. The Indigenous Peoples Planning process for the Project focused on assessing the indigenous status of the Nubi people and addressing potential impacts of the Project on their community if and as required. The assessment determined that Performance Standard 7 of the International Finance Corporation would not be triggered, largely due to the absence of any Project impacts on the Nubian communities within proximity to the Project site. The methodology followed international best practices, particularly in alignment with the International Finance Corporation (IFC) Performance Standards 5 and 7, which address involuntary resettlement and indigenous peoples' rights, respectively.

While the Nubian community of Egypt are highlighted from a broad overview in this assessment, the Nubian communities located within the Sheikh Fadl village in Aswan Governorate, specifically within proximity to the Project site, are the point of focus for this section. These aforementioned Nubian communities were thoroughly engaged with and the outcomes of the consultations allowed for the Indigenous Peoples Assessment team to make an informed decision on why IFC PS 7 would not be triggered.

It is important to note that as mentioned in "Section 6.3.2" earlier, multiple consultation sessions were undertaken at Al Raqaba Lower village along with its hamlets and at Al Raqaba Upper village along with its hamlets. However, a separate consultation session was undertaken for the Nubian Community in Sheikh Fadl Village in specific which is located within Al Raqaba Local Unit as discussed earlier in "Section 6.3.2".

The key components of this methodology are outlined below:

- Defining Indigenous Status: This entails a comprehensive evaluation to determine whether the Nubi people meet the criteria for classification as indigenous, as defined by both international standards and relevant national definitions. The assessment involves the development of a detailed community profile, which includes an analysis of cultural heritage, historical displacement events (such as their removal during the construction of the Aswan Dam), and the implications these factors have on the project's resettlement framework.

- Impact Assessments: This involves assessing the extent of displacement and other potential project impacts on the livelihoods of the Nubi community. The evaluation focuses on how the project could disrupt land use, social practices, and cultural traditions. The goal is to quantify these impacts and ensure appropriate measures are taken to mitigate any adverse effects.

- Consultation and FPIC Process: The process of Free, Prior, and Informed Consent (FPIC) will be facilitated to ensure the active involvement of the Nubi community in decision-making related to the project. This includes the development and implementation of a stakeholder engagement plan that adheres to international standards for meaningful and inclusive participation. Workshops and consultations will be conducted to ensure that the Nubi people are fully informed and can provide consent free from coercion.

- Mitigation and Benefit-Sharing: if triggered and required, a framework will be developed to minimize any negative impacts of the project on the Nubi community and to ensure that they benefit from the project's implementation. This includes the preparation of an Indigenous Peoples Plan, which will outline strategies for ongoing monitoring, grievance redress mechanisms, and livelihood restoration measures to support the long-term well-being of the community.

(i) Defining Indigenous Peoples

Good International Industry Practice

Good International Industry Practice (GIIP) refers to the standards, guidelines and practices recommended and required by a range of international institutions, mainly international and multi-lateral financial institutions.

This section sets out a definition on Indigenous Peoples for the assignment to adhere to. A review of relevant international standards, and documents is undertaken to help identify the criteria and characteristics for identifying Indigenous Peoples (IPs). These are applied in the assessment of Indigenous status of the Nubian people in this section below.

The United Nations

The architecture of international law and conventions on indigenous peoples is framed by the United Nations Declaration on the Rights of Indigenous Peoples, adopted by the UN General Assembly on 13 September 2007. [26] The multilateral international financial institutions such as the Asian Development Bank. the World Bank, the International Finance Corporation and the European Bank of Reconstruction and Development, have incorporated considerations of indigenous peoples into their performance standards and guidance to developers and practitioners addressing involuntary resettlement and its associated impacts on project affected people.

One of the forty-six articles of the Rights of Indigenous Peoples is worthy of noting here:

"Article 19. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them."

The International Finance Corporation

The International Finance Corporation (IFC) which is the entity that provides or facilitates the provision of project development finance to private sector projects, has a set of Performance Standards (PS) and its PS 7 addresses Indigenous Peoples.[27] PS 7 notes that Indigenous Peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities

PS 7 also advises that there are no widely accepted definitions of Indigenous Peoples and states: "There is no universally accepted definition of "Indigenous Peoples." Indigenous Peoples may be referred to in different countries by such terms as "Indigenous ethnic minorities," "aboriginals," "hill tribes," "minority nationalities," "scheduled tribes," "first nations," or "tribal groups."

In this Performance Standard, the term "Indigenous Peoples" is used in a generic sense to refer to a distinct social and cultural group possessing the following characteristics in varying degrees:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;

[26] https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf Accessed on 26 October 2024

[27] See also the IFC PS 7 Guidance Note (GN) on PS 7, in particular GN 2

- Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture; or
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

This Performance Standard applies to communities or groups of Indigenous Peoples who maintain a collective attachment, i.e., whose identity as a group or community is linked, to distinct habitats or ancestral territories and the natural resources therein. It may also apply to communities or groups that have lost collective attachment to distinct habitats or ancestral territories in the project area, occurring within the concerned group members' lifetime, because of forced severance, conflict, government resettlement programs, dispossession of their lands, natural disasters, or incorporation of such territories into an urban area".[28] The underlined section (our emphasis) in this quote is particularly applicable to the assessment (see section 5 below) of the indigenous status of the Nubians whose collective attachment to their ancestral territories was severely disrupted in the 1960's due to the government construction of the Aswan Dam and the inundation of these territories.

IFC PS 7 also identifies vulnerability as a characteristic of IPs. This may be that an Indigenous Peoples group is vulnerable due to other characteristics such as poverty and marginalization including lack of access to services such as education and health care. Displacement can intensify existing vulnerability. A group may become vulnerable due to displacement when they lose access to land and livelihoods resources such as fishing waters and forests. "Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded." [29]

- Recognition by others is also a characteristic but IFC cautions that "Both legal recognition and precedents in recognition of a group or community as indigenous should be given due consideration but are not determining factors for triggering Performance Standard."
- Distinct identity that is both associated with and derived from other characteristics such as language, cultural and social practices. [30]

In conclusion, this section has identified the following characteristics which enable the identification of Indigenous Peoples

- Self-identification as members of a distinct indigenous cultural group
- Collective attachment to geographically distinct traditional or ancestral lands
- A language distinct from the official language of the region or country
- Maintain distinct social, cultural, economic, or political institutions

The assessment took into account the unique characteristics, social and cultural heritage & traditions, the historical experiences of the people as well as the contexts in which these characteristics have developed and are expressed.

[28] IFC PS 7, paras 5 & 6
29 IFC PS 7 para 1, p 3
30 PS 7, para 13 and PS 7 para 5

(ii) Community Profile of the Nubians

This section of the assessment aims to provide key demographic information pertaining to Egypt, the Nubian community and the Aswan Governorate. It also provides important contextual analysis on the Nubians' historical roots, their social and cultural context, present-day circumstances, and their relationship with the Egyptian government and broader society.

Demographic Overview of Egypt

With a total population of approximately 116 million people, Egypt is the third most populated country in the African continent. Only Nigeria and Ethiopia are home to larger populations. By land mass, Egypt is the 12th largest African country and is the 15th most densely populated nation within the continent. Approximately 87% of Egyptians identify as Muslims, with just over 10% of the population adhering to the faith of Christianity. The official language of Egypt is Arabic, with most Egyptians speaking some dialect of the language.

Demographically, Egypt is made up of a predominantly Egyptian identifying ethnic group, with minority groups such as the Berbers, Bedouins and Nubians making up the majority of the minority ethnic groups within Egypt.

Demographic Overview of the Aswan Region

The area of Aswan and its surroundings were once the northernmost part of a territory known as Nubia in ancient times. Aswan is a culturally diverse region with a rich history and a unique demographic profile. It is home to the Nubians, Arab Egyptians, and Bedouins, who have strong cultural identities. Whilst the region benefits from tourism and agriculture, it faces challenges related to rural poverty, access to services, and the ongoing legacy of Nubian displacement.

Recent surveys indicate that the Aswan Region is home to a population of approximately 1.7 million people. The population is fairly split between urban and rural areas. The largest city in the Aswan Governate is the city of Aswan, which is home to a population of approximately 300,000 people. As is the case with Egypt generally, the majority of the population are made up of Arab Egyptians. One of the most significant ethnic groups in the Aswan region is the Nubians, who have a distinct cultural and linguistic heritage. Historically, the Nubians inhabited areas around Aswan and further south into northern Sudan.

Social, Cultural and Historical Context of the Nubians

The Nubian community has a rich and deep history closely tied to the Nile and the adjacent lands. For centuries, Nubians have lived along the riverbanks, maintaining strong connections to the Nile as a source of life, livelihood, and culture. Known for their skills in agriculture, pottery, and boat-making, these traditions have been passed down through generations. Vibrant music, dance, storytelling, and the creation of traditional jewelry and clothing play a crucial role in preserving Nubian heritage. Although many Nubian families have migrated to Cairo, Alexandria, and other parts of Egypt, with younger generations seeking work opportunities in Gulf countries, pride in their unique customs, language, and heritage continues to shape their identity." This is a quote from a recent stakeholder engagement exercise the Project undertook with the identified Nubian communities within proximity to the Project. The quote touches upon the sense of belonging to the region and importance of the land the community embodies. However, it is also clear to see that many Nubian families are leaving the region and venturing into more urban areas for a change of livelihood and way of living.

Historic Displacement

The Nubians are "descendants of the ancient Nubians, who inhabited the region from Aswan (Egypt) and the first cataract (waterfall) of the Nile River, to Khartoum (capital of Sudan) in the south beyond the sixth cataract. Archaeologists have established that an ancient civilization flourished as long ago as 7000BCE with "palaces, temples, and pyramids (tombs)…. in the ancient cities along the Nile." Archaeologist conclude that there has been "close, but complex Egyptian- Nubian cultural ties from prehistoric times. The Nubian territories were exploited by the Egyptians for "gold, ebony, ivory, incense, minerals, and metals …. as well as Nubian slaves."

There followed centuries of invasions and changing control of the Nubian territories until 1852 when the British occupied Egypt. They were forced out in 1956 following a coup by military officers including Gamal Abdel Nasser. Nasser became the first president of independent Egypt. Nasser was a modernizing leader who wanted to construct the Aswan Dam in order to manage flooding by the Nile River and to generate electricity. Once constructed the dam created "Lake Nasser, a vast man-made reservoir (550 km long and 35 km across at its widest point." The lake flooded the Nubian territory and resulted in their forced relocation and resettlement. Many Nubians self-relocated to the main cities such as Cairo. [31]

The resettlement process and loss of ancestral lands was highly disruptive of Nubian social and cultural life and traditions. A Ph.D. study[32] has concluded that "the design of the newly-built environment disrupted the Nubian traditional lifestyles and patterns of privacy mechanisms, territoriality and social interaction." The settlement design focused on much higher densities that took no account of the traditional Nubian village settlements and how these reflected traditional kinship-based neighborhoods. The arrangement of the housing as well as the standardized small houses further exacerbated the disruption. The Nubians were resettled from their old villages – 535 with an average population of 100 each, to 43 resettlement villages with an average population of 2000 each.

For Nubians their displacement referred to as "the bitter occurrence." More than "50,000 Nubians [were] expelled from their land after promises of a right of return following the completion of the High Dam were broken." The right of return to their lands remains an issue. "Today, Nubians continue to reside mostly in Kom Ombo, about 60 km north of Aswan, spread out across five main villages: Nasr Al-Noba, Al-Fadigga, Arab, Thoman Waffia and Al-Konouz."

Another issue has been the demand by the displaced Nubians for adequate compensation. Specialist studies have concluded that the displaced Nubians were never properly compensated. [33] In 2022 it was reported that "compensations have been paid to 3,238 beneficiaries. The disbursement to the rest (906), whether those, who are still in Aswan, or others, who moved to Greater Cairo and Alexandria, is underway."

By the 20th century, with the construction of the Aswan Low Dam in 1902; and later the Aswan High Dam in the 1960's, many Nubians were forcibly displaced from their ancestral lands along the Nile River. This displacement had long-term impacts on their identity, livelihoods, and connection to their homeland. The Nubian community in Egypt, particularly in the Aswan region, has a rich history and unique cultural identity that distinguishes them from the rest of Egyptian society.

[31] Page 55, draft ESIA SCOPING REPORT: AMEA Power 1GW "Abydos for Renewable Energy" Solar Plant Project in Egypt. REV-0 October 2024

[32] Y.M. Serag. "Nubian resettlement Challenges 2013. Proceedings of Sustainable Building Conference 6-7 November 2013

[33] Egypt Today. "52 Years After Displacement, Scars Of Loss Remain For Nubians. " 25 Oct 2016

For Nubians their displacement is referred to as "the bitter occurrence." More than "50,000 Nubians were expelled from their land after promises of a right of return following the completion of the High Dam were broken."[34] The right of return tom their lands remain an issue. "Today, Nubians continue to reside mostly in Kom Ombo, about 60 km north of Aswan, spread out across five main villages: Nasr Al-Noba, Al-Fadigga, Arab, Thoman Waffia and Al-Konouz." [35]

Another issue has been the demand for adequate compensation. Specialist studies have concluded that the displaced Nubians were never properly compensated. In 2022 it was reported that "compensations have been paid to 3,238 beneficiaries. The disbursement to the rest (906), whether those, who are still in Aswan, or others, who moved to Greater Cairo and Alexandria, is underway,"

Social Context

Following their displacement and resettlement due to the construction of the Aswan Dam "International observers predicted that the Nubians' distinct culture (language, dress, dances, traditions, and music) would die after such massive displacement. On the contrary, the tragedy sparked in Nubians—especially musicians—a determination to preserve and propagate their culture." [36]

Nubians have established the "Nubian Foundation for Preserving a Cultural Heritage." Its aims are to:

- Educate the public about Nubia.
- Encourage experts to research, explore, document, and study Nubian culture and languages before they vanish.
- Establish a public information center collecting Nubian arts, music, articles, books, and research." [37]

The Foundation notes in an article on its website that "The Nubians have a distinct identity from the Egyptians in terms of culture and language." [38] However, other sources have noted that ", the Nubian language has sadly all but died out in modern-day Egypt." [39]

The Nubian communities within Aswan Governorate have maintained distinct social and cultural traditions despite centuries of interaction with other groups. Their culture is characterized by several aspects as presented in the table below.

[34] Egypt Today. "52 Years After Displacement, Scars Of Loss Remain For Nubians. " 25 Oct 2016
[35] Y.M. Serag. "Nubian resettlement Challenges 2013. Proceedings of Sustainable Building Conference 6-7 November 2013
[36] Johanna Granville, "The Nubians." In The Oxford Encyclopaedia of the Modern World, volume 5, edited by P. N. Stearns. New York: Oxford University Press, 200
[37] The "Nubian Foundation for Preserving a Cultural Heritage." https://nubianfoundation.org/history/ Accessed 27 October 2024
[38] The "Nubian Foundation for Preserving a Cultural Heritage." https://nubianfoundation.org/history/ Accessed 27 October 2024 https://nubianfoundation.org/articles/5/
[39] Egypt Today. "52 Years After Displacement, Scars Of Loss Remain For Nubians. " 25 Oct 2016

Table 60: Overview of Social Characteristics of Nubian Communities

No.	Social Metric	Overview
1	Language	The Nubian people speak their own languages, primarily Nobiin and Kenuzi-Dongola, which are distinct from Arabic, the national language of Egypt. However, these languages are endangered, with fewer young people learning them. During an engagement exercise the Project undertook with the Nubian community, a question was put forward to them on what aspects of their culture are most important to them. Their responses were as follows: "One of the most significant aspects of Nubian culture is the language, which is still spoken, particularly by elders. This language is deeply connected to their history and identity". They also stated the following: "The Nubian community is characterized by a strong sense of unity, respect for cultural traditions, and efforts to preserve the Nubian language, despite the fact that younger generations are less likely to use it in daily life". This illustrates the importance of their own language and efforts to preserve the endangered tongue, despite its popularity dwindling from the Nubian youth.
2	Architecture	Nubian houses are traditionally known for their unique mudbrick construction and dome-shaped roofs, often adorned with intricate, colorful designs. Nubian villages along the Nile have a distinct aesthetic compared to other regions in Egypt[40]
3	Music and Dance	Nubian music and dance are central to their cultural identity. Their music, characterized by rhythmic drumming and string instruments, is deeply connected to celebrations, weddings, and other social events. "Music, traditional dances, and celebrations such as weddings remain central cultural expressions that unify the community. While Nubians are now integrated into various levels of society in Aswan and across Egypt, they continue to cherish their heritage and strive to maintain their customs." This is a quote from the aforementioned engagement activity that illustrates the importance of music and dance for the Nubian community.[41]

[40] The paper by Y.M. Serag. "Nubian resettlement Challenges 2013. Proceedings of Sustainable Building Conference 6-7 November 2013, provides further information on this aspect

[41] See further details on the Nubian Foundation website and in Egypt Today. "52 Years After Displacement, Scars Of Loss Remain For Nubians. " 25 Oct 2016

No.	Social Metric	Overview
4	Customs and Traditions	The Nubians have a strong sense of community and family. They practice distinct marriage customs, maintain traditional dress for ceremonial occasions, and celebrate their unique festivals. "What sets Nubians apart is their ability to blend ancient traditions with modern influences, while still holding on to their distinct identity. Today, they occupy roles across various sectors in society, demonstrating adaptability while remaining rooted in their heritage. Over time, the community has experienced significant changes in both lifestyle and work. While cultural traditions remain central, many have adapted to modern ways of living. The younger generation, more educated, is increasingly pursuing opportunities beyond traditional livelihoods like agriculture. Some have gained experience working on modern projects, such as solar energy, while others have sought employment abroad, particularly in the Gulf. Despite these transformations, the community's sense of identity and pride in its cultural heritage remains strong, as they continue to celebrate their traditions while adapting to contemporary realities." This quote from the engagement undertaken emphasizes the importance that is still placed on their customs and traditions, even in an interconnected society.
5	Arts and Crafts	Nubian art is vibrant, with pottery, hand-woven textiles, and beadwork being significant elements of their culture. Their art often reflects their connection to the Nile and the natural environment.

Despite these strong cultural markers, modern influences and pressures have eroded some aspects of traditional Nubian life. Many younger Nubians, particularly those displaced to urban areas, have adopted more mainstream Egyptian customs, though efforts to preserve Nubian heritage continue.

Modern Context & Relationship with the Government of Egypt

The construction of the Aswan High Dam in the 1960s led to the forced relocation of approximately 50,000 Nubians, moving them from fertile Nile lands to desert villages, disrupting traditional livelihoods tied to agriculture, fishing, and trade. Today, many Nubians live around Aswan, Kom Ombo, and urban centers like Cairo and Alexandria, where they often feel a profound sense of loss and disconnection from their heritage.

While many Nubians have adapted economically, shifting to tourism, trade, and urban professions, their bond with ancestral lands remains strong. Advocacy for cultural preservation and language retention continues, driven by cultural groups and associations. However, the Egyptian government's approach to Nubian issues has often been seen as symbolic rather than substantive, despite the 2014 Constitution recognizing Nubians' right to return to their historical lands.

Socially, Nubians face to some extent marginalization within Egypt, where Arabic culture prevails, leading to underrepresentation in political and social institutions. Despite the government's focus on development projects in Nubian areas, meaningful consultation and benefit-sharing remain limited, sustaining tensions as Nubians seek land rights, cultural preservation, and equitable treatment.

(iii) Assessment of Indigenous Status

Analyzing the Nubian community of the Aswan Governorate in Egypt, specifically in Sheikh Fadl Village based on the criteria of IFC PS7 to determine whether they qualify as Indigenous is complex, given the

conflicting reports on their indigenous status. The following table provides a breakdown of each criterion in the context of the Nubians, using available historical, cultural, and social data.

Table 61: IFC PS 7 Criteria

No.	Criteria	Description	Assessment	Verdict
1	Self-identification	The community self-identifies as Indigenous or distinct from mainstream society.	The Nubians in Egypt often identify themselves as a distinct ethnic and cultural group, with a unique language, traditions, and history that predates the Arabization of Egypt. However, the Egyptian government does not officially recognize them as Indigenous, but it does recognize them as an ethnic group, which complicates their status. Nevertheless, there have been consistent efforts since the forced removals resulting from the construction of the Aswan Dam, by Nubians to retain and strengthen their traditions that they identify with.	Nubian's likely meet the criterion.
2	Distinct language	The group has a distinct language or dialect from the national language(s), which may be oral or written.	The Nubians speak their own languages, such as Nobiin and Kenuzi-Dongola, which are distinct from Arabic, the national language of Egypt. Although these languages are increasingly at risk of extinction, many Nubians still maintain their linguistic heritage.	Nubian's clearly meets the criterion.
3	Distinct social, cultural, economic, or political institutions	The community maintains institutions that differ from those of mainstream society.	The Nubians maintain distinct social and cultural institutions, such as their unique marriage practices, music, and architectural styles. However, modern economic pressures have pushed many into more mainstream professions and practices, diluting some traditional systems.	Nubian's meet the criterion to a considerable extent.
4	Collective attachment to territories and natural resources	The community has a collective attachment to territories and natural resources.	Nubians have a strong historical attachment to the Nile River and the lands along its banks. However, their displacement due to the Aswan High Dam and the subsequent lack of formal recognition of their right to return has affected this attachment. While many Nubians still advocate for a return to their ancestral lands, their access to these lands is limited.	Nubian's partially meet the criterion, but displacement complicates this attachment.

(iv) Conclusion

Whilst, under IFC PS7 criteria, the Nubian community of the Sheikh Fadl Village, Aswan Governorate in Egypt could be viewed as Indigenous Peoples, this assessment has concluded that IFC PS 7 will not be triggered for the Project. The Nubian community in proximity to the Project site do indeed possess a distinct cultural identity, language and historical continuity, with a deep-rooted connection to their ancestral lands, despite disruptions caused by displacement. However, the main barriers to their official recognition as Indigenous Peoples lie in Egypt's lack of formal recognition and the Nubians' partial fulfilment of certain criteria, such as land attachment post-displacement.

IFC PS 7 is not considered applicable or triggered for this Project due to the following defining characteristics:

- The absence of any Project impact on the Nubian community. The Project does not impact their land, livelihoods, natural resources, or cultural heritage. As the Project site holds no cultural or religious significance and remains unused by the community, it is determined that Free, Prior, and Informed Consent (FPIC) is not required.
- Partial but incomplete fulfilment of PS7 criteria by the Nubian community, who are also fully integrated into Egyptian society.

However, SEP should include an accessible, culturally appropriate grievance mechanism for Sheikh Fadl village to raise any issues is required. Additionally, Sheikh Fadl village should be prioritized for local labor opportunities where possible, aligning with the Project's commitment to inclusive practices.

Although the Project location is reportedly distant from residential areas, the Project will periodically conduct assessment and monitoring on indirect impacts, on social dynamics of the Nubian families among the construction period with regular reporting and feedback.

17.3 Previous Community Experiences

As part of the consultation and engagement process undertaken, information was collected on community experiences within the area for other solar PV development projects. A summary is provided below.

Benban Solar Park

Data was requested from the Benban Solar Park staff to provide the key E&S challenges and grievances from the construction phase. However, during the consultation, the current staff indicated that they were not involved during the construction phase and therefore they are not aware of such information to provide to the "E&S Team". Refer to "Section 6.3.1".

However, the local E&S subcontractor (EcoConServ) has in general been involved as part of E&S monitoring assessments in the Benban Solar Park during the construction phase. Based on such experience, the key E&S challenges can be summarized as follows:

- Inconsistent Sanitation and Waste Disposal by Supply Contractors: Supply contractors were not always required to adhere to standardized sanitation and waste disposal practices, leading to environmental concerns and posing health risks to both workers and nearby communities. Inadequate waste management became a recurring challenge, potentially impacting the surrounding environment and the project's reputation. Enforcing clear, mandatory guidelines on waste disposal and sanitation was essential to mitigate these issues and align with environmental best practices.

- Labor Sourcing Challenges: A primary challenge faced was securing a consistent supply of temporary labor to meet the demands of the project, particularly during peak construction phases. The project initially relied on the local labor office as a primary employment resource, but this approach proved problematic due to the lack of registered temporary workers. This gap in labor availability forced the project to depend heavily on local contractors for workforce supply. However, without formal registration and oversight, managing these temporary labor arrangements became difficult, resulting in issues related to workforce accountability, compliance, and quality.

- Lack of Formalized Employment Contracts by Subcontractors: Subcontractors were often not required to establish formal employment contracts for temporary workers, a practice that posed significant challenges for both workforce stability and project accountability. The absence of formal contracts left workers with little job security and limited protections, impacting morale and reliability. For the project management team, this lack of structured employment arrangements created uncertainties in labor availability and retention. Addressing this issue required consistent efforts to reinforce the need for contract formalization to ensure fair labor practices and operational continuity.

- Appointment of Environmental and Social Officers: The absence of dedicated environmental and social officers posed a significant oversight challenge. Without individuals specifically tasked with implementing and monitoring the environmental and social management plan, issues related to compliance with regulatory standards, community engagement, and environmental preservation risked being overlooked. The recommendation to appoint these officers was based on the need for comprehensive oversight across all project phases to ensure that environmental and social responsibilities were consistently managed and aligned with the project's broader sustainability goals.

- Coordination with the Social Solidarity Office: The project encountered challenges in developing and executing a cohesive social responsibility strategy that met community expectations and aligned with local priorities. Engaging with the Social Solidarity Office was recommended as a strategy to overcome these challenges. By coordinating with this office, the project could gain valuable insights into community needs, particularly for vulnerable populations, and implement a more responsive and impactful social responsibility plan.

- Engagement with Local Accredited Contractors: Working with accredited local contractors emerged as a critical issue, especially as the project sought to maintain quality standards and ensure compliance with regulatory requirements. Although there were local contractors in village with valuable solar project experience, many lacked official registration, limiting their ability to engage formally with the project. The recommendation to work exclusively with accredited contractors was driven by the need for regulatory compliance, enhanced accountability, and to maintain high standards of workmanship. This approach, however, required additional effort to ensure that interested local contractors met accreditation requirements.

- Limited Job Opportunities and High Community Interest in Solar Projects: The local community, facing limited employment opportunities, exhibited high interest in solar projects as a potential avenue for economic engagement. This interest presented both a valuable opportunity and a challenge for the project team. Without structured communication and job access, unmet expectations could lead to frustration within the community. Developing clear communication channels and a transparent hiring process was recommended to manage community expectations and facilitate positive engagement.

- Site Security Measures: Securing the project site was another critical challenge. A lack of proper perimeter fencing and gated entry made the site vulnerable to unauthorized access.

The consultations undertaken with the FMC team, indicated the following key E&S challenges during the operation phase as noted within "Section 6.3.1" are related to labor rights, contractual matters, hiring and termination processes, welfare facilities, and financial entitlements.

Abydos 1 Project

Consultations were undertaken with the Developer to aim to summarize the key E&S challenges and grievances related to the construction phase of the Project. Those are summarized below.

- Some labor brokers/recruiters operating within Aswan Governorate were operating informally with local communities and promising employment at the project in exchange for a fee. Those were reported to the Labor Office by the Developer. Developer was generally working through the labor office, however stronger communication with local communities was required to emphasize importance on registering with labor office and following formal channels for employment only.
- Local communities indicated that most jobs provided to local communities were unskilled and they required involvement in skilled opportunities but felt that they cannot compete on such opportunities. Specific technical training is required from the onset for local communities in coordination with key entities such as the labor office, USAID Vocational Training Program in Aswan in Solar PVs Project, and the Benban solar school.
- Confusion from local communities on different standards and requirements implemented amongst projects and developers in the area. In specific, local communities indicated that other nearby solar PV projects had lower standards and requirements related to procurement, employment as well as labor and working conditions compared to Abydos 1 even though they had lenders involved.
- High worker influx to Projects site seeking employment opportunities.
- Requests and complaints on why local companies cannot be engaged and work directly with EPC Contractor.
- Perception of lack of opportunities for employment and procurement with very high expectations on what the Project can offer.
- Weak culture amongst local workers on importance of adherence to key E&S practices.
- Unequal labor and working conditions for casual / daily workers in specific by subcontractors. This includes issues such as termination of daily workers if they take leaves or reduction on allowances. In addition, casual workers do not adhere to proper procedures for applying for leaves and some would just decide not to show on any given day.
- Casual / daily workers had constant fear of job security given that on other solar PV projects they had no information on when contract would expire and sometime contractors would terminate the contract on the same day without informing them in advance. Developer on Abydos 1 ensured that all subcontractors on this project made this clear to casual / daily workers within contracts.
- Some subcontractors were not complying fully with the labor laws and IFC PS 2 requirements. Such examples include inappropriate implementation of social insurance, payment delays, in adherence to code of conduct, etc.

17.4 Assessment of Potential Impacts

Given the generic nature of the impacts on socio-economic development for both phases of the Project (construction and operation) those have been identified collectively throughout this section.

According to information provided by the Developer, the Project will require the following workforce throughout the construction and operation phase:

- Around 4,000 job opportunity at peak during the construction phase. The duration of the construction phase will be for a duration of approximately 17 months. This will mainly include 2,120 skilled job opportunities (to include engineers, technicians, consultants, surveyors, etc.) and 1,880 unskilled job opportunities (such as laborers, security personnel, housekeeping, etc.).
- Around 90 job opportunities during the operation phase for a duration of 25 years. This will include around 30 skilled job opportunities (such as engineers, technicians, administrative employees, etc.) and 60 unskilled job opportunities (such as security personnel, drivers, etc.).

However, although the EPC Contractor and Project Operator (for the first two (2) years – refer to Section 1.3) have been selected, there are no details available on the number of job opportunities targeted to local communities, type of jobs, duration, etc. In addition to the above, the local communities could also be engaged in procurements such as local contractors, local supply of equipment and machinery, cleaning services, etc.

Taking the above into account, the Developer is committed to ensuring that priority for job opportunities and procurement activities where relevant are targeted to the local communities.

The above could also entail other indirect positive benefits to the local community from increase in demand for local services, supplies, and businesses. This could include for example possible engagements for supplies and service providers (accommodation services, food, etc.). Such demands could improve the existing local economic activities and impact certain sectors, such as wholesale/retail trade.

Taking all of the above into account, this to some extent could contribute to enhancing the living environment for its inhabitants. The creation of job and procurement opportunities in specific is of crucial importance especially since, as discussed earlier, the local community in general suffers from high unemployment and poverty rates.

However, it is understood that the socio-economic development of the area is not hinged on a single project but rather on implementing collective and coordinated actions, including other development projects and investment within the area.

Nevertheless, proper planning and local community engagement from the start is crucial to understand issues and opportunities which in turn would enable the Project build true sustainable links which will bring maximum benefits to the local communities. Given the above, such impacts are anticipated to be *positive*.

However, it is important to note that there are potential for negative impacts in relation to employment and procurement from issues such as those identified below. Such issues could result in the creation of distrust and resentment between the local communities and the Developer, EPC Contractor and Project Operator.

Such issues are considered important as they are also based on local community perspectives and perceptions based on the outcomes of stakeholder consultations undertaken (as discussed previous

under "Section 6.3.2") from previous solar PV development projects in the area as well as previous experiences from other solar developments in the area (as discussed previously under "Section 17.3").

Therefore, it is critical that the Developer build on the lessons learned from previous solar PV developments in the area, on the approach for this Project in terms of community engagement, local employment, local procurement, CSR and other. Please refer to "Section 17.3" for additional information on previous E&S issues from other solar PV developments in the area.

In extreme cases such negative impacts could lead to other escalated events such as strikes, riots, blocking access roads to the Project site, or other incidents that are similar in nature.

- If local community engagement in relation to employment and procurement is not implemented properly, openly and in a transparent manner; or
- If expectations on number and amount of employment and procurement opportunities are not properly managed and addressed; or
- If procurement and employment is coming primarily from another region or abroad specifically for opportunities where local capacity is available.

The table below provides an overall summary of the impact on socioeconomics during the construction and operation phases. The overall impact assessment will be of moderate significance.

Construction Phase			**Operation Phase**		
Type	Negative		Type	Negative	
Duration	Short-term	Limited to construction which is around 17 months	Duration	Long-term	Will be relevant for 25 years for entire operational period.
Magnitude	High	They could entail issues related to strikes and in worst-case scenario riots or blocking access to site. Given previous local community perceptions, this issue is considered important.	Magnitude	High	They could entail issues related to strikes and in worst-case scenario riots or blocking access to site. Given previous local community perceptions, this issue is considered important.
Reversibility	Reversible		Reversibility	Reversible	
Sensitivity	High		Sensitivity	High	
Likelihood	Medium	Due to previous local community perceptions	Likelihood	Medium	Due to previous local community perceptions
Extent	Medium	Given the proximity of the closest local community	Extent	Medium	Given the proximity of the closest local community
Significance	**Major**		**Significance**	**Major**	

This section provides recommendations which aim to enhance such positive impacts anticipated from the Project throughout the construction and operation phases to the greatest extent possible.

Therefore, it is recommended that the EPC Contractor and Project Operator undertake the following:

- Project Updates to local communities in accordance with identified measures in the Stakeholder Engagement Plan (SEP) which also includes measures related to management of local stakeholder expectations on jobs during both construction and operation phase. This should include the following in particular:

- Undertake continuous and ongoing consultations (at least monthly) with local communities to: (i) manage expectations on employment and procurement opportunities for the Project; (ii) emphasize that job opportunities for this Project are huge and will be met throughout various entities that will include local communities but possibly other districts and Governorates as well; (iii) provides updates on Project implementation and overall schedule; and (iv) other as appropriate.

- Provide updates on implementation of the local recruitment and procurement procedure to date (e.g. number of locals employed to date from each village as appropriate) and emphasize importance of following formal channels only.

- As required by the local communities (refer to "Section 6.3.2") all communication / updates to the local communities should be provided through the following channels in particular: (i) notifications via key local platforms in Aswan, to include but not limited to Local Unit Offices, mosques, commercial areas, CBOs, other local governmental entities; (ii) key Facebook pages related to the Aswan Governorate and Al Raqaba Local Unity (e.g. Sheikh Fadl Local Community Development Association); (iii) public announcements through the Mayor of Al Raqaba Local Unit.

- Local Recruitment and Procurement Plan and Procedure: the procedure must identify the following: (i) number of job and procurement opportunities targeted for local communities to include skilled and unskilled workers, (ii) details on how job and procurement opportunities will be announced; (iii) a selection process that is fair and transparent and provides equal opportunities for all including females; and (iv) order of priority with respect to employment and procurement subject to availability of qualifications and skills.

  In general, local employment activities should be undertaken through Aswan Governorate's Labor Office and considers workers officially registered with the labor office.

  As discussed earlier in 'Section 6.3.1' and 'Section 17.3', consultations with FMC representatives from the Benban Solar Park indicated that their project faced many challenges, and one of the most important issues was obtaining registered workers. It was stated that, at that time, handling job opportunities through the labor office was not effective as they did not provide a sufficient registered worker database. However, they recommended that in order for the process to be effective for this project, it is important ***to coordinate as soon as possible and at very early stages with the labor office*** to ensure all required measures are undertaken from the onset that would ensure all available workers are registered within their database and provided to the Project. This is important in order to build on previous lessons and experiences from previous solar PV development projects in the area.

  Therefore, based on the above, it is recommended that as part of the local recruitment procedures the following is considered, as soon as possible and at very early stages:

  - Consultations are undertaken with Aswan Governorate's Labor Office from the onset to determine and agree on the key principles and methodology implementation for the local recruitment and procurement procedure including identification of priority for employment for Daraw District. The approach for implementation of the recruitment and procurement procedure should be under the guidance and overall management of the Aswan Governorate Labor Office;

  - Identify suitable platforms for announcements to ensure available workforce register within Aswan Governorate's Labor Office as applicable and in accordance with consultations undertaken above with Governorate's Labor Office (this could include for example advertisements at the Local Office,

online advertisement on Aswan Governorate's website, etc.) and also require contractors to register officially;

- Provide Aswan Governorate's Labor Office with detailed list on number of job and procurement opportunities that are targeted to the local communities along with skills and qualifications required and obtain worker database taking into account the duration of announcements as discussed above

- Undertake selection process in accordance with the local recruitment and procurement procedure that is fair transparent and provides equal opportunities for all including women.

- Undertake as soon as possible a capacity building and training program for selected local community workforce members, including women groups whom indicated willingness to be involved in such opportunities. This should be undertaken in coordination with key local entities such as Aswan Governorate's Labor Office, USAID Vocational Training Program in Aswan in Solar PVs Project, and the Benban solar school.

- Community Tension: Al Raqaba Local Unit has high expectations and a strong sense of entitlement in terms of employment and procurement opportunities from the Project and also requires that those are prioritized for their village. The justification is that they are considered the closest community to the Project site within Daraw District (i.e. the district within which the Project site is located), and also due to the fact that they have also not benefited from other mega solar PV development projects such as the Benban Solar PV facility – unlike other communities who did such as Benban village.

  However, Al Raqaba Local Unit's local community understand that hiring requirements are significant and shall be based on skills and competence, and they accept that other communities will be engaged in the Project if Al Raqaba cannot meet the Project demands.

  The required employment and procurement opportunities are unlikely to be fulfilled by the Al Raqaba Local Units and hamlets, and therefore are expected to benefit other nearby communities and even Aswan Governorate in general.

  However, careful planning is required to manage and avoid potential adverse impacts resulting from community tensions between the villages within the surrounding communities which could lead to community unrest and potential disruptions to the Project.

  Therefore, to specifically address such issues it is recommended that Local Employment and Recruitment Plan by the EPC Contractor considers the following:

  - Once employment and procurement opportunities targeted for local communities are identified, an allocation for prioritization should be established internally – to include jobs allocated for the Al Raqaba Local Unit, and its villages along with their associated hamlets (including Sheikh Fadl hamlet in particular), Daraw District and finally Aswan Governorate. Such targets should be developed internally for guidance and it is recommended that such targets should not be published or disclosed to any entity at any time;

  - As included within the SEP, undertaken continuous and ongoing consultations (at least monthly) with local communities through proper channels to include but not limited to the Al Raqaba Local Unit, Daraw Unit and Aswan Governorate Labor Office to reiterate the following:

    - Manage expectation on employment and procurement opportunities for the Project

- Emphasize again that job opportunities for this Project are huge and will be met by various villages to include Raqaba Local Unit, and its villages along with their associated hamlets, Daraw District and finally Aswan Governorate. It should be emphasized throughout such consultations that priority for such opportunities will be for Al Raqaba but at the same time it will not be exclusive for them only and other opportunities will be provided to other villages in Daraw District and Aswan Governorate.
- Provide updates on implementation of the local recruitment and procurement procedure to date (e.g. number of locals employed to date from each village as appropriate).

In addition, the Developer is considering implementing a Community Development Plan which aims to benefit the local communities to the greatest extent possible. It is recommended that a structured approach is developed for such a program that takes into account the community's needs and priority development projects which could benefit local communities (which logically should also take into account other factors such as allocated budget by the Developer, timeline for implementation of such projects, etc.)

The Developer could consider undertaking such a program in collaboration with key and active entities as per previous experiences from other solar PV developers, such as the Social Solidarity Office, or with NGOs within Aswan Governorate. For example, Umm Habiba Foundation is considered the most active NGO in terms of social, economic and civil society development of communities in Aswan Governorate including women groups and has collaborated with some developers in the Benban Park to implement social responsibility programs. In addition, they also have specific experience in community development initiatives in the Daraw District, including projects related to vulnerable groups such as economic empowerment of women.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor and Project Operator:

- Submission of stakeholder engagement log sheets that summarize local community engagement activities and their objectives for the reporting period along with evidence (e.g. photos of sessions or announcements). This should be submitted monthly during both construction and operation.
- Submission of local community employment and procurement register by area/village/district along with evidence for announcements and selection process. This should be undertaken on a monthly basis during construction and on a semi-annual basis during operation.
- Submission on an annual basis a summary of community development plans undertaken.
- Documentation of submitted grievances related to local community engagement or employment/procurement and measures undertaken to resolve such grievances. This should be submitted monthly during both construction and operation.

18. SUBCONTRACTOR AND SUPPLIER MANAGEMENT

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to subcontractor and supplier management. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

18.1 Assessment of Baseline Conditions

Subcontractors refer to any entity, whether international or local, appointed directly by the EPC Contractor or the Project Operator through contractual agreements to carry out construction or operation activities within the project area or provide specific services for the project. These services could encompass various tasks such as security, cleaning, water supply, waste collection, and more.

Suppliers, on the other hand, are entities appointed directly by the EPC Contractor or the Project Operator through contractual agreements to provide necessary products, including equipment, materials, or components, essential for the project's development. This could include but not limited to PV panels, inverters, office furniture, etc.

As noted earlier, the EPC Contractor has not been appointed at this stage. Therefore, there is no information on the required subcontractor(s) and supplier(s) that will be appointed for this Project.

18.2 Assessment of Potential Impacts

Improper management of subcontractors could entail key E&S risks on the Project as identified throughout all previous sections earlier. Such risks could also cascade to the subcontractor's subcontractor. This could include but not limited to:

- Environmental risks such as for example inappropriate management of dust from construction activities which could impact air quality as discussed previously under "Section 13.2.1";
- Occupational health and safety risks such as for example inappropriate Personal Protective Equipment (PPE) which could lead to risk of injury or death as discussed previously under "Section 15.2.1";
- Other labor risks such as inappropriate management of worker accommodation or worker influx into local communities, or human rights risks and violations and other as discussed in "Section 15.2.1"; and
- Social risks such as for example inappropriate management of local recruitment and procurement opportunities as discussed previously under "Section 0".

In relation to suppliers, key risks are related to offsite risks and within the suppliers' premises. This most importantly includes human right abuses concerning workers and employees such as discrimination, child labor, forced labor and other similar violations.

The table below provides an overall summary of the impact on subcontractor and supplier management during the construction and operation phases. The overall impact assessment will be of moderate significance.

Construction Phase			Operation Phase		
Type	Negative		Type	Negative	
Duration	Short-term	Limited to construction	Duration	Long-term	During entire operation period
Magnitude	Medium	Contractors and suppliers could result in key E&S risks for the project.	Magnitude	Medium	Contractors and suppliers could result in key E&S risks for the project.
Reversibility	Reversible		Reversibility	Reversible	
Sensitivity	Medium		Sensitivity	Medium	
Likelihood	High		Likelihood	High	
Extent	Low		Extent	Low	
Significance	**Moderate**		**Significance**	**Moderate**	

Mitigation Measures

The Developer is required to develop and implement a Contractor and Supply Chain Management Plan that must also be enforced on the second-tier subcontractors and suppliers as applicable. The objective will be as follows:

- Identify the key subcontractors and suppliers that will be involved in the Project.
- Subcontractor and Supplier Management Procedure to ensure that Environmental and Social (E&S) requirements are adhered to. This could include but not limited to the following:

  a. Screening Process: during the tendering process the key E&S requirements applicable to the scope of work should be identified and included within the tender documents. This may include adherence to International Financial Institution (IFI) E&S requirements, national E&S regulations, ESIA and ESMS requirements and other. In addition, tenders will be required as part of the tender to specify how they intend to comply with such requirements as part of their scope of work.

     In the case there is no tendering process subcontractor/supplier will be required to respond to an E&S prequalification questionnaire and will be required to submit company E&S and labor policies.

     Finally, as part of the screening process, an online desktop review (including media research) on the list of companies bidding, their owners and shareholders on E&S reputational issues.

  b. Selection Process: where selected subcontractor / supplier risks have been identified, Developer / EPC Contractor will assess these risks further with the subcontractor / supplier concerned to understand their capacity to avoid and manage such risks and to understand the controls the subcontractor / supplier has in place. This could include but not limited to: (i) submission of E&S policies and procedures as relevant for subcontractor / supplier (e.g. for suppliers' focus would be on human resources and labor policies and procedures), (ii) traceability, (iii) cascading E&S requirements, (iv) undertaking auditing protocols, etc. Where this is not possible, alternative suppliers will be sought.

  c. Contractual Controls: Developer / EPC Contractor will put in place controls to avoid and manage potential risks. This will include but not limited to contractual controls, including corrective actions and exit mechanisms, to avoid and manage potential risks. This would depend on the level of risk identified and the leverage over the subcontractor / supplier concerned. Contractual controls could include but not limited to the following: (i) requirement to comply with IFI E&S requirements and national E&S requirement as applicable; (ii) requirements to comply with the project ESMS; (iii) include clauses that enable the undertaking of inspections and/or audits to ensure compliance with the requirement above; (iv) include clauses allowing imposition of contractual penalties as applicable.

d. Proactive management and a system of contractor accountability.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Developer:

- Submission of a Contractor and Supply Chain Management Plan
- Submission of outcomes of screening processes for all selected subcontractors and suppliers (e.g. tender E&S requirements, reputational assessments).
- Submission of risk assessment for subcontractor / supplier selected and E&S controls for risks identified.
- Submission of E&S contractual controls.
- For all appointed subcontractors, detailed monitoring and reporting requirements are identified (e.g. inspections, audits) throughout the construction and operation phases. This is discussed in further details within the institutional arrangement requirements under "Section 22.1".
- For suppliers Developer / EPC contractor will, depending on the risks associated with a supply plan, put in place monitoring approach including reports from suppliers, ad hoc audits, etc. to the extent this is feasible. Monitoring will seek to ensure compliance with the mitigation defined, and in cases of non-compliance, help define corrective actions with the supplier concerned. Developer / EPC Contractor will maintain appropriate records of its supply chain assessment and risk management. Where this is conducted by EPC contractors it will be reported to Developer on a regular basis.

19. HUMAN RIGHTS AND GENDER ASSESSMENT

This section is a gender and human rights risk assessment. The assessment was conducted in accordance with the following:

- Guidance Note: On Implementation of Human Rights Assessments Under the Equator Principles; and
- UN Guiding Principles on Business and Human Rights.[42]

The assessment includes the following:

- A high-level review of human rights and gender indicators at the national level.
- A Project-site specific context of socio-economic and development factors.
- An overview of the national labor law and the rights available to workers to identify possible gaps which may lead to labor violations. Gaps were reviewed and benchmarked against the International Bill of Human Rights and the eight ILO Core Labor Standards as outlined in EP4 Guidance Note.
- Based on the gaps identified, possible human rights risks are outlined and classified according to human rights categories and potentially impacted groups.
- Mitigation measures that are needed during the construction and operation phases.
- Recommendations

19.1 Overview of Human Rights and Gender Context in Egypt

This section provides a high-level overview of national-level human rights risks, drawing on reliable sources such as the United Nations Development Programme (UNDP), the World Bank, Amnesty International, the International Labor Organization (ILO) and Egypt's Labor code.

19.1.1 Human Development Index in Egypt

The 2023 Human Development Index (HDI) ranks Egypt 106 out of 204 countries. While HDI in Egypt has increased 26% since 1990 (from 0.572 to 0.73) progress has stalled in the past two years, decreasing 0.004 since 2019, in line with global post COVID-19 pandemic trends. While overall, Egypt is classified as a "high" development country, this designation is marred by significant economic and gender inequality.

19.1.2 Economic and Social Rights

Economic and social rights in Egypt are challenged by high levels of poverty, income inequality, and a lack of social protection for vulnerable populations. According to the World Bank, 29.7% of Egyptians fell below the 2019 poverty line, a figure that is likely to have increased due to the impact of inflation and stresses

[42] Equator Principles, Guidance Note: On Implementation of Human Rights Assessments Under the Equator Principles.
The UN Working Group on Business and Human Rights, The UN Guiding Principles on Business and Human Rights: An Introduction.

related to COVID-19.[43] Furthermore, Egypt has struggled to provide adequate social services, including housing, education, and healthcare, which has disproportionately affected lower-income and rural populations. Access to quality education remains a challenge, with high dropout rates, low literacy levels, and a lack of resources for students with disabilities.[44]

While Egypt's Labor laws (explored in detail in section 4) provide protections for workers, the implementation of these laws can be hindered by a slow-moving and complex bureaucracy. Child Labor remains a pressing concern, with an estimated 2.76 million children working during the period 2021-2022.[45] Informal workers, who make up a significant portion of the workforce lack access to basic Labor protections. Notably, Egypt has strict procedures and quotas for allowing non-Egyptians the right to work, which can leave refugees and economic migrants at increased vulnerability for exploitation and conditions of forced Labor. Human Trafficking also remains an issue in Egypt, though the precise scope is unclear due to under-identification. According to the US Department of State in 2022 "Egypt does not fully meet the minimum standards for the elimination of trafficking but is making significant efforts to do so" with increased prosecutions and operationalizing a trafficking shelter. Identified cases in recent years include sex trafficking of both adults and minors, forced begging, and forced Labor primarily in construction, cleaning, and domestic servitude.[46]

19.1.3 Rights of Minorities and Gender Inequality

Gender inequality is a significant human rights issue in Egypt, with women facing widespread discrimination in both public and private spheres. Egypt ranks 134 out of 146 countries in the 2023 Global Gender Gap Index.[47] Gender-based violence, including sexual harassment, domestic violence, and female genital mutilation, remains pervasive, affecting large numbers of Egyptian women.[48] Despite the existence of laws to protect women's rights, enforcement is often weak, and social norms continue to perpetuate harmful practices.

Ethnic and religious minorities have also historically been marginalized in Egypt. Egypt is primarily made up of Arab Sunni Muslim with a small Coptic Christian population and smaller minorities including Shi'a Muslims, Baha'i, and non-Coptic Christians. Views on the status of minorities in post-Mubarak Egypt are mixed. For example, long marginalized Nubian Egyptians gained representation in the 2014 constitutional drafting process, which then referenced Nubian return. However, since 2013, the country's Coptic Christian minority, which makes up around 10% of the population, has continued to experience documented incidents of sectarian violence and restrictions on religious practices especially church construction.[49]

---

[43] World Bank, December 2022, Egypt Economic Monitor: Strengthening Resilience through Fiscal and Education Sector Reforms.

[44] UNICEF, Education: Egypt, Accessed March 2023

[45] Walaa Elsayed (2024), Breaking the cycle of child labor in Egypt: Exploring social and economic factors associated with child labor in Egypt for a sustainable future, Sustainable Futures, Volume 8.

[46] U.S Department of State Office to Monitor and Combat Trafficking in Persons, 2022 Trafficking n Persons Report: Egypt, July 2022

[47] World Economic Forum, 2023 Gender Gap Index, 2023.

[48] UN Women, Global Database on Violence Against Women: Egypt. Accessed March 2023

[49] Ashok, Alex Luke. The Plight of Coptic Christian Minorities in Post Mubarak Egypt, https://journalspoliticalscience.com/index.php/i/article/view/230/65

19.2 Project Specific Context

The Project site is located in Aswan Governorate around 650 km southeast of the capital city of Cairo. The Governorate is divided into 7 Marakez[50] (Aswan, Daraw, Kom Ombo, Nasr Al Nuba, Edfu, Abu Simbel, and New Toshka), 12 cities, and 33 rural local units with 72 affiliated villages.[51] The Project site is located within the Daraw Markaz, where the closest village is Al Raqaba, located at a distance of around 6.5 km, while Daraw city is located around 11 km from the Project site. Administratively, Al Raqaba is divided into two villages: Al Raqaba Foaniyeh (Upper Al Raqaba) and Al Raqaba Tahtaniyeh (Lower Al Raqaba). In addition, the Project site is located within a vacant desert land around 1 km east of the Luxor-Aswan Highway and about 8.5 km west of the River Nile.

19.2.1 Nature of the Area

The population of Aswan Governorate is 1,643,211. Looking at Daraw district specifically, there is a population of 167,923 (40,599 households), and 11,300 people reside in Raqaba village (2,568 households). Agriculture is a key economic activity in that area. The region's agricultural focus is typical of the local communities. The second major economic sector is industry, particularly in food processing, sugar extraction, textiles, and chemicals.[52]

19.2.2 Local Communities

Since the Project site is located within the Daraw District, where the closest village is Al Raqaba, located at around 6.5 km, Al Raqaba Local Unit along with its affiliated Hamlets are considered the local community that will be directly or indirectly affected by the Project. Additionally, there is a small community of indigenous peoples – Nubian families – who reside in Sheikh Fadl Village, a small village in the area near the Project site. During the scoping phase, different consultation sessions were conducted with community members of Al Raqaba Local Unit, the main hamlets associated with the Raqaba village, and the Sheikh Fadl Hamlet (specifically with the Nubian Community). [53]

19.2.3 Observations Related to Women during Stakeholder Consultation Sessions

Despite the absence of comprehensive data regarding the challenges faced by women in Aswan—such as the prevalence of female-headed households, poverty rates, or instances of gender-based violence, particularly sexual harassment—observations made during site visits and consultations with community members in Al Raqaba Local Unit and its hamlets yielded the following insights:

[50] Markaz. In the administrative division of Egypt, the Markaz is the main city or village followed by a group of villages in agricultural areas (not urban), and often the most important city is a Markaz for a total of villages. The Markaz has more commercial markets than villages, and there may also be branches of government service institutions and agencies serving villages. Each Governorate of the Delta and Upper Egypt includes a number of Markaz, Cities and villages.

[51] Urban Planning Authority, future vision and projects supporting the development of Aswan Governorate, 2017.

[52] Project Environmental and Social Impact Assessment.

[53] Project Environmental and Social Impact Assessment.

- There is a high level of educational attainment among females, with families demonstrating a strong commitment to educating their daughters through to university level, taking pride in those who achieve higher education. While there are no significant barriers to women's workforce participation, limited job opportunities primarily exist in Daraw and Aswan City.
- Women have the opportunity to voice their opinions regarding the Project and express a desire to participate in consultation activities. They are particularly interested in learning about available opportunities through the Project, including vocational training.
- In some hamlets, community norms do not discourage women from participating alongside men in dialogue sessions and expressing their views publicly, indicating a lack of strict restrictions in this regard.
- Women, especially older women, hold a respected and valued status within the community, reflecting a shared belief in the importance of protecting women's rights.
- Consultation activities indicated that some women, particularly widows and divorcees, represent a vulnerable group within the local community, facing challenges in supporting their families and lacking stable income to meet daily living expenses. However, specific data regarding the number of widows, divorcees, or women living below the poverty line in Al Raqaba Local Unit is not available.

Some reports have identified indicators of social violence against women, including early marriage and female circumcision. The table below presents the percentages of violence indicators against women in Aswan Governorate, as outlined in the 2020 report on localizing the Sustainable Development Goals, published by the Ministry of Planning and Economic Development.

Indicator	Ratio %
Female circumcision; Percentage of females aged 0-19 years who have been circumcised or are expected to be circumcised	86.6
Physical violence; Percentage of ever-married women aged 15-49 who have experienced physical violence	25.4
Early marriage; Percentage of women aged 18-10 who are currently married	1.0

The following indicators regarding women's participation in education are derived from the annual statistical report published by the Aswan Governorate Information Center in 2023:

- The total number of females enrolled in basic education reached 14,799, accounting for 49% of the overall student population in this educational stage.
- In pre-university education, the total number of female students was 365,493, representing 48% of all students at this level. The highest enrollment percentage at the governorate level is observed in the Edfu and Daraw centers, where female participation reached 49%. This is followed by the Aswan and Kom Ombo centers at 48%, and the Nasr Al-Nuba Center at 47%.

19.3 The Labor Code in Egypt

The foundational Labor law governing Egypt is Law 12/2003[54] which consists of 247 articles and its relevant amendments and applies to both the private and public sectors. Labor law reform has been a major topic in Egypt in recent years. A reform law was drafted but not passed in 2017 and has recently been

[54] Available in Arabic and English from the Egyptian government. Also available in English here [1] [2]

reintroduced and debated in the Egyptian government in late 2022 through early 2023. Proponents of the new code advocate that it will better balance interests of workers and employers, improve job security by clarifying termination procedures, and better align Labor law with the 2014 Egyptian constitution. However, those in opposition have criticized the lack of participatory drafting and report that the proposals are too similar to the current law, arguing that the changes primarily benefit employers and contradict existing laws and international conventions.[55] To date, however, there has been no major reform, and law 12/2003 remains the primary instrument governing Labor law in Egypt.

The below table outlines the most relevant Labor laws as well as applicable sections of Egyptian Penal Code and 2014 Egyptian Constitution which underly Labor Rights in Egypt and compares these codes to established international benchmarks.

[55] Al Jazeera, Criticism of Egypt's New Labor Law Bill, January 2023 (Arabic)

Table 62: Benchmarking National Legislation Against International Standards

Question	Yes/No	Relevant articles from Law 12/2003 and other laws	Non-technical summary of Egyptian law	International benchmark	Notable gap between Egyptian law (as written) and international benchmark
Is there a national minimum wage?	Yes	Part – III Wages: article 34	A National Wage Committee under the Ministry of Planning should set the national minimum wage and minimum rate for annual raises based on cost of living.	Minimum Wage Fixing Recommendation, 1970	None
Are employment contracts commonly used?	Yes	Part II: Individual Labor Contract: articles 31, 32	Three copies of the contract in Arabic must be kept and include specific personal and wage information.	Employment Relationship Recommendation, 2006	None
Can employers confiscate passports?	Yes	Not specifically addressed in Law 12/2003	N/A	Abolition of Forced Labor Convention, 1957 (Ratified, 1958) Migrant Workers Convention, 1975 (Unratified) Workers must have access to their identity documents at all times and be free to leave the country.	Law 12/2003 does not explicitly prohibit employers from confiscating employees' passports.
Are workers entitled to compensation for overtime?	Yes	Part VI – Organization of Work: Article 85	Overtime is a minimum 135% of the normal wage during the day and 170% at night, and 300% on official holidays.	Hours of Work (Industry) Convention, 1919 (Ratified, 1960) The rate of pay for overtime shall not be less than one and one-quarter times the regular rate.	None

Question	Yes/No	Relevant articles from Law 12/2003 and other laws	Non-technical summary of Egyptian law	International benchmark	Notable gap between Egyptian law (as written) and international benchmark
Are there established maximum working hours?	Yes*	Part VI – Organization of Work: Articles 80-84	Maximum 48 hours a week: 8 hours a day for 6 days including at least one hour break every 4 hours. Overtime is allowed with appropriate need, but in all cases, working hours should not exceed 10 per day. Workers should have a 24-hour period of rest after 6 days of work.	Forty-Hour Week Convention, 1935 (Ratified 1960) Reduction of Hours of Work Recommendation, 1962 Set 40-hour work week as the recommended standard. Weekly Rest (Industry) Convention, 1921 (Ratified 1960) Weekly Rest (Commerce and Offices) Convention, 1957 (Ratified 1958) Workers should be entitled to an uninterrupted weekly rest period not less than 24 hours in each 7-day period.	Egypt did not ratify the forty-hour work week convention, 1935. However, the convention suggests that Egypt should work in stages to reduce maximum working hours from 48 to 40 hours a week.
Are workers entitled to annual leave?	Yes	Part IV- Leaves: Article 47	Annual leave is 21 days per year after working 1 year (pro-rated after 6 months). 30 days for those who have worked more than 10 years or are aged 50+	Holidays with Pay Convention (Revised), 1970 (Unratified) At least 3 working weeks of annual paid holiday leave (note including public holidays) for one year of service.	None
Are workers entitled to official/public holidays?	Yes	Part IV- Leaves: Article 52	Full pay and leave on official holidays decreed by the minister (maximum 13 days).	No ILO standard	N/A
Are workers entitled to sick leave?	Yes	Part IV – Leaves: Article 54 Social Insurance Law	With established need from a medical authority, the employee is entitled to 90 days leave at 75% of their salary and up to a further 90 days at 85%.	Medical Care and Sickness Benefits Convention, 1969 (Unratified)	None

Question	Yes/No	Relevant articles from Law 12/2003 and other laws	Non-technical summary of Egyptian law	International benchmark	Notable gap between Egyptian law (as written) and international benchmark
				Sets out rules for protecting employees and providing care in case of sickness.	
Are male employees entitled to paternity leave?	No	Not specifically addressed in Law 12/2003	N/A	No ILO standard. However, paternity leave was identified as a "public good and collective responsibility" by a 2023 ILO report. In 2021 115 out of 185 countries surveyed by the ILO offer a right to paternity leave (9 days as a global average).	N/A
Are female employees entitled to maternity leave?	Yes**	Part – VI Organization of Work: Articles 91-96	Once employed for 10 months, three months of maternity leave at 100% comprehensive wage (75% covered by social security), not more than twice within one period of service. At companies with more than 50 employees, 2 years unpaid leave. In companies with 100 employees, employers must provide in-house nurseries or place children in adequate nurseries until they are school age. Women are entitled to 2 half hour nursing breaks for 24 months.	Maternity Protection Convention, 2000 (Unratified) Provides for 14 weeks of maternity leave with cash benefit no less than two-thirds of her previous earnings, and breast-feeding breaks. Prohibits hazardous work for pregnant women and termination related to pregnancy, maternity leave, or return.	None

Question	Yes/No	Relevant articles from Law 12/2003 and other laws	Non-technical summary of Egyptian law	International benchmark	Notable gap between Egyptian law (as written) and international benchmark
Must a valid reason be given to lawfully terminate an employment contract?	Yes	Part – VII Termination of Work Relationship. Articles 104 – 130. Part V – Duties and Impeachment of Workers: Article 69	Article 69 outlines valid reasons for termination based on gross negligence and article 110 for incompetence. Employers must receive approval from a labor court or give employee written notice 2-3 months prior to termination. In the case of unfair dismissal, employer must award at least two-month salary per year of service.	Termination of Employment Convention, 1982 (Unratified)	There is no explicit statutory requirement for severance beyond money owed. Additionally, employers have little recourse if employees do not provide the required 2-3 month notice of terminating their contract.
Are workers entitled to work injury benefit?	Yes	Part V – Vocational Safety and Health and Ensuring the Labor Environment Security: articles 202, 208-227, 256. Social Insurance Law	Part V calls for the employing establishment to take specific measures to prevent a wide range of risk and harm, medically examine workers for fitness, and provide proper training, information, and first aid. Injuries and entitlements for the injured are defined under Social Insurance Law	Occupational Safety and Health Convention, 1981 (Unratified)	None
Does the labor law prohibit discrimination?	Yes	Part III – Wages: Article 35 Egyptian Constitution: article 53	Wage discrimination based on sex, origin, language, religion, or creed is prohibited.	Equal Remuneration Convention, 1951 (Ratified, 1960) Equal wages for men and women.	Law 12/2003 does not explicitly prohibit discrimination based on race, color, or political opinion; however, these are addressed in the 2014 Egyptian constitution.

Question	Yes/No	Relevant articles from Law 12/2003 and other laws	Non-technical summary of Egyptian law	International benchmark	Notable gap between Egyptian law (as written) and international benchmark
				Discrimination (Employment and Occupation) Convention, 1958 (Ratified, 1960)	
Does the law explicitly prohibit sexual harassment?	Yes	2014 Amendment to the Egyptian Penal Code, again amended in August 2021 Law No.141. Not explicitly mentioned in law 12/2003.	The penal code for sexual harassment includes words, gestures, physical touch, indecent exposure, suggestions, and hints both in person and online. In August 2021 sexual harassment was changed from a misdemeanor into a felony. If a perpetrator has occupational authority over the victim, or exercised pressure, the minimum penalty is seven years imprisonment and a 500,000 EGP fine. Article 306(A) of the amended penal code punishes four different forms of harassment (physical, verbal, visual, and online) with up to four years in prison and a fine of up to EGP 200,000. The penalty will be toughened to five years in prison and a fine of up to EGP 300,000 if the crime is committed at a workplace or on transportation and if the offender is holding a weapon.	Violence and Harassment Convention, 2019 (Unratified) explicitly defines and prohibits sexual harassment in the workplace and defines measures to protect from, prevent, enforce measures, remedy, train, and raise awareness of sexual harassment related to labor.	None

Question	Yes/No	Relevant articles from Law 12/2003 and other laws	Non-technical summary of Egyptian law	International benchmark	Notable gap between Egyptian law (as written) and international benchmark
Is there a minimum age for employment?	Yes**	Part VI – Organization of Work: Article 99.	Juveniles can be employed once they reach 14 years old or upon completion of elementary education (whichever is older). However, training may begin at age 12.	Minimum Age Convention, 1973 (Ratified, 1999) Encourages a 15 as the minimum age of work with exceptions for developing countries (14 as suggested age).	In 1999 Egypt ratified the Minimum Age Convention, 1973 and specified 15 years as their minimum age, but has 14 in law 12/2003
Are there special protections for workers under the age of 18?	Yes**	Chapter 3 Employment of Infants/Juveniles articles 98 – 103.	Imposes restrictions such as 6-hour workdays, no work between 7pm and 7am, prohibiting overtime, and requiring displaying labor rights.	Minimum Age Convention, 1973 (Ratified, 1999) Outlines special provisions for workers under the age of 18. Egypt ratified in 1999. Worst Forms of Child Labor Convention, 1999 (Ratified, 199) Defines worst forms of child labor	Law 12/2003 delegates specific terms for employees aged 14-18 to industrial Ministers. Accordingly, the law does not explicitly prohibit hazardous work.
Can workers join and form unions?	Yes	Part V – collective organization: Articles 148 - 152, 160, 164, 165. Part IV - Collective Labor Litigations: article 171, 180, 182, 190-193, 197-199 2014 Egyptian Constitution: Articles 75-77	Law 12/2003 include the right to join and form unions as well as the right to strike, while the constitution protects the right to establish associations, form syndicates, and establish trade unions.	Freedom of Association and Protection of the Right to Organize Convention, 1948 (Ratified, 1957) Right to Organize and Collective Bargaining Convention, 1949 (Ratified, 1954)	None

Sources: Law 12/2003 Available in Arabic and English from the Egyptian government. Also available in English here [1] [2]. International Labor Organization (ILO) Normlex database. /
*Minister of each industry can issue a decree for an exception if necessary for technical or operational conditions / **Does not apply to agricultural sector

19.3.1 Work and wages

As of May 1, 2024, the National Wage Council (NWC) raised the minimum wage for private sector employees to EGP 6,000. This amount includes the employer's social insurance contribution. This marks a substantial increase from previous years: January 2022: EGP 2,400. While minimum wage has been on the rise, the increases do not keep pace with the impact of inflation and the devaluation of the Egyptian pound on real wages in recent years, which has been exacerbated significantly since the steep currency devaluation of the EGP since late 2022.[56] Further, reports suggest that Egyptian officials fail to fully enforce minimum wage, and workers struggle to effectively seek redress for underpayment.

19.3.2 Occupational Health and Safety

Occupational Health and Safety stipulations are enshrined in Egyptian Labor law and upheld by a specialized agency for inspection that sits under the Ministry of Manpower. However, experts have suggested that, in practice, commitment to OHS sits at 40% due to legal, institutional and technical problems with inspections, ineffectiveness of sanctions, incomplete incident reporting, and an overall weak national OHS culture.[57] This lack of safety culture highlights the importance of developing effective internal OHS monitoring systems and providing thorough OHS training as workers and managers may be accustomed to unsafe behaviors.

19.3.3 Termination of Employment

Law 12/2003 lays out grounds for termination due to gross fault and incompetence and requires employers to seek approval for termination from a Labor court. In practice, however, the cumbersome cost and time of seeking court approval, as well as some vague wording on procedures between article 69 and article 110 (which allows termination with 2-3 months' notice without mentioning the need for court approval) have encouraged employers to work outside of established law and circumvent judicial approval.

19.3.4 Effectiveness of labor Unions

Egyptian Labor Law and the Egyptian constitution clearly protect the right of workers to form unions, collectively bargain, and to go on strike. Further, Egypt has ratified the two major conventions protecting collective and union Labor rights. However, a widely criticized 2017 law which institutionalized all unions under a single government-controlled body, significantly curtailing the effectiveness and autonomy of all unions. Under pressure from the ILO, the 2017 law was amended in mid-2019 to be more in line with the relevant ratified conventions and Egyptian constitution.[58] While the law is now much more in line with the relevant ratified conventions and protections in the Egyptian constitution, this recent history may have a lasting impact on the strength and effectiveness of Labor organizations in Egypt today.

[56] Prior to November 2016 the EGP did not rise above 10 EGP to 1 USD. From November 2016 to October 2022 the EGP remained below 20 EGP to 1 USD. Since then, the currency has significant devalued, sitting just over 30 RGP to 1 USD as of March 2023.

[57] Said, Nihal Hatem; Fahmy, Nourhan; and Hanafy, Ossama, Occupational Health and Safety Implementation Issues in Egypt, 2019

[58]The Arab Weekly, Egypt Eases Restrictions on Trade Unions to Avoid International Censure, July 2019

19.3.5 Child Labor

Egyptian Labor law has clear regulations for workers under the age of 18 and Egypt is a signatory to the Minimum Age Convention and the Worst Forms of Child Labor Convention. However, an ILO/CAPMAS study in 2016 estimated that 1.6 million children are engaged in hazardous or unlawful work out of 1.8 million working children in Egypt.[59] With so few working children adequately protected, there are clear gaps in implementation of child Labor laws. Accordingly, child Labor remains a concern in Egypt, and a topic of national conversation, with many children working in hazardous conditions in industries including agriculture, construction, and manufacturing. These children are often subjected to long hours, low pay, and dangerous working conditions, depriving them of their rights to education, health, and a safe environment.

19.3.6 Gender Discrimination and Harassment

Despite laws against gender discrimination, in practice, the Egyptian Labor market remains highly unequal with only 15% of women participating in the Labor force compared to 67% of men.[60] Women face significant barriers to entering the workforce, including cultural and societal norms that encourage traditional gender roles. Women who do find work are often concentrated in low-paying, low-skilled jobs and may experience wage discrimination especially in the private sector and in higher paying roles.[61]

Sexual harassment and gender-based violence in the workplace are also widespread, further discouraging women from participating in the Labor market. According to a 2013 study by UN Women, 99% of women sampled across seven governorates in Egypt had been sexually harassed.[62] Formal reporting of harassment remains an issue. The Penal Code was amended in 2023, imposing stricter penalties for sexual harassment. The amended article stipulates that individuals making sexual or obscene insinuations toward others in public or private spaces face imprisonment from two to four years or a fine between EGP 100,000 and 200,000, or both. This applies to actions involving sexual suggestions through gestures, words, or deeds using various communication methods. If the offense occurs in workplaces, public transport, involves multiple individuals, or if the perpetrator is armed or repeatedly stalks the victim, the punishment increases to imprisonment of three to five years and a fine between EGP 200,000 and 300,000. If multiple aggravating circumstances exist, the minimum prison sentence is four years, with penalties doubled in cases of recurrence. Offenders with authority over the victim, who exploit their position, or if the crime occurs under aggravating circumstances in the workplace or on public transport, face a minimum of seven years in prison, increasing to a minimum of 10 years if multiple aggravating conditions apply.[63]

[59] ILO, Capacity of Egyptian Government, Works;, ad Employers' Organizations Strengthened to Combat Child Labor. April 2016

[60] UNDP, HDI Country specific Data: Egypt. Data current as of September 2022

[61] Marwa Biltagy, Gender wage disparities in Egypt: Evidence from ELMPS 2006 and 2012, The Quarterly Review of Economics and Finance, Volume 73, 2019. And Aysit Tansel, Halil Ibrahim Keskin, Zeynel Abidin Ozdemir, Public-private sector wage gap by gender in Egypt: Evidence from quantile regression on panel data, 1998–2018, World Development, Volume 135, 2020.

[62] UNFPA, Gender-Based Violence: Egypt. Accessed March 2023

[63] Ahram Online, Sisi ratifies law imposing stricter penalties for sexual harassment.

19.3.7 Informal Sector Employment

In 2016, estimates suggested that some 51-70% of non-agricultural workers were employed in the informal sector,[64] a trend that is expected to have increased in recent years due to growing microenterprise in the private sector, influx of refugees, and impacts of COVID-19. While some workers prefer informal employment due to higher profits/wages, less bureaucracy, tax avoidance, and distrust of government, others are forced into informal arrangements due to barriers to work permits (for non-Egyptians), lack of formal opportunities, lack of skills, or discrimination. Ultimately, a significant portion of the Egyptian Labor market is not regulated, and informal workers are vulnerable to exploitation and abuse, as they are not entitled to the same rights and benefits as their counterparts employed in the formal sector. Informal sector workers are also more likely to face hazardous working conditions, low wages, and job insecurity, further contributing to both economic inequality and social unrest.

19.4 Classification of Identified Human Rights Risks

The following table outlines potential project-related human rights risks that could impact various rights-holders' groups (i.e. workers and affected communities). The table outlines the most relevant risks organized by the category of human rights to which they belong, providing examples of potential harms, and identifies impacted groups. The level of risk for each issue is categorized as low, medium, or high based on an assessment of the scope, scale, remendability, and likelihood of doing harm. Two values are given for the level of risk for each issue: "National-level", which assesses the level of risk in the general contextual environment of Egypt, and "with mitigation" which assesses the risk of harm occurring within the scope of the project, given proper mitigation measures listed below.

[64] African Development Bank, Working Paper: Addressing Informality in Egypt, 2016. Source: ILO

Rights category	Human Rights issues	Example of potential risk	Level of Risk	Group impacted
Labor Rights	**Child labor**: ILO standards prohibit hazardous work for all persons under 18 years. While Egyptian law has some protections for workers under the age of 18, illegal and hazardous child Labor remains widespread.	▪ Contractors or third-party service providers hiring workers under the age of 18 and not providing adequate protections (reduced working hours, non-hazardous work, displaying labor rights…) thus harming the child. ▪ Discovering children laboring in hazardous conditions and failing to resolve the situation in a manner that considers the best interest of the child. For example, immediate dismissal of the child may put them at risk of further exploitation, threatening their standard of living or security of person.	**National-level - Medium with mitigation - Low** Child labor remains common in Egypt and can cause significant harm to children exposed to hazardous conditions and deprived of education. However, with strict oversight and implementation of proper policies for the project and its contractors there is a low likelihood of creating harm through child labor.	Workers (children)
Labor Rights	**Right to Work:** Loss of income from termination impacts both the worker and their family's well-being. Workers should not be terminated without a valid reason connected to their conduct or performance. While there are established procedures and limitations to termination in Egyptian law, they are commonly circumvented.	▪ Managers, contractors, or third-party service providers that do not adhere to (or circumvent) legal and fair termination procedures and/or arbitrarily or unfairly dismiss a worker violating their right to work. ▪ Managers, contractors, or third-party service providers informally employ workers who do not have the legal right to work in Egypt such as refugees or non-Egyptian economic migrants without work permits. In addition to being illegal, these workers have no legal protections making them vulnerable to exploitation. As with child Labor, the discovery and resolution of this situation presents the risk of creating additional harm to the worker if it is not resolved with consideration of their best interest.	**National-level - Medium with mitigation - Low** Employers in Egypt commonly circumvent the established legal processes for termination, and the large informal economy in the country increases general tolerance of informal work agreements and terminations. However, adherence to clear proper policies for work contracts and legal termination, and a commitment to properly compensate any workers who are found to have been unlawfully terminated, there is a low likelihood of creating	Workers

			harm by violating the right to work.	
Labor Rights	**Fair Wages**: Workers should receive equal remuneration for work of equal value Remuneration should provide for a decent standard of living and covering basic needs. While Egypt has an established minimum wage, currency devaluation and inflation has outpaced increases in the minimum wage.	▪ Hiring a contractor or third-party service provider that does not pay their workers a fair wage (cash-in-hand) sufficient to attain a standard of living that includes adequate food, clothing, and housing, depriving them and their families of achieving a basic standard of living. ▪ Hiring a contractor or third-party service provider that does not pay all workers equal remuneration for work of equal value due to discrimination or favoritism. ▪ Inadequately surveying the wage market for similar work of similar value and distorting that market with inappropriate wage values to the detriment of workers and the community.	**National-level - Medium** **with mitigation - Low** Wage violations are common in Egypt, and there is debate as to whether the established minimums are sufficient to provide an appropriate standard of living. However, by establishing and adhering to a clear, fair, and adequate wage scale that is applied equally to all positions and types of Labor, the risk of causing harm through unfair wages is low.	Workers Local Community
Labor Rights	**Working Hours**: While Egyptian law allows for a 6-day 48-hour work week, ILO recommends a standard 40-hour work week to provide for an adequate work-life balance and allow workers to have sufficient rest and leisure time. Overtime should be compensated above the standard rate and should not exceed 10-hours a day six days a week.	▪ Hiring a manager, contractor, or third-party service that does not adhere to established maximum working hours and/or does not compensate workers for overtime work, harming workers' work-life balance and threatening workplace safety. ▪ Workers are required to live on site without adequate periods of leave, infringing on their right to spend time with families, rest, and/or engage in leisure.	**National-level - Medium** **with mitigation – Low** Given low wages and the large informal economy, working in excess of 48-hours a week is common in Egypt, harming workers right to rest, leisure, and family time. However, with strict oversight and adherence to maximum working and overtime hours, the risk of doing harm by violating working hours is low.	Workers
Labor Rights	**Discrimination**: All individuals should be treated equally regardless of class,	▪ Workers are recruited, hired, advanced, and compensated based on social, familial, class, religious etc. connections to	**National-level – Medium** **with mitigation – Low**	Workers

	race, color, religion, gender, age, political or other beliefs, national or social origin, sexual orientation, disability, civil status, family background etc.	hiring managers thus creating discrimination against others of different origin, race, religion, ethnicity, family, class etc.	Bias in hiring is widespread in Egypt as social and familial networks are often used to seek and fill Labor needs. Additionally, women are significantly less likely than men to be participants in the workforce, due in part to discrimination. With proper policies and proactive anti-discrimination measures, the risk of harm through discrimination is low.	
Labor Rights	**Forced Labor and/or Human Trafficking:** All individuals should be free from servitude and severe economic exploitation such as in the trafficking of workers or debt bondage. Egypt has a 2010 anti-trafficking and a 2016 anti-smuggling law and continues to make efforts to eliminate forced Labor and trafficking, but incidents continue to be reported.	▪ The project unknowingly benefits from forced Labor or human trafficking through its supply chain. ▪ A manager, contractor, or third-party service provider employs individuals under conditions of forced Labor, such as confiscating personal travel documents, or putting workers in a position of debt.	**National-level – Medium with Mitigation – Low** Forced Labor and human trafficking cause significant harm to affected peoples' human rights across multiple domains. While the exact scope is unclear, these practices are present in Egypt, especially within the informal economy. However, strict adherence to policies explicitly prohibiting any conditions of forced Labor of human trafficking (including prohibiting confiscation of passports/travel documents) the risk of creating harm through forced Labor is low.	Workers Local Community (other individuals under forced Labor)
Labor Rights	**Occupational health and safety:** Companies should provide and actively	▪ A manager, contractor, or third-party service provider does not strictly adhere to OSH standards. For example, by bypassing regulators or inspections, or dealing with worker injuries informally rather than through an established	**National-level - Medium with mitigation – low** The Egyptian Labor market does not have a strict culture	Workers

	promote safe and healthy work conditions for workers.	reporting, response, and improvement mechanism thus creating an unsafe work environment and potential harm to workers.	of adherence to Occupational Health and Safety measures. Unsafe working conditions can place workers at significant risk, up to and including loss of life for working operating in hazardous roles. While the lack of a strong OSH-culture makes it more difficult to fully mitigate than more straightforward risks, with adequate training, strict adherence to proper protocols, and zero tolerance of unsafe behaviors the likelihood of causing harm by providing unsafe working conditions is low.	
Economic, Social, and Cultural	**Right to Social Insurance:** The state should provide protections for a range of issues such as inability to work due to illness and injury, unemployment support, and maternity leave.	▪ With the high prevalence of informal work in Egypt, a contractor or third party may hire workers informally (or workers may want to work informally), which leaves workers largely unprotected and unable to contribute to and access social insurance, including sick, injury, maternity, or annual leave as well as unemployment benefits.	**National-level – Medium** **with Mitigation – Low** Given the large size of the informal economy in Egypt, many workers and employers are accustomed operating without contracts and outside of the national social insurance system, leaving workers without access to basic Labor rights granted by the state. However, by requiring a formal contract with each worker which is recognized and enforced by the state the risk of doing harm by violating the right to social insurance is low.	Workers

Economic, Social, and Cultural	**Right to Organize and Join Unions** Workers should have the right to form and join unions as well as the right to bargain collectively. These rights are enshrined in Egyptian Labor law while the constitution also protects the right to establish associations, form syndicates, and establish trade unions.	▪ Workers are discriminated against or unlawfully terminated for expressing support for or joining a union.	**National-level – Medium with mitigation – Low** In recent years Egypt has passed anti-union measures. While these measures were largely repealed, some anti-union sentiments and administrative barriers may remain nationally. However, with proper policies that allow and do not obstruct workers forming and joining unions, the likelihood of causing harm by violating workers right to organize is low.	Workers
Group Rights / Heightened Risk of Vulnerability	**Rights of Women:** Workers are entitled to a safe workplace free from sexual harassment. While men can also be targeted, the vast majority of Egyptian women report having been sexually harassed in their lifetime. Additionally, women are far less likely to participate in the workforce than men. This is, in part, due to cultural norms but has also been attributed to discrimination. Women who work are also subject to wage discrimination, especially in lower paying roles, making less than men for the same Labor.	▪ Sexual harassment occurring without being reported through any formal channels, remaining ongoing and unaddressed harming victims and negatively impacting the work environment. ▪ Sexual harassment being reported through formal penal channels creating significant disruption to the workplace. ▪ Women are passed over for hiring, promotions, and compensation increases in favor of men due to their gender. ▪ Women are paid less than men for equivalent Labor ▪ Women are discriminated against or wrongfully terminated for becoming pregnant	**National-level – Medium with mitigation – Low** Sexual harassment is extremely common in Egypt, ranging from verbal harassment to physical assault. While covered as a felony in the Egyptian Penal Code, it is not explicitly addressed in Labor law and therefore workplace harassment can be difficult to remedy. However, with strict adherence measures and access to remedies, the risks become low. While discrimination against women in work and wages is prevalent in Egypt, with strict adherence to proper policies	Workers

			and proactive measures (as noted under the risks of fair wages, and discrimination) the risk to causing these harms to women is low.	
Group Rights / Heightened Risk of Vulnerability	**Rights of migrant workers** should be respected. Migrant workers should not be discriminated or denied Labor rights such as legal work contracts, reasonable working hours, and fair wages, and should not be subject to conditions of forced labor or human trafficking. Egypt is not a signatory to the Migrant Workers Convention, 1975.	▪ Migrant workers are brought into the project site and made to work beyond maximum recommended working hours and are not compensated above the regular rate for overtime. The workers feel they have little recourse to remedy the long hours / unfair wages as their stay in the country, and access to travel home are tied in with their work contract and they fear they may be terminated if they raise these issues.	**National-level – Medium** **with mitigation – Low** In Egypt, unprotected migrant workers, who are primarily employed in the informal economy, are commonly hired without contracts and are at significant risk of wage and Labor exploitation. However, sound and fair contracts with migrant workers and proper policies which mandate and enforce the protection of migrant workers' Labor rights against common risks issues such as fair wages, working hours, and occupational health and safety, the risk of doing harm to migrant workers is low.	Workers
Group Rights / Heightened Risk of Vulnerability	**The local community,** should be respected. Local community has the right to consent to projects that impact them.	▪ Engaging in business activities without taking into account the impact it has on local communities or without due consultation with local population groups.	**National-level – Low** **with mitigation – Low** According to the ESIA community leaders and groups have been identified and informed of the project.	Local Community

Guidance Material: The Equator Principles Guidance Note on implementation of Human Rights Assessments Under the Equator Principles, September 2020

19.5 Mitigation Measures

Based on the classified human rights risks identified in the previous section, the following mitigation measures should be applied during the construction and operation phases of the Project. The below mitigation measures are applicable to the EPC Contractor, Project Operator and any involved subcontractor throughout the construction and operation phase.

Risks	Mitigation Measures	Reference Plan
Child labor: ILO standards prohibit hazardous work for all persons under 18 years. While Egyptian law has some protections for workers under the age of 18, illegal and hazardous child labor remains widespread.	The Labor and Working Conditions Management Plan should explicitly prohibit the recruitment of children under the age of 18 in illegal and hazardous work. However, if children between the ages of 15-18 are to be employed at any stage throughout the construction or operation stages, the following should apply: ▪ An official letter with the approval of their parents or guardian should be provided. ▪ Young workers must provide valid identification that presents proof of age at the recruitment stage. Driver licenses are not admissible as proof of age. ▪ Minor workers are not allowed to work onsite and are only allowed to work in the Project's worker camp. They are not to be employed in any kind of work which by its nature is likely to harm their health and safety or expose them to risks and hazards. Hazardous jobs include but not limited to the following: a. Operating or supervising machines, apparatus, and equipment of substantial power b. Operating vehicles of any kind c. Exposure to petroleum products and/or hazardous materials of any kind d. Lifting, moving, or pushing heavy materials e. Work performed at heights f. Any underground works g. Other activities which entail exposure to dangerous or hazardous equipment, materials, or activities h. Other activities similar in nature to the above. ▪ In accordance with the labor law, young workers shall not work for more than six hours a day, during which one or more break periods totaling not less than one hour shall be granted for meals and rest. They shall not be made to work overtime hours or required to come to work on weekends and official holidays. They shall not be made to work between 7:00 pm and 7:00 am.	Labor & Working Conditions Management Plan
Right to Work / termination: Loss of income from termination impacts both the worker and their family's well-being. Workers should not be terminated without a valid	▪ The labor and Working Conditions Management Plan should explicitly prohibit wrongful termination. ▪ The employment of a worker shall not be terminated unless there is a valid reason for such termination connected to the capacity or the conduct of the worker. ▪ In accordance with the Labor law, the following reasons shall not be considered as legitimate and adequate justifications for termination:	Labor & Working Conditions Management Plan

Risks	Mitigation Measures	Reference Plan
reason connected to their conduct or performance. While there are established procedures and limitations to termination in Egyptian law, they are commonly circumvented.	a. Color, sex, social status, family obligations, pregnancy, religion, or political view. b. the context of the limits set by the laws. c. Exercising the quality of workers' representative, fanner exercise of that quality, or seeking to represent the workers. d. Submitting a complaint, filing an action against the employer, or joining in that, in protest against violating the laws, regulations, or labor contracts. e. Laying garnishment with the employer on the worker's dues. f. The worker's use of his/her rights to the leaves ▪ The employment of a worker shall not be terminated for reasons related to the workers' conduct or performance before they are provided an opportunity to defend themselves against the allegations made. ▪ A worker who considers that his employment has been unjustifiably terminated shall be entitled to appeal against that termination to an impartial body, such as a court, labor tribunal, arbitration committee or arbitrator. ▪ If a worker's employment is terminated without justification, the worker shall be entitled, in accordance with national law to compensation that is not less than the wage of two months of the comprehensive wage for each year of service, to be determined by a judicial committee.	
Fair Wages: Workers should receive equal remuneration for work of equal value. Remuneration should provide for a decent standard of living and covering basic needs. While Egypt has an established minimum wage, currency devaluation and inflation has outpaced increases in the minimum wage.	▪ Wages will be based on a clear and established salary scale that is applied without discrimination and takes into account the local market and will be fair and should meet the basic needs to maintain a safe and decent standard of living. ▪ Wages must be established based on qualifications and competencies, professional experience, job responsibilities, and wages at equivalent positions. ▪ Remuneration for work of equal value should be provided for female and male workers. ▪ Wages should not be below the nationally established minimum wage.	labor & Working Conditions Management Plan
Working Hours: While Egyptian law allows for a 6-day 48-hour work week, ILO recommends a standard 40-hour work week to provide for an adequate work-life balance and allow workers to have sufficient rest and leisure time. Overtime should be compensated above the	▪ According to the labor law, working hours should be set to a maximum of 8 hours a day for 6 days including at least one hour break every 4 hours. ▪ Overtime is allowed with appropriate need, but in all cases, working hours should not exceed 10 per day. Workers should have a 24-hour period of rest after 6 days of work. ▪ All workers will be notified of their schedule for the weekly day rest, working hours, break periods and any changes introduced to such a schedule.	labor & Working Conditions Management Plan

Risks	Mitigation Measures	Reference Plan
standard rate and should not exceed 10-hours a day six days a week.		
Discrimination: All individuals should be treated equally regardless of class, race, color, religion, gender, age, political or other beliefs, national or social origin, disability, civil status, family background etc.	▪ The local recruitment process will be conducted in an inclusive and diverse manner, which means job opportunities will be open to all community members regardless of their class, race, color, gender, age, disability, civil status etc. ▪ Recruitment will be based on competency and skill. ▪ Efforts and resources will be allocated to make sure that women are also fairly targeted and recruited and are provided opportunities for learning skills to participate equally as men. ▪ In some cases, the project can apply quota to enforce female hiring with competences who meets the vacancy requirement. ▪ Gender inclusive advertising will be identified, in consultation with female stakeholders (such as women's groups and CBOs) and will be utilized in the announcement of job opportunities. ▪ Candidate selection (recruitment) will be conducted by a mixed-sex panel (comprising of at least two people). Candidate promotion selection will always be carried out by a gender diverse and balanced panel (more than one person and never by a single-sex panel). ▪ It will be prohibited to terminate the contract of a female worker during her maternity leave.	labor & Working Conditions Management Plan
Right to Social Insurance: With the high prevalence of informal work in Egypt, a contractor or third party may hire workers informally which leaves workers largely unprotected and unable to contribute to and access their rights.	▪ All workers on site will be provided with a contract. Each worker will be provided with a signed copy of the contract and another copy will be retained with the HR Manager and the third copy is given to the labor office (for casual labor's insurance) OR to the social insurance office for the social insurance system for fixed term contract employees ▪ Each employee will be provided with a copy of the contract and Code of Conduct as well as Gender Based Violence and Harassment (GBVH) Code of Conduct and will be required to sign it. The signed copy will be retained with the HR Manager. ▪ At recruitment stage and before signature, contracts and codes of conduct have to be verbally explained to workers in a language that they understand – to ensure that illiterate workers are fully informed of their rights and responsibilities. ▪ Workers should be entitled to annual and sick leaves as well as any other social benefits as stipulated in the labor law. These will be included in the worker's contract.	labor and Working Conditions Management Plan
Right to Organize and Join Unions: Worker should have the right to organize, including the ability to form and join unions and bargain collectively.	▪ The labor and Working Conditions Management Plan should explicitly state that workers have the right to organize and form and join unions and collectively bargain. ▪ Discrimination against workers who join unions or support organizing efforts should be explicitly prohibited.	labor and Working Conditions Management Plan
Forced labor and/or Human Trafficking: Egypt has a 2010 anti-trafficking and a 2016 anti-	▪ The labor and Working Conditions Management Plan should explicitly prohibit forced labor and human trafficking. ▪ Confiscation of employees' passports should be explicitly prohibited.	labor and Working Conditions Management Plan

Risks	Mitigation Measures	Reference Plan
smuggling law and continues to make efforts to eliminate forced labor and trafficking, but incidents continue to be reported.		
Occupational health and safety: Companies should provide and actively promote safe and healthy work conditions for workers.	▪ An Occupational Health and Safety Management Plan (OHSP) that is project and site specific will be developed that ensures the health and safety of all personnel and prevents accidents which may injure personnel or damage property. ▪ A Worker Influx Plan should be developed and to take into account: i) medical examination program for workers; ii) procedures to maintain hygienic conditions onsite, iii) code of conduct for workers; iv) induction training and awareness requirements for risk diseases.	Occupational Health and Safety Plan Worker Influx Plan
Rights of Women: Workers are entitled to a safe workplace free from sexual harassment. While men can also be targeted, the vast majority of Egyptian women report having been sexually harassed in their lifetime.	▪ Female workers should explicitly be subject to the same protections as male workers, including legal contracts, fair wages, reasonable working hours, occupational health and safety measures, and non-discrimination. ▪ The Worker Grievance Mechanism will mitigate gender-based violence and harassment in the workplace and will outline that a suitably trained male and female person is designated to process grievances in which male / female workers might feel uncomfortable discussing with a person of the opposite sex. The grievance mechanism also includes a procedure to deal with GBVH grievances. ▪ Female sanitary, toilet facilities, and prayer rooms will be kept separate from men. All such facilities will have lockable doors with adequate numbers provided. ▪ Recreational/resting areas provided for workers should be designated separately for women and men. ▪ Separate changing rooms and cabinets will be provided for men and women both of which have locking mechanisms. ▪ In case of hotel and apartments, separate sleeping rooms for men and women will be provided Means of securing bedroom doors from inside and out will be provided. Finally, female sanitary and toilet facilities will be kept separate from men. ▪ Men and women will be provided with separate sleeping rooms/ dormitories. In addition, female sanitary and toilet facilities will be kept separate from men ▪ All workers will be required to read and sign a Worker Code of Conduct which will be explained verbally. The code of conduct prohibits the following and which is subject to disciplinary action: (i) harassment, gender-based violence and abuse of any kind will not be tolerated; (ii) discrimination based on personal characteristics is prohibited to include but not limited to gender, race, nationality, ethnic, social and indigenous origin, religion or belief, disability, age, or sexual orientation.	Labor & Working Conditions Management Plan Accommodation Management Plan

Risks	Mitigation Measures	Reference Plan
	▪ In the case body searches are required for security reasons, those will be gender sensitive (i.e. body searches on female workers / employees /visitors should be undertaken by female security officers and vice versa).	
Rights of migrant workers should be respected. Migrant workers should not be discriminated or denied labor rights. Egypt is not a signatory to the Migrant Workers Convention, 1975.	▪ The project should ensure that migrant workers employment is in conformity with Egyptian laws and regulations, to ensure workers are not vulnerable to exploitation for fear of deportation or arrest. ▪ Migrant workers should explicitly be subject to the same protections as non-migrant workers, including legal contracts, fair wages, reasonable working hours, occupational health and safety measures, and non-discrimination. ▪ Migrant workers should have access to fair and reasonable complaint mechanisms for rights violations. In the case of a dispute, the migrant worker should have the right to present his case to a competent body without fear of retribution. ▪ In the case of expulsion of a migrant worker of their family, the cost shall not be borne by them. ▪ Migrant workers should have access to their personal and travel documents including passports at all times. ▪ If provided, accommodations for migrant workers should provide adequate personal space and standard of living.	Labor & Working Conditions Management Plan Accommodation Management Plan
Rights of local community groups	▪ The Project is excepted at a minimum to provide job opportunities for local communities. This, to some extent, could contribute to enhancing their socio-economic conditions. ▪ While the ESIA notes that there are no economic activities relating to Bedouin Groups within the Project site, the area is under their "Ghafra System" and therefore it is recommended that a Community Integration Plan for employment and procurement opportunities for local communities and Bedouin groups is developed. ▪ The Stakeholder Grievance Mechanism included within the Stakeholder Engagement Plan (SEP) allows local communities (including Bedouin groups) to lodge grievances.	Community Integration Plan

19.6 Recommendations

This Initial Human Rights Risk Assessment was conducted for the AMEA Power 1GW "Abydos for Renewable Energy" Solar Plant Project and based on a desk review identified potential human rights risks that could occur during the different stages of the Project. In accordance with the Equator Principles, the risks were classified according to category and the groups that may be impacted. For each risk, mitigation measures were identified along with the respective reference plans. As mitigation measures were identified for each risk, along with appropriate pathways (through policies and plans) through which workers and community members can access remedies, **the recommendation is that a detailed human rights risk assessment is not required.**

20. CLIMATE CHANGE RISK ASSESSMENT

This section provides a high-level Climate Change Risk Assessment (CCRA) related to the Project development. The CCRA is guided by the "Guidance Note on Climate Change Risk Assessment" (EP, 2020).

The CCRA investigates the relevant climate-related 'Physical Risks' defined as risks resulting from climate change which are event driven (acute) or longer-term shifts (chronic) in climate patterns. Acute physical climate risks can include increased severity and frequency of droughts, storms, floods, heat waves and wildfires. Chronic physical climate risks can include sea level rise and longer-term temperature increase.

The CCRA does not include an assessment on 'Transition Risks' as indicated in the Guidance Note (which is only required for Projects with combined Scope 1 and Scope 2 emissions of more than 100,000 tons of CO_2 equivalent annually – which is considered irrelevant for this Project as discussed in the section below). Those are risks related to policy, legal, technology, reputation and market changes.

The key physical risks that have been investigated as part of the CCRA and which are relevant for the Project development include the following:

- Sea Level Rise and Riverine Floods;
- Urban Flash Floods;
- Temperature Increase and Heat Waves;
- Extreme Weather Events;
- Wildfires;
- Infectious Diseases; and
- Water Scarcity and Drought.

20.1 Project GHG Emissions

This section aims to provide a high-level estimation on the GHG emissions and avoidance rates from the Project activities.

One of the key positive impacts of the Project, as far as resource efficiency, is that it will be utilizing solar energy to produce electricity. The Project will be of an installed capacity of 1GW AC that will contribute to the national grid and reach end users and help meet the increasing electricity demands throughout Egypt – as opposed to meeting such increasing demands through conventional electricity production from thermal power plants.

The Project is expected to provide around 3,100 GWh of electricity per year and is expected to displace approximately 1,545,000 tons of CO_2 annually. This has been calculated based on the grid factor from IGES standards and UNFCCC data, are calculated using the CDM Grid Tool to estimate CO2 emissions per MWh of electricity.

The International Financial Institution (IFI), under the Framework for a Harmonized Approach to Greenhouse Gas (GHG) Accounting, published the document titled "GHG Accounting for Grid Connected Renewable Energy Projects" (IFI, 2019). This document indicates that construction emissions for

renewable energy projects may be excluded, as such forms of renewable energy are generally recognized to have low construction and lifecycle emissions.

To provide further context, a research study titled "Assessing the Lifecycle Greenhouse Gas Emissions from Solar PV and Wind Energy: A Critical Meta-Survey" (Nugent & Sovacool, 2013) reviewed an extensive number of lifecycle studies encompassing a wide range of wind and solar photovoltaic (PV) electricity generation technologies. This study identified 41 of the most relevant, rigorous, original, and comprehensive assessments to elucidate the dynamics of their greenhouse gas (GHG) emissions profiles.

The study concludes that the average lifecycle greenhouse gas emissions for Solar PV farms is approximately 49.9 gCO2-eq/kWh. It estimates that around 70% of these emissions are attributed to material cultivation and fabrication processes, including mining, extraction, and processing of final products. Construction activities contribute an average of 9.5 gCO2-eq/kWh, while operational activities contribute an average of 6.5 gCO2-eq/kWh.

These figures encompass all on-site construction activities, including, but not limited to, transportation of materials, civil works, installation activities, and the fossil fuels burned in transporting and assembling the system. Similarly, operational activities include maintenance, cleaning of modules, and replacement of parts.

For this Project, construction activities are projected to result in approximately 29,450 tons of CO2-eq, while operational activities are expected to generate less than 20,150 tons of CO2-eq. Considering the emissions displaced during operation, these numbers are deemed negligible, representing only around 1.6% of the total emissions.

20.2 Compatibility with Host Country Climate Change Commitments

20.2.1 Background on Climate Change and Egypt

Egypt's journey to combat climate change began with its participation in the Earth Summit in Rio de Janeiro in 1992 and continued through the sessions leading to the Kyoto Protocol in 1998. However, it was not until Prime Minister Decree No. 272 that the Egyptian government initiated the development of policies and strategies to address climate change.

This decree led to the establishment of the National Committee on Climate Change. A year earlier, the National Committee for Crisis Management and Disaster Risk Reduction (NCCMDRR) was formed in response to the Hyogo Framework for Action (HFA) on disaster reduction, established in 2005. Both committees have played a crucial role in shaping Egypt's first strategy for climate change adaptation.

In 2011, the Egyptian government published the "National Strategy for Adaptation to Climate Change and Disaster Risk Reduction." This strategy was developed in alignment with the commitments made during the Copenhagen Summit and the Copenhagen Accord in 2009. It serves as a guide for all sectors in Egypt to address the challenges associated with climate change adaptation and resilience. The National Strategy, which has paved the way for numerous government-led initiatives to date (2021), has three primary goals:

- Increasing the adaptability and flexibility of Egyptians in dealing with climate related risks and disasters
- Enhancing the capacity and resilience to withstand climate related risks
- Reducing climate change inducing factors

These goals were to be achieved through six key actions, with their progress monitored through seven determinants. The Strategy was aligned with the National Strategy for Crisis and Disaster Management in Egypt, published in 2010; however, it was much more comprehensive and specifically focused on climate change risks. Notably, the Strategy was not time-bound and aimed to pave the way for other related policies and initiatives.

In 2016, Egypt published the Integrated Sustainable Energy Strategy (ISES), which outlined the plan for increasing the percentage of electricity generation from renewable energy to 42% by 2035. Furthermore, in 2018, the Egyptian Ministry of Environment released the "Egyptian Strategy for Clean Development Mechanism," which articulated actions to ensure that continued development and economic growth in Egypt positively contribute to climate change mitigation efforts.

20.2.2 Egypt's Commitment to Combatting Climate Change

To date, Egypt has submitted four National Communications (NC) to the United Nations Convention on Climate Change (UNFCCC), which include, among other things, a strategic summary of the country's greenhouse gas (GHG) inventory and current programs aimed at mitigating climate change at the national level. These NCs serve as a continuation of Egypt's commitment to the UNFCCC and highlight the progress made in reducing emissions through various plans and policies, as well as the development of mitigation measures through targeted strategies and programs. The Ministry of Environment, through the Egyptian Environmental Affairs Agency (EEAA), develops the NCs with support from the United Nations Development Program (UNDP). Additionally, Egypt submitted its first Biennial Update Report to the UNFCCC, which encompasses the GHG inventory up to 2015, the progress of climate change mitigation projects, and various mitigation policies and actions implemented by that date.

Over the past decade, Egypt has reinforced its commitment through two significant ministerial decrees. Prime Minister Decree No. 1912 of 2015 established the National Council for Climate Change, which overtook the committee established in 2007. Prime Minister Decree No. 1129 of 2019 further articulated the Council's responsibilities, enhancing its institutional capacity and obligations. The Council is supported by a technical team from the climate change department of the EEAA, responsible for reporting, research, and monitoring.

Egypt was a signatory to the Paris Agreement in April 2016 and subsequently submitted its Nationally Determined Contributions (NDCs) to the UNFCCC, which must highlight mitigation measures and adhere to the principle of progression. The first NDCs were submitted in 2017 and became effective in 2020. The main segments of the NDC include:

- National Circumstances (Population Growth, Economic Conditions, National Objectives, Political Context/Social Context)
- National Efforts for Adaptation and Mitigation (Challenges, Intended Actions, Mitigation Policies and Measures)
- New Market Mechanisms
- Need for Strong Economic Approach
- Means of Implementation

Egypt's 2030 Vision was launched in 2016 as a national agenda that includes the long-term strategic plan for Egypt and for Egypt to meet its Sustainable Development Goals (SDGs) objectives. One of the key 8

objectives of the 2030 Vision, is objective 5 covering "integrated and sustainable ecosystem" that emphasizes on addressing the impacts of climate change. As part of this program, a development plan report is developed for the coming year that includes the government's priorities for development.

20.2.3 AMEA Power 1 GW Solar PV Plant in Egypt Climate Change Related Permits

Aside from an Environmental obtaining approval and certification from the EEAA for project implementation, which is based on the EIA study prepared in accordance with EEAA categorization for projects, there are no energy, water or climate change related permits or certification.

The Abydos 1GW Solar Power Project is designed to generate 1-Gigawatt through a Photovoltaic (PV) technology that will be connected to the National Grid by a high voltage overhead transmission Line. This project implementation contributes to and is aligned with a number of programs, policies and strategy objectives that include:

- Integrated Sustainable Energy Strategy ISES – 2015
  - Boost renewable energy production to 42% by 2035, with photovoltaic (PV) energy accounting for 22%.
  - BUR for 2019 in section 3.3 Migration Policies and Actions – **Install additional renewable energy generation to reach updated 37% target (Action 2) with 11.8% by Photovoltaic solar 49,407 GWh by 2035.**
- NCs – 2016 Climate Change Mitigation Action Areas
  - Renewable Energy Actions – **3.2 PV Energy Generation**
  - Energy Sector Institutional Reform and Restructuring Actions – **11.1 Increasing the Role of Independent Power Producers in the Generation Sector**
- Egypt Sustainable Long-term and Mid-term development plans (Egypt 2030 Vision)
  - Urban Development and Environmental Enhancement **– Increase the usage of "clean" energy for provision of energy, that has minimal impacts on the environment and produces minimal pollution**
- Egypt's NDC Mitigation Polices – 2023
  - **Renewable Energy Expansion:** Achieve a 42% share of renewable energy in the electricity generation mix by 2030.
  - **Smart Grid Development:** Implement advanced smart grid technologies and enhance regional interconnections.
  - **Decentralized Energy Promotion:** Foster energy efficiency and support small-scale renewable energy systems through comprehensive regulatory frameworks.
- Clean Development Mechanism (CDM) Strategy – 2017
  - To be added to **Egypt's Portfolio of CDM projects** and will have an active quantified estimated emissions reductions tCO_2 per year under renewable energy projects

20.3 Sea Level Rise and Riverine Floods

A little over one-third of Egypt's coastline borders the Mediterranean Sea, while the remainder extends along the Red Sea and the Gulfs of Suez and Aqaba. These coastal areas are particularly susceptible to sea level rise (SLR) and saltwater intrusion. The shoreline along the Mediterranean Sea is characterized by relatively low elevations, with substantial portions of the Nile Delta situated below sea level, rendering it

especially vulnerable. Furthermore, the increasing frequency of intense precipitation events is expected to exacerbate the risk of coastal flooding and related riverbank overflow.

The Project site is located in the desert fringes, approximately 8 kilometers west of the Nile River floodplain, at an altitude of about 80 meters above the Nile River's ground level (refer to the figure below). As discussed in further detail in "Section 20.4" below, the potential rise in water levels in the Nile River due to climate change remains uncertain. However, any anticipated increase is unlikely to exceed 80 meters in the surrounding area due to the prevailing topographical conditions, as indicated in the figure below. Consequently, such risks are deemed irrelevant for the Project site

.

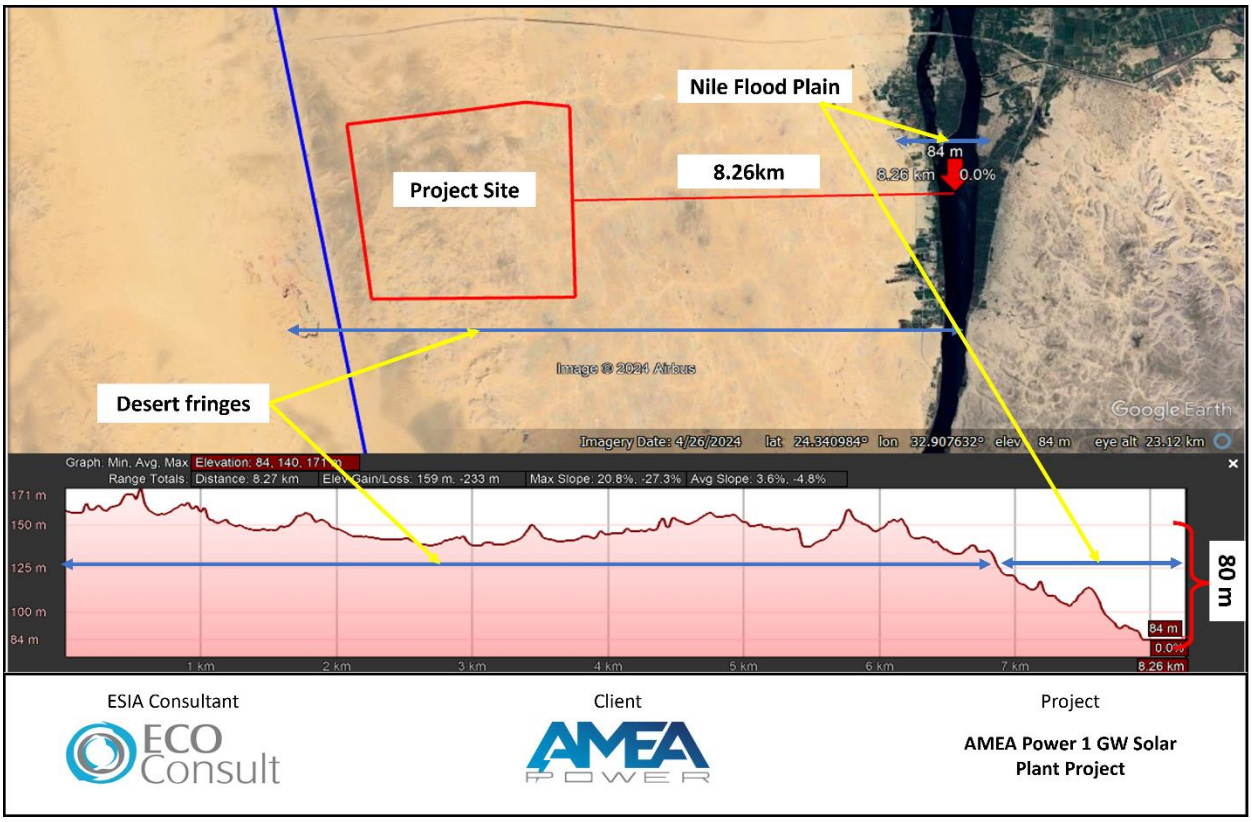

Figure 93: Elevation Profile of Project Site and Nile River Flood Plain

20.4 Urban Floods

Urban flooding is a significant issue in many regions worldwide and ranks among the most frequent natural disasters occurring annually. Although areas south of Cairo, including Aswan Governorate, typically receive only minimal rainfall, they can unexpectedly experience extreme precipitation events that result in flash floods.

For Aswan Governorate, the Think Hazard tool categorizes urban floods as a low-risk hazard, as illustrated in the figure below. This classification indicates that there is over a 1% chance of potentially damaging and life-threatening flash floods occurring within the next 10 years, corresponding to a return period of approximately 1 in 1,000 years. The Developer has conducted a flood risk assessment for the Project site, which is presented as a standalone document.

Taking the above into account, urban flood risks are considered irrelevant for the Project site.

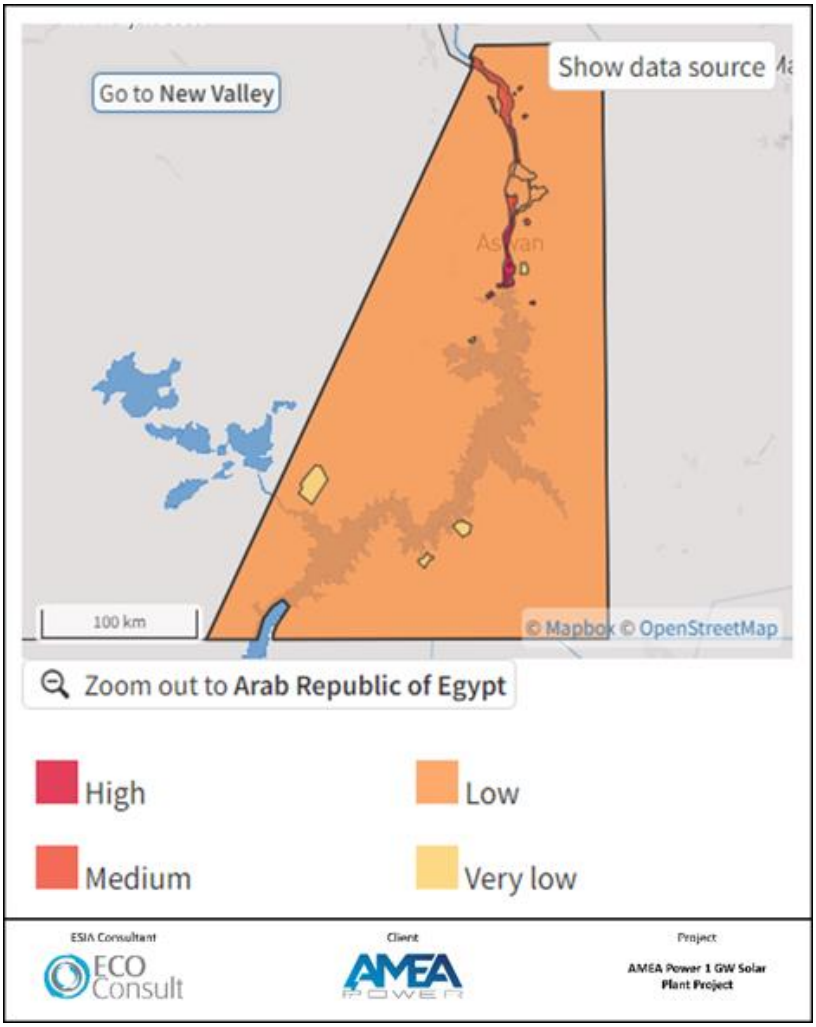

Figure 94: Hazard Levels for Urban Floods for Aswan

20.5 Temperature Increase and Heat Waves

The section below is provided from the "Climate Risk Country Profile: Egypt" (World Bank, 2021). Analysis of data from the World Bank's Climate Change Knowledge Portal (CCKP) shows historical information on temperature in Egypt for 1991–2019. The mean annual mean temperature for Egypt is 22.5°C, with average monthly temperatures ranging between 30°C (July) and 13°C (January). The figure below presents the spatial variation of observed average annual temperature across Egypt.

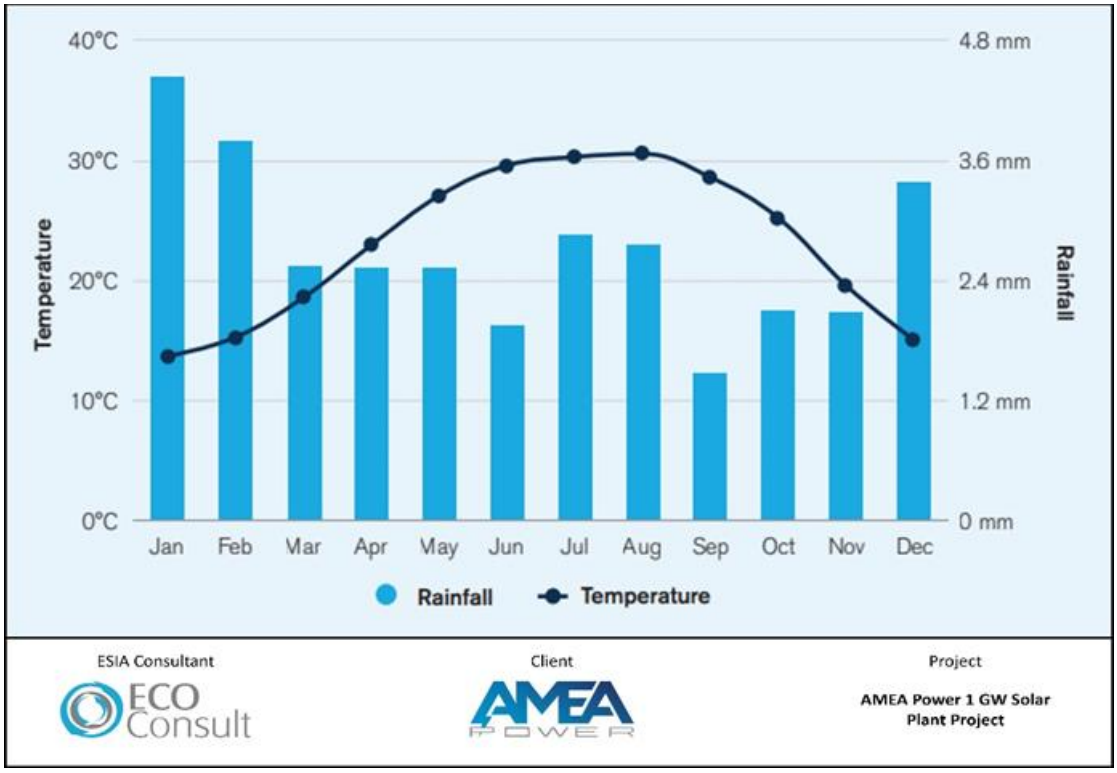

Figure 95: Average Monthly Temperature and Rainfall of Egypt for 1991-2019

Based on the figure below it can be concluded that temperatures in Egypt have increased at a rate of 0.1°C per decade on average between 1901– 2013. However, substantially stronger warming was observed over the past 30 years, with average annual temperatures increasing by 0.53°C per decade.

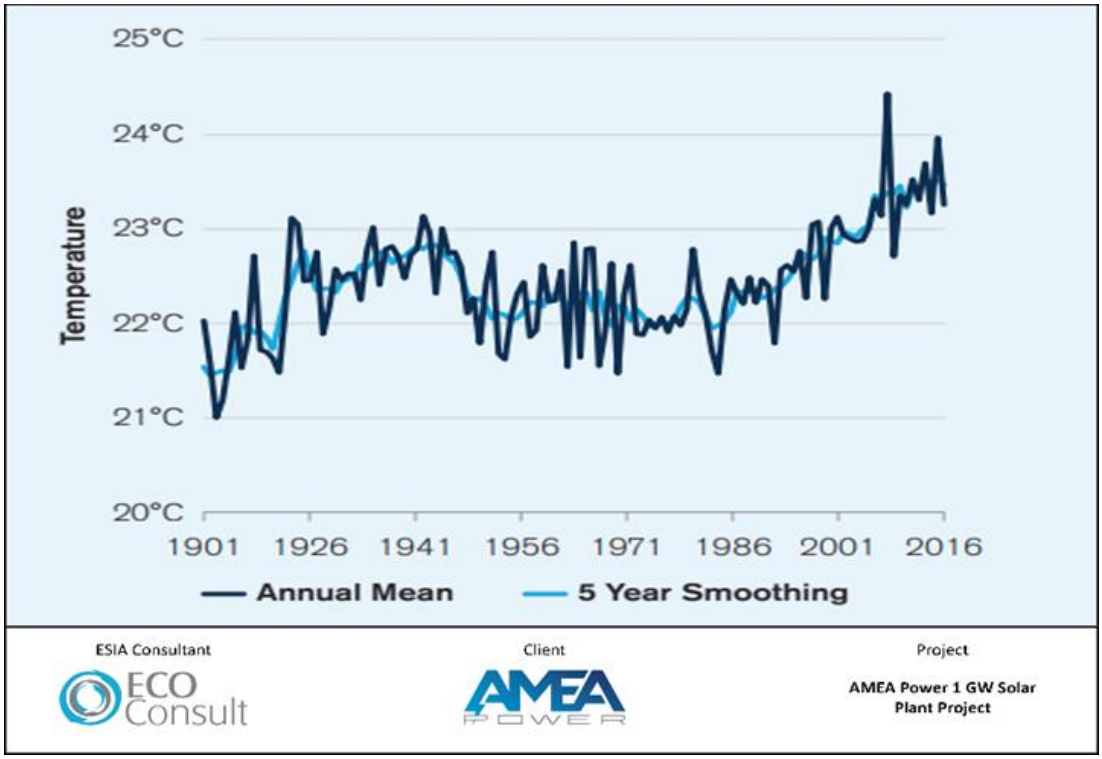

Figure 96: Observed Temperatures for Egypt between 1901-2016

The figures below from the Climate Change Knowledge Portal provide a projection of maximum and minimum temperature trends in Egypt under the RCP 8.5 Ensemble (this particular projection scenario operates under the assumption of a business-as-usual approach, without the implementation of any climate change mitigation measures). In 2024, the average maximum temperature is projected to be 30.04°C, while the average minimum temperature is estimated to be 17.44°C. Based on the projections, in 2050 (which aligns with the Project operational period) the average maximum temperature is anticipated to rise to 31.56°C, and the mean minimum temperature is expected to increase to 19.0°C.

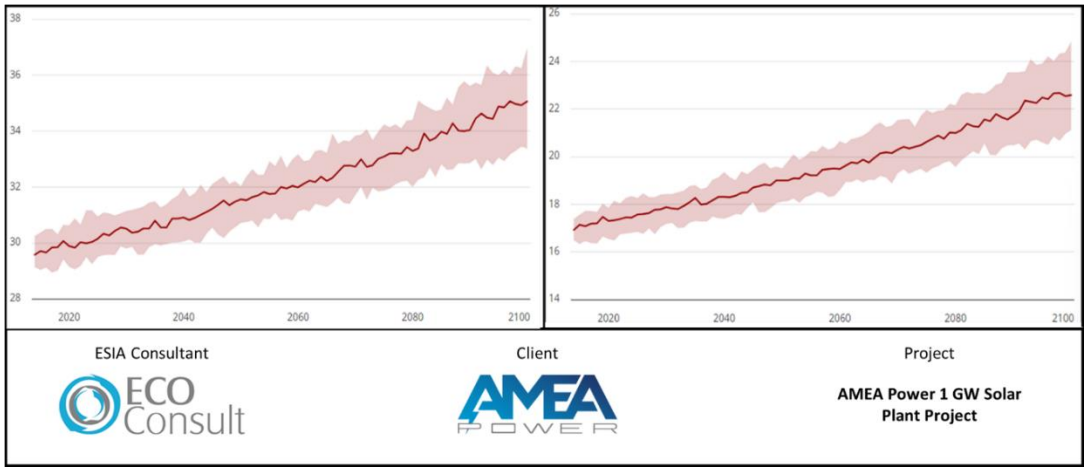

Figure 97: Average Minimum Temperatures

Rising temperatures are of increasing concern. The annual distribution of days with a high-heat index provides insight into the health hazard of heat. The figure below shows the expected Number of Days with a Heat Index >35°C for the 2090s; showing a sharp increase in high heat index days, starting to accelerate by mid-century and continuing to sharply increase under a high-emission scenario by end of the century.

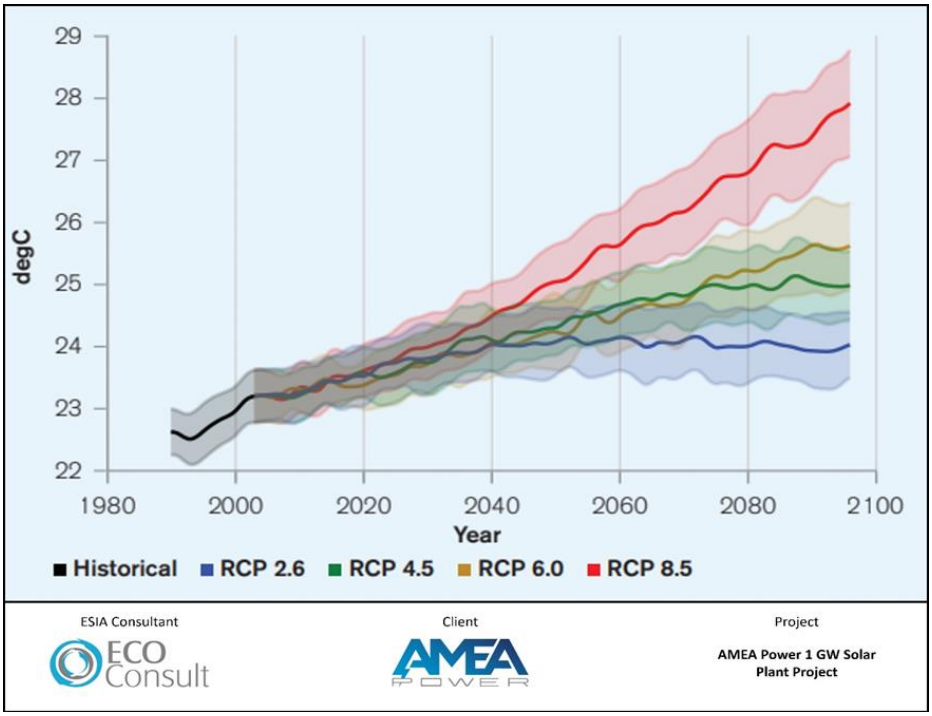

Figure 98: The Number of Days with a Heat Index >35°C

Finally, for Aswan, the Think Hazard tool indicates extreme heat as a high-risk hazard level as noted in the figure below.

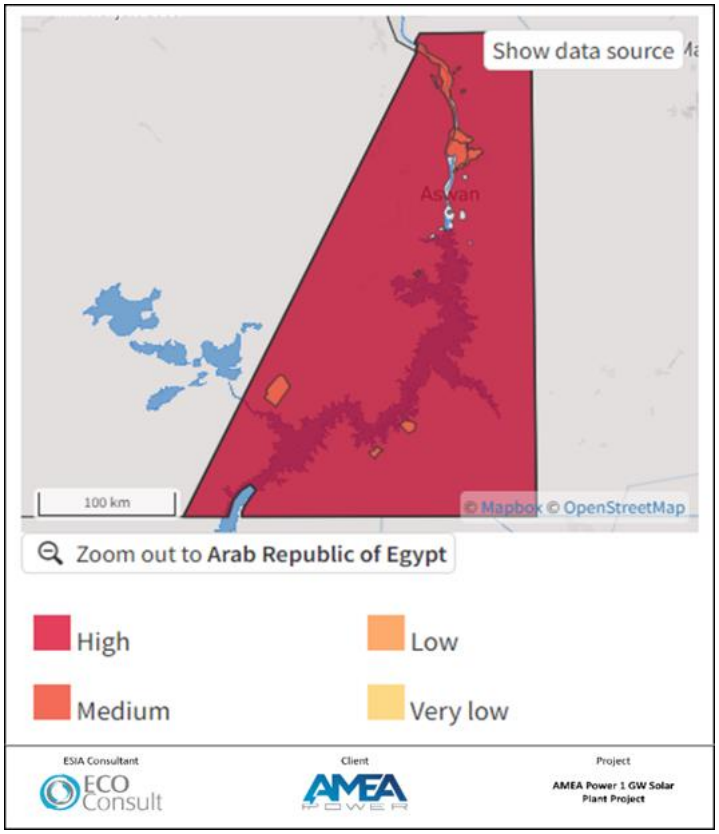

Figure 99: The Hazard Levels for Aswan in regards to Extreme Heat

Damage to Assets and/or Impacts on Project Efficiency

High temperatures could damage or affect certain Project assets (e.g. cables) and/or could affect generation capacity (e.g. high temperature could affect the production efficiency of PV panels). It is assumed that such risks have been taken into account as part of the technical studies of the Project.

Impacts on Outdoor Workers/Laborers

Working in outdoor areas and exposure to high temperatures entails occupational health and safety risks on workers during the construction and operation phase. The OHSP is to be prepared for the construction and operation phase should take into account risks from working in sunny conditions and high temperatures. This could include measures such as the following;

- Avoid continuous exposure to the sun during the shift. Temporary shelter and or similar protections will be defined and provided. Project should comply with limits to heat exposure during working hours required by Executive Regulation 1095/2011;
- Exposed personnel have to wear protective clothing and cover the skin by means of long-sleeved, closely-woven shirts and long trousers;
- If considered necessary, exposed personnel have to use an SPF 30 or higher sunscreen, before going outdoors on skin exposed;

- Provide adequate amount of water per worker (it suggested to drink about 0.5 liters of water before work commencement, drink 1 to 2 cups of water every 20 minutes, for a total of 4 to 8 liters per day or 1 liter per hour);
- Reduce metabolic heat production (heat produced by the body): automation and mechanization of tasks minimize the need for heavy physical work and the resulting build-up of body heat;
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing;
- Define regular breaks in cool, shaded areas;
- Continuous weather monitoring for informed work scheduling; and
- Worker training on recognizing and responding to heat-related illnesses.

In addition, an Emergency Preparedness and Response Plan should be developed by EPC Contractor and Project Operator which should include a section related to heat strokes.

20.6 Extreme Weather Events

Sand and Dust Storms

According to the Climate Risk Country Profile: Egypt (World Bank, 2021), future projections indicate that Egypt will experience an increase in the frequency and intensity of extreme weather events, including sand and dust storms. The intensity and occurrence of these storms, which are already common in Egyptian weather, are expected to escalate. Dust and sand storms are associated with various infectious diseases, such as influenza and pneumonia, as well as non-infectious diseases like asthma and pulmonary fibrosis, thereby posing significant respiratory health risks.

Given this context, Egypt is assessed to be at moderate risk from sand and dust storms, which could adversely affect the Project by impacting outdoor workers and laborers. Working in outdoor environments during such storms entails occupational health and safety risks for workers throughout the construction and operational phases. As previously mentioned, an Emergency Preparedness and Response Plan should be developed by the EPC Contractor and Project Operator, which must include a section specifically addressing dust and sand storms. This section should encompass the following measures:

- All outdoor activities shall be temporarily suspended during sand and dust storms
- All workers must avoid staying in open areas and locate nearest shelter and take safe refuge
- Disposable dust masks shall be distributed and worn by all personnel
- Depending on site conditions and expected forecast, all works onsite could be suspended.

Earthquakes

In the context of Aswan Governorate, the Think Hazard tool assesses earthquakes as a low-risk hazard, as illustrated in the figure below. The Think Hazard tool is a web-based platform designed to evaluate the potential impacts of disasters on new development projects, thereby assisting with project planning and design. This tool is developed and maintained by the Global Facility for Disaster Reduction and Recovery (GFDRR Labs) and has been integrated into the World Bank Operations Portal for essential use in project planning.

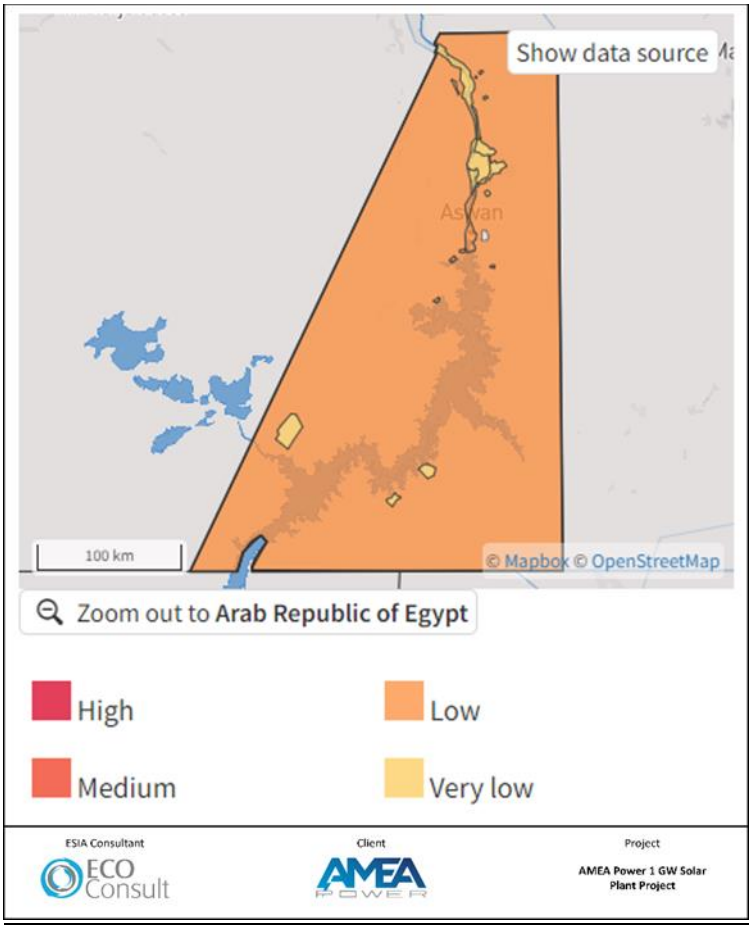

Figure 100: Earthquakes in Aswan Governorate

In addition, as required, detailed design of the Project will be considering seismic factors for the area that should be taken into account for design specifications. Taking the above into account, such risks are considered low and there are no further requirements to be considered.

Other

Other known natural disasters are not considered relevant for the Project area such as tsunamis, volcanos, and cyclones. In addition, other extreme weather events have been assessed in other sections – this includes heat waves, flood risks, and sea level rise.

20.7 Wildfires

A wildfire is defined as an unplanned, unwanted, and uncontrolled fire occurring in an area with combustible vegetation. As previously mentioned, the Project site and its surrounding region are classified as a desert-like habitat characterized by arid and barren conditions, featuring extremely limited vegetation coverage, primarily consisting of low shrubs that account for less than 1% of the total surface area.

In the context of Aswan Governorate, the Think Hazard tool assesses the risk of wildfires as a very low hazard level, as illustrated in the figure below. Think Hazard is a web-based tool designed to evaluate the impacts of disasters on new development projects, thereby assisting in project planning and design.

Developed and maintained by the Global Facility for Disaster Reduction and Recovery (GFDRR Labs), this tool has been integrated into the World Bank Operations Portal for core use in project planning.

Taking the above into account, such risks are considered low.

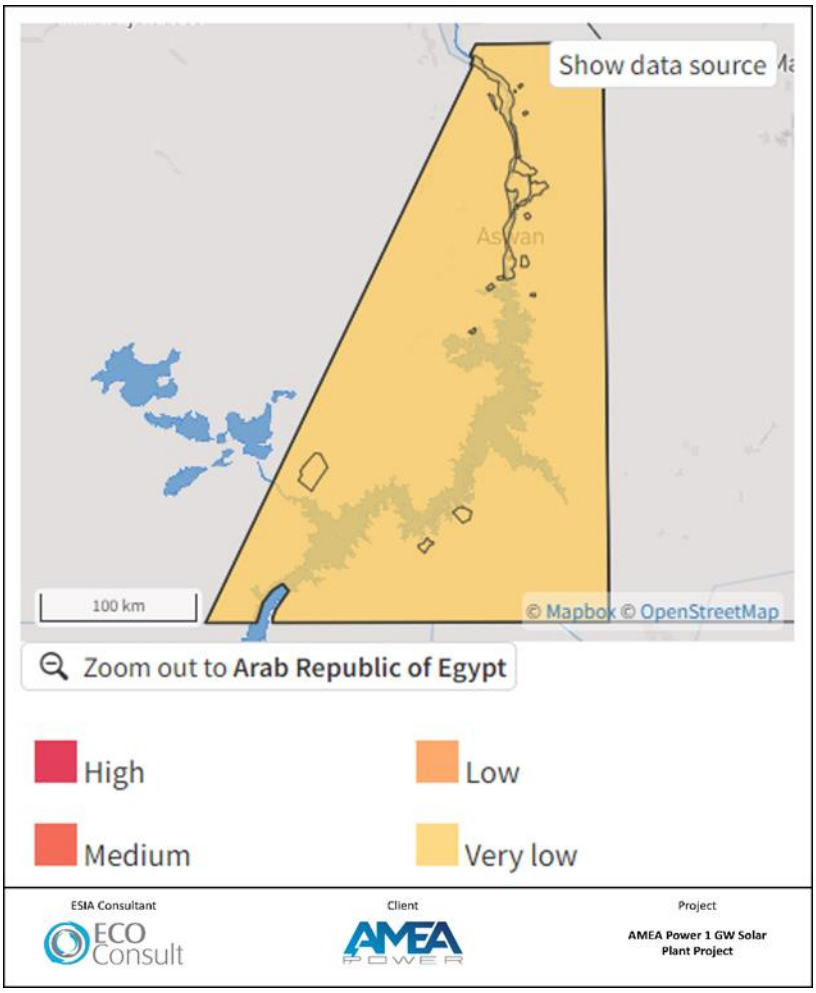

Figure 101: Hazard Level of a Wildfire in Aswan Governorate

20.8 Infectious Diseases

According to Egypt's Third National Communication Under the UNFCCC (EEAA, 2016), climate change may indirectly impact health by altering the ecological ranges and distribution of vector-borne diseases, waterborne pathogens, and air quality. A well-established body of evidence links climatic conditions with the prevalence of infectious diseases, and direct climate impacts on Egypt could increase the incidence of human parasitic diseases. Specifically, climate change is expected to affect the spread and prevalence of mosquito-borne, fly-borne, and snail-borne parasitic infections.

Egypt is vulnerable to vector-borne diseases such as malaria, lymphatic filariasis, dengue fever, and Rift Valley fever due to favorable climatic conditions and habitats for disease vectors, exacerbated by increasing climate events. For this Project, malaria and dengue fever are particularly relevant health concerns, as they are highly sensitive to climate fluctuations and are anticipated to worsen with ongoing climate change.

The Climate Risk Country Profile: Egypt (World Bank, 2021) further underscores those diseases like malaria, dengue fever, and respiratory infections are acutely responsive to climatic changes and are projected to increase across Egypt.

According to the Centers for Disease Control and Prevention (CDC), Egypt had eliminated malaria and the last *locally* transmitted case was in 1998. In addition, there have been no cases of malaria in Egypt since June 14, 2014. Between late May to mid-June, 19 locally-acquired *P. vivax* malaria cases were identified in one village of the Aswan Governorate in Egypt and it is believed that the *P. vivax* malaria came from Sudanese migrants[65].

Taking the above into account, Egypt is considered at a moderate risk from infectious diseases, which could adversely affect the Project. Key impact is mainly during the construction phase related to influx of 4,000 workers into the area which could increase the risk of spread of new reservoirs of infectious diseases which could also impact local communities. At this point it is still unclear how many of these workers will be expatriates, Egyptian and/or from local communities.

During operation, impacts are considered minimal given the low number of workers involved all of which are expected to be Egyptians. However, due to the period of operation, although considered of low risk, there could be specific risks related to infections disease outbreak such as malaria. Therefore, this should also be taken into account.

Nevertheless, as discussed in "Section 16.2.2" a worker influx plan should be prepared which takes into account the following:

- Medical examination program. All workers must be subject to a preliminary medical examination before commencement of any job tasks in accordance with local applicable requirements. In addition, routine medical examination for workers (bi-annually) must be undertaken. Such medical examinations must be undertaken at certified centers. Copies of medical examination results of all workers must be retained onsite.
- Details and procedures for ensuring and maintaining hygienic conditions onsite at all times specifically related to toilet and washing facilities, eating areas, etc.
- Induction training and awareness raising sessions on risks associated to the most common contagious diseases (e.g. influenza virus), communicable diseases, general measures for hygiene, code of conduct expected to be implemented and other as appropriate.
- Continuous monitoring with national health officials (e.g. Ministry of Health) and local authorities (e.g. Aswan Health Directorate) on updates on health situation within the Governorate in specific and Egypt in general (e.g. for any specific disease outbreaks and control measures to be implemented)
- Screening of expatriate workers for any potential infectious diseases (e.g. malaria)

It is recommended that a similar plan is also undertaken for the operation phase of the Project by the Project Operator.

[65] https://www.cdc.gov/malaria/new_info/2014/malariaegypt.htm

20.9 Water Scarcity and Drought

Based on "Water Saving in Irrigated Agriculture in Egypt" (Lambert, 2017), the current water supply in Egypt is as follows:

- The Nile River supplies about 93% of Egypt's annual renewable water resources and is Egypt 's main and almost exclusive resource of fresh water. A share of 55.5 billion cubic meters per year (BCM/year) is allocated to Egypt according to the Nile Water Agreement (1959). About 10 BCM/year is lost through evaporation from the Aswan High Dam reservoir (Lake Nasser).
- Groundwater resources: investigations indicate that about 1 BCM of groundwater can be used annually at an economic rate. However current abstraction is estimated to be 2.5 BCM/year. The main abstracts in utilizing this huge resource are the great depth (up to 15mm) of these aquifers and deteriorating water quality at the increasing depth
- The average annual amount of rainfall water that is effectively utilized (by harvesting flash floods mainly) is estimated to be around 1.0-1.5 BCM/year This amount cannot be considered a reliable source of water due to high spatial and temporal variability.

Water demand in Egypt is primarily driven by agriculture, followed by municipal water supply and industrial needs. As noted in Water Scarcity in Egypt: Growing Concerns, and Partnerships (UNICEF, 2023), Egypt faces an annual water deficit of approximately 7 billion cubic meters. To address this shortage, non-conventional water sources, including agricultural drainage, desalinated brackish groundwater or seawater, and treated municipal wastewater, are increasingly utilized. These resources support agriculture, landscaping, and industrial activities through specialized treatment processes. Currently, desalination is practiced on a small scale, primarily along the Red Sea coast.

Table 63: Water Balance of Egypt in 2022 (CAPMAS, 2023)

Water Resource	Volume (billion m3/year)
Nile Water	55.50
Deep Groundwater	2.50
Rainfall/flash floods	1.30
Desalination	0.38
Total fresh water resources	**59.68**
Surface Groundwater	6.33
Reuse of wastewater	15.36
Total reuse	21.69
Total (billion m3/year)	**81.37**

The table above highlights Egypt's heavy reliance on the Nile River as its primary water source, which supports potable water, agriculture, industry, and more. Consequently, Egypt's water availability and resource security are particularly vulnerable to the impacts of climate change on the Nile River.

However, the specific impacts of climate change on Nile River flow remain uncertain. Some studies suggest that global temperature increases could heighten evaporation rates within the Nile, leading to reduced water supply and exacerbating water scarcity. In contrast, other research indicates that heightened evaporation in Egypt may increase precipitation in the Ethiopian highlands (upstream), resulting in greater runoff and increased downstream Nile flows.

These divergent scenarios necessitate opposing adaptation strategies: one focused on flood control at the Aswan Dam, and the other on water scarcity and potential drought mitigation. This uncertainty is underscored in the Climate Risk Country Profile: Egypt (World Bank, 2021), which reports potential impacts

ranging from a 70% decrease in water availability due to evaporation to a 15%-25% increase in flows from elevated rainfall in the Ethiopian highlands and Blue Nile Basin.

Beyond climate change, the Nile River's water supply faces significant challenges from increased upstream water use, including developments such as Ethiopia's Grand Renaissance Dam on the Blue Nile tributary. Projections of rising temperatures due to climate change, combined with declining rainfall patterns (as further detailed below), are anticipated to heighten the risk and severity of water scarcity and drought across Egypt. These conditions are likely to drive increased water demand, compounded by additional factors like population growth.

Changes in rainfall and evaporation rates will impact other resources beyond the Nile, including (i) rainwater collection systems and (ii) surface water infiltration and groundwater recharge rates. This is expected to decrease the reliability of unimproved groundwater sources and surface water resources during droughts or extended dry periods.

The Climate Risk Country Profile: Egypt (World Bank, 2021) provides comprehensive rainfall data for Egypt, as examined in the following section. Historical rainfall data from the World Bank's Climate Change Knowledge Portal (CCKP) indicate that Egypt's mean annual precipitation is 33.3 mm, with the highest rainfall between December and February and very low precipitation throughout most of the year. The figure below illustrates the spatial distribution of observed average annual rainfall across Egypt.

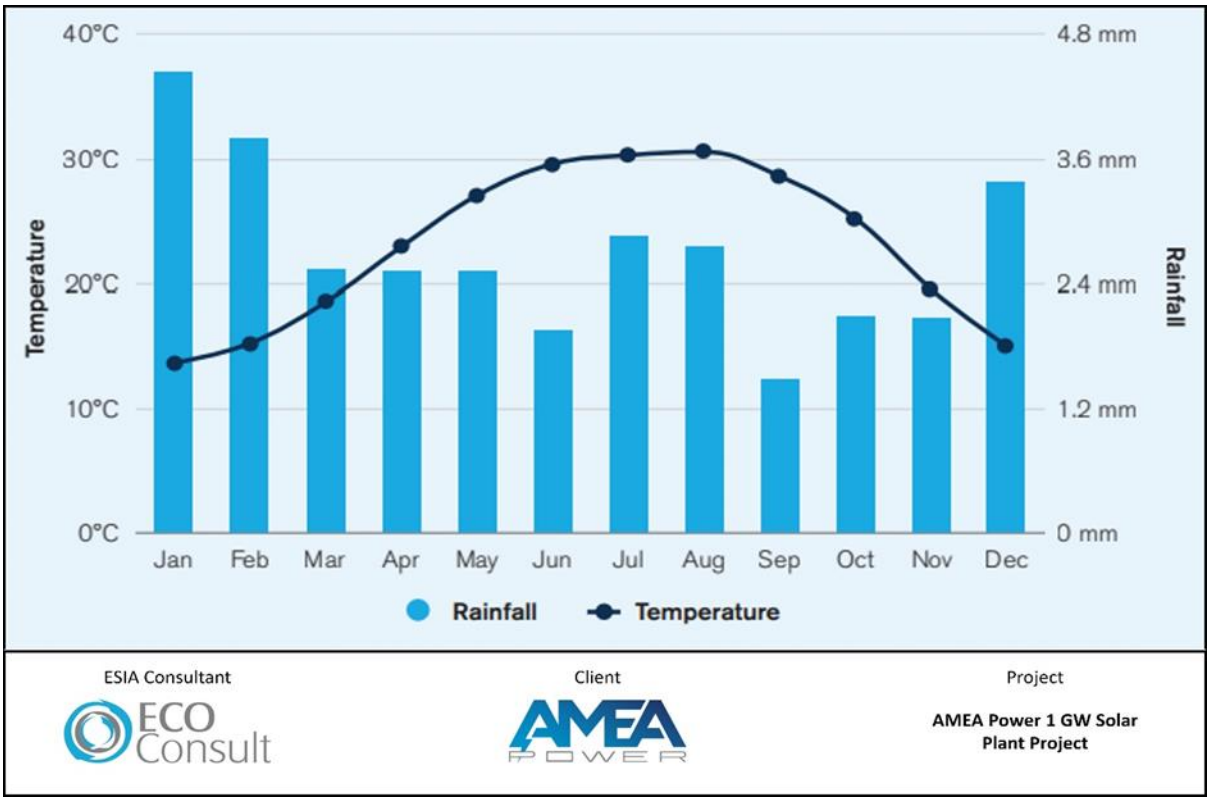

Figure 102: Average Monthly Rainfall and Temperature of Egypt for 1991-2019

According to the Climate Risk Country Profile: Egypt (World Bank, 2021), Egypt has experienced a statistically significant 22% reduction in annual total precipitation over the past 30 years, leading to decreased water availability in some regions and extended drought periods. Analysis from the German Climate Service Center (GERICS) global climate models (GCMs) indicates that this trend is expected to continue through the end of the century, with projections suggesting even longer dry spells—potentially

increasing by 75 days by the 2080s. Reduced precipitation, combined with higher temperatures, is anticipated to impact evaporation rates, water balance, and overall drought conditions. Annual precipitation is projected to decline by 0.5 mm between 2020-2023 and by 1.9 mm between 2040-2059 under the RCP 8.5 scenario (business-as-usual, assuming no climate mitigation measures), the operational period for the Solar PV project.

The Climate Risk Country Profile also presents projected values for the Standardized Precipitation Evapotranspiration Index (SPEI), a metric that measures water deficit by accounting for temperature-dependent evapotranspiration, providing insights into pressures on water resources. Negative SPEI values indicate dry conditions, with values below -2 representing severe drought, while positive values suggest increased wet conditions. This index is critical for assessing the quantity and quality of Egypt's water supply. Nationally, Egypt is projected to experience significantly heightened dry conditions and severe drought, especially in the central and northwestern regions by the 2050s and 2090s, respectively, intensifying the water stress across the country.

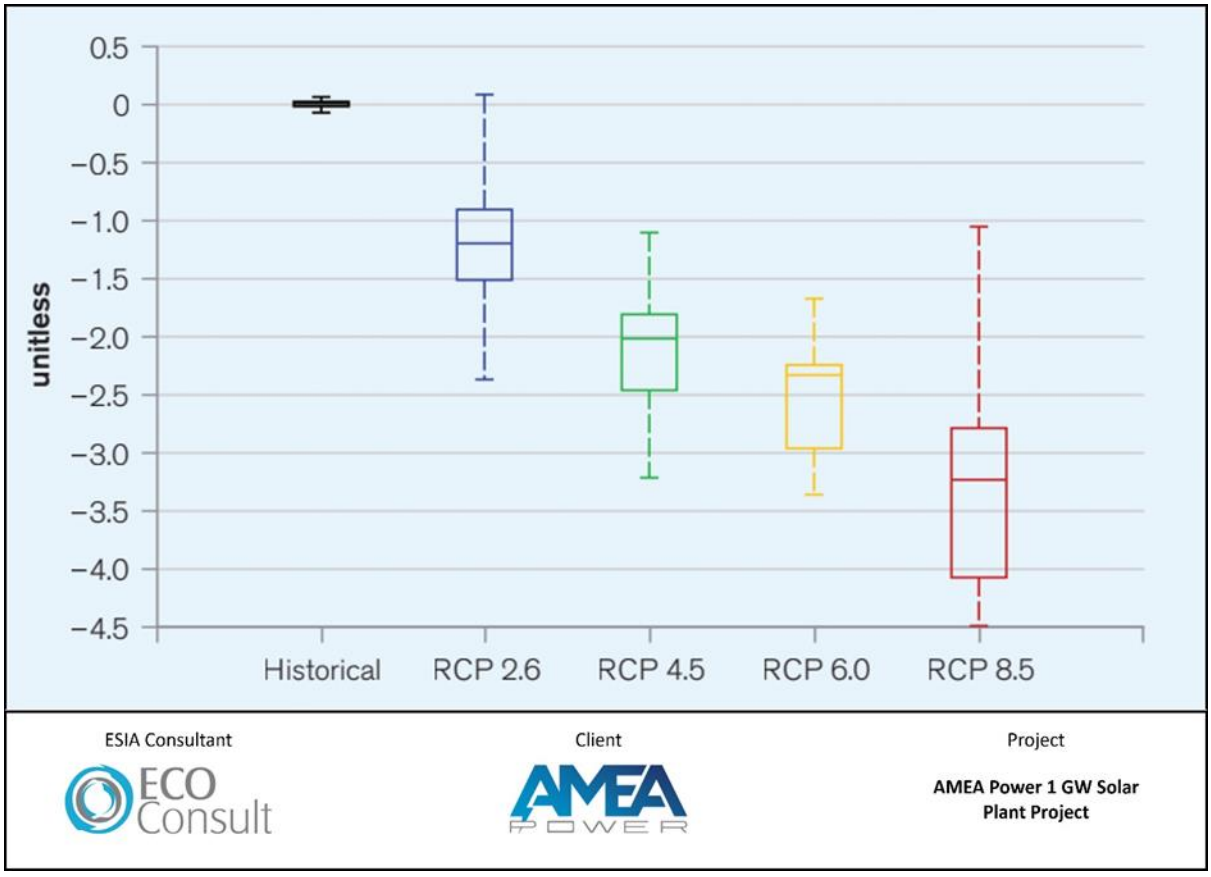

Figure 103: Annual SPEI Drought Index in Egypt for the Period 1986-2099

In summary, the following deductions have been reached:

- Egypt's heavy reliance on the Nile River as a primary water resource makes it highly vulnerable to climate change impacts on this resource and its availability. However, climate change impacts on Nile River flow remain uncertain at this stage.
- Beyond the Nile, climate-induced changes in rainfall and evaporation rates will also impact rainwater collection systems and groundwater abstractions, potentially decreasing the reliability of groundwater and surface water sources, especially during droughts or extended dry seasons.

- Projections indicating rising temperatures and declining rainfall rates due to climate change are expected to heighten water scarcity risks and intensify drought conditions across Egypt.
- Egypt is currently exceeding its sustainable water resource capacity, making it essential to explore additional water sources and efficiency measures, independent of climate change impacts. This necessity is further underscored by potential water use increases from upstream countries.

The Climate Risk Country Profile: Egypt (World Bank, 2021) recommends that Egypt consider adaptation measures, which include:

- Diplomatic engagement and agreements with Nile Basin countries, including Ethiopia, Sudan, and Uganda, to facilitate collaborative and sustainable Nile River resource management.
- Adoption and implementation of national adaptation strategies. Egypt has already taken steps to enhance water resource management, as outlined in the Egypt's Third National Communication under the UNFCCC (EEAA, 2016).
    - Water conservation measures for agriculture, industry and municipal supplies,
    - Upgrading water quality and sanitation to minimize pollution,
    - Constructing new infrastructure for water collection in flash flood areas, water desalination, and increasing storage of drainage and fresh water in coastal lakes,
    - Improving public awareness campaign on water scarcity and water shortage.
    - Cooperating with Nile Basin countries to reduce water evaporation and safeguard river flows
    - Improve rain harvesting techniques
    - Increase abstraction of groundwater both fresh and brackish
    - Improve recycling techniques of treated sewage and industrial effluent, desalination and improved water conveyance.

The Arab Republic of Egypt's Intended Nationally Determined Contribution (NDC) under the UNFCCC underscores the nation's recognition of the significant challenges posed by climate change and its commitment to enhancing the sustainable management of its water resources. The report outlines various actions aimed at promoting resilience, which align with previously mentioned strategies, including:

- Increasing water storage capacity
- Improving irrigation and drainage systems
- Modifying cropping patterns and farm irrigation techniques
- Reducing surface water evaporation through the redesign of canal cross-sections
- Developing new water resources through projects in the upper Nile region
- Implementing rainwater harvesting initiatives
- Expanding desalination efforts
- Recycling treated wastewater

- Enhancing the utilization of deep groundwater reservoirs
- Raising public awareness regarding the need to rationalize water use
- Strengthening precipitation measurement networks in the upstream countries of the Nile Basin, promoting data exchange among Nile Basin nations, and developing circulation models to forecast the impact of climate change on local and regional water resources
- Maintaining water levels in Lake Nasser

As evident from the above, the Government of Egypt is aware of such key challenges and is undertaking ongoing efforts to adopt and implement water resilience strategies for water management at the national level, that will include water supply and water demand. The Government of Egypt is working on this through various national and regional entities such as the Ministry of Water Resources and Irrigation (MWRI), water companies, and other. Therefore, the above will directly and indirectly include Aswan Governorate as well.

However, within the Project context, this underlines the importance of emphasizing water conservation and water efficiency. As discussed within "Section 14.2.1", the ESIA requires the following:

- Coordinate with Aswan Water and Wastewater Company to security the water requirements of the Project given that this is the official entity responsible for water supply in Aswan Governorate. As discussed, water supply will most likely be through tankers whom in turn will source the water from the Nile River.
- Develop a water management plan for the construction and operation phase. The plan should emphasize on water conservation and efficiency such as the following in particular:
  - Utilizing the dry-cleaning method for the PV panel cleaning mechanism.
  - Utilizing water saving fittings where applicable (taps, urinals, toilets, trigger guns, etc.)
  - Consider utilizing treated wastewater/grey water for dust suppression and any irrigation requirements as applicable.

21. ASSESSMENT OF CUMULATIVE IMPACTS

A standalone Rapid Cumulative Impact Assessment (RCIA) is being developed in accordance with the "Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emergency Markets (IFC, 2013). Please refer to Annex II.

22. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

This section presents the Environmental and Social Management Plan (ESMP) for the various Project phases and the overall requirements for the Environmental, Social, Health and Safety (ESHS) Management System (MS).

22.1 Institutional Framework and Procedure Arrangements

Generally, two main pillars govern the successful implementation of any Environmental and Social Management Plan (ESMP) as well as the Environmental and Social Management Systtem (ESMS) for the project that will be developed at a later stage (as discussed in further details in below). These pillars include:

- Proper identification of roles and responsibilities for the entities involved; and
- Effective control of the process.

All management practices are interlinked, and this section describes how these two pillar criteria could be fulfilled, which in turn helps ensure that the overall objectives are met.

A standalone ESMS Manuel has been prepared and submitted that identified detailed requirements for institutional requirements and procedural arrangements. A summary is provided below but please refer to the ESMS Manuel for additional details.

Staffing Requirements

Defining roles and responsibilities of the involved entities identifies where and when each entity should be engaged, their degree of involvement, and the tasks expected of the entity. This in turn eliminates any overlap of jurisdiction or authority and ensures proper communication and effective management of ESMP and ESMS components.

The table below identifies the staffing requirements that are expected for the Project. This should be expanded further in the ESHS Manual that is required as part of the ESMS (as discussed in further details below). This should include an organizational structure that identifies the lines of authority and roles and responsibilities of all involved entities.

Table 64: Roles and Responsibilities of Entities Involved in ESMP

Project Role	Entity	Responsibilities	Staffing Requirements
Project Owner and Developer	AMEA Power	▪ Selection of EPC Contractor and Project Operator; ▪ Implement mitigation and monitoring requirements as applicable for such entity as detailed in the ESMP; and ▪ Ensure overall compliance of EPC Contractor and Project Operator with the requirements of the ESMP and ESMS.	Appoint competent HSE Manager and HSE Site Officer. Manager should have the overall EHS responsibility of the project and interface with senior management of EPC, while supervisor will have on-site responsibilities to ensure full implementation of project and Developer standards and provisions. This is required during the construction phase, whereas during the operation phase there will be 1 HSE Manager. Appoint a Social Specialist for construction and operation phase. Appoint Community Liaison Officer (CLO) for construction and operation phase.
EPC Contractor	TBD	▪ Appoint a competent onsite HSE team. ▪ Implement mitigation and monitoring requirements as detailed in the ESMP and ESMS requirements including development of CIP (under assistance of the Developer) ▪ Prepare and implement a project-specific ESHS management system for the construction	For Project nature and duration, this is expected to include at a minimum full-time and onsite HSE Manager, 1 HSE officer per 100 workers, and 1 social specialist.
Project Operator	TBD	▪ Appoint a competent onsite HSE manager. ▪ Implement mitigation and monitoring requirements as detailed in the ESMP and ESMS requirements including development of CIP (under assistance of the Developer) ▪ Prepare and implement an operational project-specific ESHS management system	▪ Appoint 1 full time HSE manger onsite.
EEAA	Granting environmental clearance to the Project	Undertake compliance monitoring	N/A

Training and Awareness

An ESHS training plan must be developed and maintained onsite which identifies the type of training that is required for each worker onsite. The plan will ensure that each worker is competent in relation to the tasks to be performed. In addition, signed attendance sheets and training material must be maintained onsite at all times. This should be completed by the EPC Contractor and Project Operator as applicable.

Training should include the following as applicable and as highlighted in the table that follows.

Training	EPC Contractor	Project Operator
Basic visitor HSE induction training	✓	✓
Worker HSE induction training	✓	✓
Emergency response training	✓	✓
Specialized training	✓	✓
Tool Box Talks (TBT)	✓	✓

Inspection and Monitoring

ESHS inspection and monitoring must be undertaken to ensure compliance of involved entities with the mitigation and monitoring requirements as detailed in the ESMP and ESMS requirements. This should be completed by the Developer, EPC Contractor, and Project Operator as applicable.

Inspection and monitoring should include the following as applicable and as highlighted in the table that follows.

- Daily HSE inspection and monitoring at the site and preparation of a daily observation report stating therein the corrective measures on observed safety deficiencies, unsafe acts and conditions.
- Weekly site inspections to be carried out using the weekly site inspection checklists template based on requirements of the ESMP and ESMS
- HSE Audits to be undertaken by EPC Contractor as well as HSE Audits to be undertaken by Developer on EPC Contractor to ensure compliance with ESMP requirement and ESMS. HSE audits should be undertaken monthly during the construction phase and quarterly during the operation phase
- ESHS and Labor & Working conditions Audits to be undertaken by Developer on EPC Contractor to ensure compliance with ESMP requirement and ESMS. ESHS and labor/working conditions audits should be undertaken quarterly during the construction phase and annually during the operation phase.

Inspection and Monitoring	Developer	EPC Contractor	Project Operator
Daily HSE Inspection and Monitoring		✓	
Weekly Site Inspections		✓	✓
Monthly/Quarterly HSE Audits	✓		
Monthly/Quarterly Labor/HR Audits	✓	✓	

Meetings

Regular ESHS meetings must be undertaken to discuss ESHS performance onsite, outstanding issues, key issues of concern and other as applicable. Signed attendance sheets and Minutes of Meeting (MoM) must

be maintained onsite at all times. This should be completed by the Developer, EPC Contractor, and Project Operator as applicable.

Meetings should include the following as applicable and as highlighted in the table that follows.

- Weekly HSE meetings
- Monthly HSE meeting
- Quarterly management HSE reviews

Meetings	Developer	EPC Contractor	Project Operator
Weekly HSE Meetings	✓	✓	
Monthly HSE Meeting	✓	✓	✓
Quarterly Management HSE reviews	✓	✓	✓

Reporting

ESHS reporting will be required to summarize the following:

- Progress in implementing the ESMP and ESMS plans as required;
- Findings of the monitoring programs, with emphasis on any breaches of the control standards, action levels or standards of general site management;
- Outstanding incident report forms;
- Relevant changes or possible changes in legislation, regulations and international practices;
- Reporting on Key Performance Indicators (KPI);
- Grievances (worker and stakeholder); and
- Security incidents.

Reporting should be submitted to the Developer as applicable by the relevant entities as identified below.

Reporting	EPC Contractor	Project Operator
Reporting	Weekly	Semi-annually

22.2 Environmental and Social Management Systems (ESMS)

The ESIA is considered a key document in assessing and managing environmental and social risks related to the Project. The key output of the ESIA is the ESMP which aims to provide high level mitigations and requirements for managing the environmental and social risks anticipated from the Project.

Throughout the Project's construction and operation phase an Environmental and Social Management System (ESMS) must be implemented by all relevant parties (i.e. Developer, EPC Contractor and Project Operator). The ESMS must be project and site specific and must build on and take into account the requirements of the ESMP presented throughout this document.

Summarized below is the overall framework, structure and key requirements for the ESMS for the key entities involved in the Project.

Developer

- ESIA including ESMP
- ESMS Manual that should include: (i) ESMS Policy; (ii) Human Resources Policy and Procedures; (iii) ESMS Organizational Structure and Responsibilities; (iv) ESMS Monitoring and Reporting Requirements; (v) ESMS Meeting Requirements; (Vi) ESMS Training Requirements.
- Stakeholder Engagement Plan (SEP) including stakeholder grievance mechanism;
- Contractor and Supply Chain Management Plan.

EPC Contractor

Main Documents:

- ESMS Manual
- QHSE Policies
- Legal Register (Regulatory Framework)
- Permits Register

Quality:

- ISO Certifications
- Quality Management Plan
- Contractor and Supply Chain Management Plan
- Document Control Plan
- Communication Plan
- Project Management Plan
- Organization Chart (HSSE staff Project Specific)

Health and Safety:

- Site Mobilization Plan
- Occupational Health & Safety Management Plan
- Emergency Preparedness and Response Plan
- Hazardous Material Management Plan
- Community H&S and worker influx plan
- Traffic and Transportation Management Plan
- Training Management Plan

- Fire Safety Management Plan

Environmental:

- Noise Management Plan
- Air Quality and Dust Management Plan
- Soil and Groundwater Management Plan
- Water Management Plan
- Waste and Wastewater Management Plan
- Biodiversity Management Plan

Social:

- Labor and Working Conditions Management Plan
- Gender Equality Plan
- Gender-Based Violence and Harassment Management Plan
- Employment and Procurement Management Plan
- Worker Grievance Mechanism
- Community Grievance Mechanism
- GBVH and Modern Slavery Grievance Mechanism
- Accommodation Management Plan
- Employment and Procurement Management Plan
- Workers Demobilization Management Plan
- Archaeological Chance Find and Cultural Heritage Procedure

Security:

- Security Management Plan

Project Operator

Main Documents:

- ESMS Manual
- QHSE Policies
- Legal Register (Regulatory Framework)
- Permits Register

Quality:

- ISO Certifications
- Quality Management Plan
- Contractor and Supply Chain Management Plan
- Document Control Plan
- Communication Plan
- Project Management Plan
- Organization Chart (HSSE staff Project Specific)

Health and Safety:

- Site Mobilization Plan
- Occupational Health & Safety Management Plan
- Emergency Preparedness and Response Plan
- Hazardous Material Management Plan
- Community H&S and worker influx plan
- Traffic and Transportation Management Plan
- Training Management Plan
- Fire Safety Management Plan

Environmental:

- Noise Management Plan
- Air Quality and Dust Management Plan
- Soil and Groundwater Management Plan
- Water Management Plan
- Waste and Wastewater Management Plan
- Biodiversity Management Plan

Social:

- Labor and Working Conditions Management Plan
- Gender Equality Plan
- Gender-Based Violence and Harassment Management Plan
- Employment and Procurement Management Plan

- Worker Grievance Mechanism
- Community Grievance Mechanism
- GBVH and Modern Slavery Grievance Mechanism
- Accommodation Management Plan
- Employment and Procurement Management Plan
- Workers Demobilization Management Plan
- Archaeological Chance Find and Cultural Heritage Procedure

Security:

- Security Management Plan

22.3 Compilation of the Framework Environmental and Social Management Plan (ESMP)

The tables below present the ESMP for the: (i) planning and construction, and (ii) operation phase respectively and which include the following:

- The E&S attribute (e.g. air quality) that is likely to be impacted;
- A summary of the potential E&S impact and/or likely issue;
- The identified management measures that aim to eliminate and/or reduce the potential impact to acceptable levels. Management measures include mitigation actions, further requirements, additional studies, etc.;
- Monitoring actions to ensure that the identified mitigation measures are implemented. Monitoring actions include inspections, review of reports/plans, reporting, etc.;
- The frequency for implementing the monitoring actions, which include once, continuously throughout the construction/operation period (depending on the mitigation measure identified this could include daily, weekly, or monthly), or upon occurrence of a certain issue;
- Parameters and location of monitoring actions as identified and applicable; and
- Responsible entity for implementing the mitigation measures and monitoring actions identified.

Table 65: ESMP for the Planning and Construction Phase

Environmental Attribute	Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
Landscape and Visual	Visual and landscape impacts due to presence of elements typical of a construction site such as equipment and machinery.	Ensure proper general housekeeping and personnel management measures are implemented which could include: (i) ensure the construction site is left in an orderly state at the end of each work day, (ii) to the greatest extent possible construction machinery, equipment, and vehicles not in use should be removed in a timely manner, (iii) ensure proper storage, collection, and disposal of waste streams generated.	Mitigation	Inspection	Continuous	EPC Contractor
Geology, Hydrology and Hydrogeology	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities, spillage of hazardous material, random discharge of waste and wastewater.	Coordinate with Aswan Solid Waste Management Department or hire a competent private contractor for the collection of solid waste from the site to the approved disposal facility.	Mitigation	Review contract with contractor	Once; before construction commences	EPC Contractor
		Prohibit fly-dumping of any solid waste to the land	Mitigation	Inspection	Continuous	
		Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste"	Mitigation	Inspection	Continuous	
		Distribute an appropriate number of properly contained containers clearly marked as "Construction Waste" for the dumping and disposal of construction waste.	Mitigation	Inspection	Continuous	
		Undertake recycling measures onsite in the following approach: (i) separation and disposal of wood pallets in a separate container (relatively large quantities are expected), (ii) separation and disposal of other recyclables in a separate container (cardboard, paper, glass, metal, etc.); and (iii) separation and disposal of non-recyclable materials in a separate container (e.g. food waste).	Mitigation	Inspection	Continuous	
		Implement proper housekeeping practices on the construction site at all times	Mitigation	Inspection	Continuous	
		Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill. The numbers within the records are to be consistent to ensure no illegal dumping at the site or other areas.	Mitigation	Review of manifests to ensure consistency	Continuous	
				Undertake audit to ensure disposal as designated site	Continuous	Developer
		Coordinate with NAWWCo to hire a private contractor for the collection of wastewater from the site to the closest WWTP (being New Aswan City WWTP).	Mitigation	Review contract with contractor	Once; before construction commences	EPC Contractor
		Prohibit illegal disposal of wastewater to the land	Mitigation	Inspection	Continuous	
		Ensure that collection tanks during construction and those to be used during operation are well contained and impermeable to prevent leakage of wastewater into soil.	Mitigation	Inspection	Once; before construction commences	
		Ensure that collection tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing.	Mitigation	Inspection	Continuous	
		Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas.	Mitigation	Review manifests to ensure consistency	Continuous	
				Undertake audit to ensure disposal as designated site	Continuous	Developer
		Coordinate with and hire a private contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities.	Mitigation	Review contact with contractor	Once; before construction commences	EPC Contractor
		Ensure that hazardous waste is disposed in a dedicated area that is enclosed, of hard surface, with proper signage and suitable containers as per hazardous waste classifications and that they are labelled for each type of hazardous waste. The area should be properly ventilated due to the intense heat which could increase evaporation of chemicals that could make the ambient air of the storage potentially toxic and, in some cases, explosive.	Mitigation	Inspection	Continuous	
		Ensure hazardous waste storage area is equipped with spill kit, fire extinguisher and anti-spillage trays and a hazardous waste inventory is available	Mitigation	Inspection	Continuous	
		Prohibit illegal disposal of hazardous waste to the land.	Mitigation	Inspection	Continuous	

		Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste	Mitigation	Inspection	Continuous	
		Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing.	Mitigation	Inspection	Continuous	
		Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous Facility.	Mitigation	Review manifests to ensure consistency	Continuous	
		Ensure that hazardous materials are stored in proper areas and in a location where they cannot reach the land in case of accidental spillage. This includes storage facilities that are of hard impermeable surface, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another as per Material Safety Data Sheet (MSDS)	Mitigation	Inspection	Continuous	
		Maintain a register of all hazardous materials used and accompanying Material Safety Data Sheet (MSDS) must present at all times. Spilled material should be tracked and accounted for.	Mitigation	Inspection	Continuous	
		Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.).	Mitigation	Inspection	Continuous	
		Regular maintenance of all equipment and machinery used onsite. Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refueling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material.	Mitigation	Inspection	Continuous	
		Ensure that a minimum of 1,000 Liters of general-purpose spill absorbent is available at hazardous material storage facility. Appropriate absorbents include zeolite, clay, peat and other products manufactured for this purpose.	Mitigation	Inspection	Continuous	
		If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste.	Mitigation	Inspection	Continuous	
				Reporting of incident and measures taken to minimize impact	Upon occurrence	
	Construction activities could disturb soil, and result in erosion and runoff which could result in siltation of surface water	Avoid executing excavation works under aggressive weather conditions.	Mitigation	Inspection	Continuous	
		Place clear markers indicating stockpiling area of excavated materials to restrict equipment and personnel movement.	Mitigation	Inspection	Continuous	
		Erect erosion control barriers around work site during site preparation and construction to prevent silt runoff where applicable.	Mitigation	Inspection	Continuous	
		Return surfaces disturbed during construction to their original (or better) condition to the greatest extent possible.	Mitigation	Inspection	Continuous	
Biodiversity	Construction activities could disturb existing habitats (flora, fauna, avi-fauna) and any threatened or endangered species which might be present within the Project site. In addition, other impacts could be from improper management of the site (e.g. improper conduct and housekeeping practices).	Developer should consider to the extent possible, the following: (i) Option 1: altering site boundary to avoid the regionally endemic species (Hyoscyamus boveanus). Those are located in very small patches and within the northern parts of the Project site; (ii) Option 2: if this is not a viable option, then avoiding through design the areas of the endemic species should be considered. Under both Option 1 and 2 appropriate buffer distance should be considered appropriate fencing should be established with an appropriate buffer to ensure they are not impacted by dust or other construction activities; and (ii) proper induction training workers to emphasize importance of these plants and ensure they avoid them at all time; (iii) Option 3: if both options above are considered not viable, then the Developer should undertake seed collection from existing specimens of Hyoscyamus boveanus at the appropriate time of year (October-December) form micropropagation of existing specimens within the Project site upon completion of construction activities. Any seeds which are collected must be stored in appropriate conditions and any specimens collected for micropropagation should be managed and maintained by appropriately experienced botanists. Note: seed collection is currently being undertaken by an experienced botanist to account for a worst-case scenario in case Option 1 and 2 cannot be considered, in order not to miss the seeding period (October to December).	Mitigation	Submission of final detailed design demonstrating avoidance of regionally endemic species (Option 1 and 2 earlier). If this option is not possible, submission of seed collection, micropropagation and translocation report once completed. In addition, undertake monthly monitoring of translocated Hyoscyamus boveanus plants	Once; before commencement of construction activities	Developer

		Implement proper management measures to prevent damage to the biodiversity of the site. This could include establishing a proper code of conduct and awareness raising / training of personnel (e.g. with respect to prohibiting hunting) and good housekeeping (e.g. keeping the site orderly and clean).	Mitigation	Inspection	Continuous	EPC Contractor
		Avoid unnecessary elevated noise levels at all times.	Mitigation	Inspection	Continuous	EPC Contractor
		Limit disturbance of topsoil and during excavations, separate topsoil and subsoil and reinstate in correct order, this will allow there to be negligible net loss of habitat as a result of the development.	Mitigation	Inspection	Continuous	EPC Contractor
		Preventing the introduction, movement and spread of invasive species on and off the construction site, for example through cleaning vehicles before they enter the site.	Mitigation	Inspection	Continuous	EPC Contractor
Archaeology	Construction activities could damage/disturb potential archaeological remains, as well as potential archaeological remains which could be buried in the ground (if any).	Implement chance find procedures for potential unearthing of any archaeological sites during construction. This includes: (i) consulting with Ministry to determine if an expert should be present during excavation; (ii) in case remains are discovered activities must be halted area must be fenced and proper signage installed; (iii) immediately notify Ministry through formal communication; (iv) announce through appropriate channels to all construction staff that such a site has been discovered and prohibit collection of any remains or disturbance to the site; (v) no additional work will be allowed before the Ministry assesses the found potential archaeological site and grants a clearance to resume the work; and (vi) ensure induction training that will be implemented for all employees includes a module on chance find procedure requirements .	Mitigation	Report submitted to Ministry with measures implemented for formal communications undertaken	Upon Occurrence	EPC Contractor
				Submission of induction training records	Once; before construction commences	
Infrastructure and Utilities	Water requirements – water requirements of the Project could entail constraints on existing users	Coordinate with Aswan Water and Wastewater Company to determine the most feasible and practical approach for securing the water requirements of the Project. In the case a well is to be used (although unlikely) a permit is required and, in the case, tankers are to be used, list of authorized water tankers should be obtained.	Additional Requirement	Submit proof for coordination with authorities	Once; before construction commences	EPC Contractor
		Document water consumption of the Project		Submit monthly report	Continuous	
		If Project utilizes a local water well, a baseline analysis should be undertaken that indicates the water level, production capacity and water quality of the groundwater and nearby wells within the area.	Additional Requirement	Submit report	Once; before construction commences	Developer / EPC Contractor
	Waste utilities – it is important to ensure that existing utilities would be able to handle the amount solid waste, wastewater and hazardous waste	Coordinate with the Aswan Solid Waste Management Department, National Aswan Water and Wastewater Company and Environmental Affairs Department for disposal of solid waste, wastewater and hazardous waste respectively.	Additional Requirement	Submit proof of coordination with authorities	Once; before construction commences	EPC Contractor
	Road Networks-transportation activities required for the Project could affect existing road networks and traffic flows as well as existing users	Obtain an approval on the traffic management requirements onsite as identified by GARBLT related to entrance/exit of the Project site.	Additional requirement	Submit GARBLT approval	Once; before construction commences	Developer
		Develop a Traffic and Transport Plan before commencement of any transportation activities to ensure that the transportation process is properly and adequately managed and does not pose a risk of damage to the existing roads or existing users on the road. Plan to include but not limited to: (i) identify the traffic requirements of the Project; (ii) identify types of vehicles to be utilized; (iii) identify procedures for onsite management of traffic; (iv) identify requirements to be adhered to and enforced on all haulage suppliers; (v) identify a code of conduct to be adhered to and enforced on all drivers in the Project ; (vi) identify speed limits onsite and identification of all traffic signage requirement onsite; (vii) identify a procedure for management of onsite/offsite traffic accidents; (viii) identify if any abnormal loads are required and obtain permits to carry these loads on highways from GARBLT accordingly	Additional Study	Regular (daily) visual monitoring of speeds and density of project traffic	Daily	EPC Contractor
				Ongoing monitoring of delivery vehicle tracking data	Continuous	
				Maintaining vehicle inspection / maintenance log	Continuous	
				Recording and documenting of any incidents of non-compliance with plan	Upon occurrence	

	Improper management of construction activities could damage or disturb the various nearby infrastructure and utility elements (electricity line, gas pipeline and telecom tower).	Implement proper management measures to prevent damage or disturbance of nearby infrastructure and utility elements. This could include establishing a proper code of conduct and awareness raising / training of personnel to: (i) emphasize the presence of nearby infrastructure and utility elements; (ii) restricting activities to allocated construction areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances	Mitigation	Inspection	Continuous	
Air Quality and Noise	Construction activities will likely result in an increased level of dust and particulate matter emissions which in turn will directly impact ambient air quality.	If dust or pollutant emissions were found to be excessive, noise intensive construction activities should be stopped until the source of such emissions have been identified and adequate control measures are implemented	Mitigation	Undertake dust monitoring for TSP and PM10 in order to maintain dust levels within allowable limits. This will include at least two monitoring points.	Quarterly	EPC Contractor
				Reporting of any excessive levels of pollutants and measures taken to minimize impact	Upon occurrence	
		Comply with the (OSHA) requirements and the Egyptian Codes to ensure that for activities associated with high dust levels, workers are equipped with proper Personal Protective Equipment.	Mitigation	Inspection	Continuous	
		Apply basic dust control and suppression measures which could include: (i) regular watering of all active construction areas, (ii) proper planning of dust causing activities, (iii) proper management of stockpiles and excavated, (iv) proper covering of trucks transporting aggregates and fine materials, and (v) adhering to a speed limit of 15km/h for trucks on the construction site.	Mitigation	Inspection	Continuous	
		Develop a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment to be used throughout the construction phase for early detection of issue to avoid unnecessary pollutant emissions.	Mitigation	Inspection	Continuous	
	Possible noise emissions to the environment from the construction activities which will likely include the use of machinery and equipment such as generators, hammers and compressors and other activities.	Undertake noise monitoring on a quarterly basis to verify levels and to define and implement on a case-by-case basis measures and systems in order to maintain noise levels within allowable limits. This will include at least one monitoring points which represent activities undertaken. If noise levels were found to be excessive due to construction activities (i.e. higher than allowable limits specified within Egyptian legislations or IFC standards as included within the General EHS Guidelines, whichever is more stringent), the source of such exceedances should be identified and adequate control measures must be implemented	Mitigation	Reporting of any excessive levels of pollutants and measures taken to minimize impact	Quarterly	
		Comply with the (OSHA) requirements and the Egyptian Codes to ensure that for activities associated with high noise levels, workers are equipped with proper Personal Protective Equipment.	Mitigation	Inspection	Continuous	
		Apply adequate general noise suppressing measures which could include: (i) use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery, (ii) developing a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.	Mitigation	Inspection	Continuous	

Socio-economic	The Project is expected to provide job opportunities for local communities. This could contribute to enhancing the living environment for its inhabitants and bring social economic prosperity to the local community.	Project Updates to local communities in accordance with identified measures in the SEP which also includes measures related to management of local stakeholder expectations on jobs during the construction phase. This should include the following in particular: (1) Undertake continuous and ongoing consultations (at least monthly) with local communities to: (i) manage expectations on employment and procurement opportunities for the Project; (ii) emphasize that job opportunities for this Project are huge and will be met throughout various entities that will include local communities but possibly other districts and Governorates as well; (iii) provides updates on Project implementation and overall schedule; and (iv) other as appropriate. (2) Provide updates on implementation of the local recruitment and procurement procedure to date (e.g. number of locals employed to date from each village as appropriate); (3) As required by the local communities all communication / updates to the local communities should be provided through the following channels in particular: (i) notifications via key local platforms in Aswan, to include but not limited to Local Unit Offices, mosques, commercial areas, CBOs, other local governmental entities; (ii) key Facebook pages related to the Aswan Governorate and Al Raqaba Local Unity (e.g. Sheikh Fadl Local Community Development Association); (iii) public announcements through the Mayor of Al Raqaba Local Unit.	Recommendation	Regular Reporting of outcomes of Plan implementation	Continuous	EPC Contractor (under supervision of the Developer)
		Adopt and implement a Local Employment and Recruitment Procedure the procedure must identify the following: (i) number of job and procurement opportunities targeted for local communities to include skilled and unskilled workers, (ii) details on how job and procurement opportunities will be announced; (iii) a selection process that is fair and transparent and provides equal opportunities for all including females; and (iv) order of priority with respect to employment and procurement subject to availability of qualifications and skills.	Recommendation	Submission of Local Employment and Recruitment Procedure	Once; before commencement of construction	
			Recommendation	Submission of local community employment and procurement register by area/district/region along with evidence for announcements and selection process.	Monthly	
		Implementing a Community Development Plan which aims to benefit the local communities to the greatest extent possible. It is recommended that a structured approach is developed for such a program that takes into account the community's needs and priority development projects which could benefit local communities (which logically should also take into account other factors such as allocated budget by the Developer, timeline for implementation of such projects, etc.)	Recommendation	Submission of community development plan	Once; during 1st year quarter of construction	
			Recommendation	Submission of community development plan update report	Annually	
		Stakeholder grievance mechanism should be implemented in relation to implementation of the requirements of the Stakeholder Engagement Plan (SEP) and the Local Employment and Recruitment Procedure. Any grievances submitted should be handled fully in accordance with the mechanism that is included within the SEP. Please refer to the SEP for additional details.	Mitigation	Submission of stakeholder grievance log sheet Submission of grievance close-out forms	Monthly	
		Conducting periodical assessments and monitoring in indirect impacts on social dynamics of the Nubian families among the construction period.	Recommendation	Regular reporting on indirect impacts on Nubian Communities	Semi-annual	Developer
Worker Welfare, Health and Safety	There will be some generic risks to workers health and safety form working on construction sites, as it increases the risk of injury or death due to accidents.	Prepare an Occupational Health and Safety Plan and adopt and implement its recommendations/provisions of the Occupational Health and Safety Plan.	Mitigation	Visual inspections and investigation on electrical safety, confined spaces, crane operation, excavations, welding and cutting, concreting, PPE use, training and tool box talks, etc.	Daily/weekly	EPC Contractor

				Reporting on: (i) number of near misses; (ii) number of injuries; (iii) number of medical evacuations; (iv) number of working condition complaints; (v) lost working hours; (vi) number of working days since the last accident; (vii) number of HS audit/inspections; (viii) number of HS training/toolbox talks; (ix) number of HS meetings; (x) number of unsafe acts/conditions	Monthly	
		Prepare a Site-specific Emergency Preparedness and Response Plan (EPRP). Identify (i) emergency response procedure for implementation; (ii) training requirements; (iii) onsite assembly points; (iv) emergency kits and signs; (v) worker grievance mechanism; (vi) emergency controls measures.	Mitigation	Inspection and Audits Submission; training records and grievance mechanisms. Reporting on all EPRP procedures	Monthly	
	Worker Accommodation	Prepare an Accommodation Management Plan. The objective of the plan is to identify the required management standards and specifications for accommodation that shall be met for the workforce.	Mitigation	Regular Inspections and Audits Submission of Workers grievances	Monthly	
	Worker Human Rights	Prepare and implement a LWCMP guided by the "Labor Law No. M/51 of 2005", IFC PS2 (Labor and Working Conditions) and ILO Fundamental Labor Conventions.	Mitigation	Inspection	Monthly	
				Reporting on: (i) number of workers employed; (ii) number of local community members employed; (iii) total number of casual and day workers (disaggregated by sex); (iv) total number of working hours; (v) number of disciplinary actions issued; (vi) number of drinking water units; (vii) number of rest areas provided; (viii) number of sanitary facilities provided; (ix) number of worker grievances submitted; (x) number of unresolved complaints; and (xi) number of incidents and/or non-compliances in relation to this plan	Monthly	

	GBVH and SEAH impacts to workers and community members.	Develop and implement a Labor and Working Conditions Management Plan (LWCMP). The Plan should include at a minimum the following: Safe transport will be provided to female and male workers. The codes of conduct, which prohibit gender-based violence, harassment and abuse, will apply to transportation modes	Mitigation	Submission of signed GBVH code of conduct.	Monthly	
			Mitigation	Monitoring and Inspection. Documentation of grievances submitted	Monthly	
Community Health, Safety and Security	Trespassing of unauthorized personnel into construction active areas could result in health and safety impacts.	As part of the detailed design the security measures to prevent unauthorized access to the Project site will be identified which in turn will control any such impacts. The detailed design is expected to include security measures such as fencing around the entire perimeter, use of CCTV, utilization of unarmed security guards onsite and other.	Mitigation	Regular Inspections Reporting trespassing incidents	Continuous	EPC Contractor
	Worker Influx	Submit an Accommodation Management Plan Accommodation Management Plan and a Labor and Working Conditions Management Plan (LWCMP).	Mitigation	Develop a Code of Conduct	Once; before commencement of construction	
		Stakeholder engagement activities with local communities must provide information on security control requirements and measures implemented. Stakeholder engagement activities are provided in further details in the SEP.	Mitigation	Submission of stakeholder engagement log sheets	Monthly	
		Stakeholder grievance mechanism should be implemented in relation to any grievances related to security incidents and/or security personnel code of conduct. Any grievances submitted should be handled fully in accordance with the mechanism that is included within the SEP. Please refer to the SEP for additional details.	Mitigation	Submission of stakeholder grievance log sheet Submission of grievance close-out forms	Monthly	
	Security Personnel	Undertake a Security Management Plan (SMP) to be implemented. The plan must identify appropriate measures for hiring, rules of conduct, training, equipping, and monitoring of unarmed security personnel to control and manage such issues. The plan must also adhere to IFC PS 4 (Community Health, Safety and Security). This requires that that the behavior for the security personnel is guided by the Voluntary Principles on Security and Human Rights in terms of hiring, rules of conduct, training, equipping and monitoring of such personnel. It also requires making reasonable inquiries to satisfy itself that those providing security measures are not implicated in past abuses, will ensure they are trained adequately in the use of force and appropriate conduct towards the workers and the local community. Force should only be used when strictly necessary, and to an extent proportional to the threat.	Mitigation	Submission of SMP	Once; before commencement of construction	
			Mitigation	Submission copies of clearance of security guards in past abuses	Throughout entire construction period	
			Mitigation	Submission of signed code of conduct for security personnel	Throughout entire construction period	
			Mitigation	Submission of training and TBT records for security personnel on security rules of conduct, use of force, etc.	Throughout entire construction period	
			Mitigation	Visual Inspections	Daily HSE monitoring Weekly site inspections Monthly ESHS reports (including SMP KPIs)	
Subcontractor and Supplier Management			Mitigation	Submit Contractor and Supply Chain Management Plan	Once before commencement of construction	Developer/ EPC Contractor

	Improper management of subcontractors and supplier poses risks of major environmental impacts, human right abuses, criminal abuses or other	Develop a Contractor and Supply Chain Management Plan which should: (i) identify the key subcontractors and suppliers that will be involved, (ii) identify a screening process where during the tendering process the key E&S requirements should be identified and included within the tender documents. This may include adherence to International Financial Institution (IFI) E&S requirements, national E&S regulations, ESIA and ESMS requirements and other; (ii) selection process where selected subcontractor / supplier risks have been identified, Developer / Operator will assess these risks further with the subcontractor / supplier concerned to understand their capacity to avoid and manage such risks and to understand the controls the subcontractor / supplier has in place; (iii) contractual control will put in place controls to avoid and manage potential risks. This will include but not limited to contractual controls, including corrective actions and exit mechanisms, to avoid and manage potential risks; (iv) proactive management and a system of contractor accountability.	Mitigation	Submission of outcomes of screening processes for all selected subcontractors and suppliers (e.g. tender E&S requirements, reputational assessments)	Throughout entire construction period	
			Mitigation	Submission of risk assessment for subcontractor / supplier selected and E&S controls for risks identified	Throughout entire construction period	
			Mitigation	Submission of E&S contractual controls	Throughout entire construction period	
			Mitigation	For subcontractors - Visual Inspections	Daily HSE monitoring Weekly site inspections Quarterly Audits Monthly ESHS reports (including KPIs for SSMP)	
			Mitigation	For suppliers, depending on the risks associated with a supply plan, put in place monitoring approach including reports from suppliers, ad hoc audits, etc. to the extent this is feasible. Monitoring will seek to ensure compliance with the mitigation defined, and in cases of non-compliance, help define corrective actions with the supplier concerned. Developer / EPC Contractor will maintain appropriate records of its supply chain assessment and risk management. Where this is conducted by EPC contractors it will be reported to Developer on a regular basis	Throughout entire construction period	

Table 66: ESMP for the Operation Phase

Environmental Attribute	Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
Landscape and Visual	Potential glare caused by minimal sunlight reflected off the PV panel modules which in turn could affect nearby receptors.	Submit application and obtain approval of Ministry of Civil Aviation and Operations Authority of Armed Forces (for air force).	Mitigation	Submit approvals	Once; before operation commences	Developer
		Upon completion of construction activities, a field assessment/evaluation should be undertaken to determine if the measures have been implemented.	Mitigation	Submission of field assessment/ evaluation report	Once; before operation commences	Developer/ Project Developer
Geology, Hydrology and Hydrogeology	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities, spillage of hazardous material, random discharge of waste and wastewater.	Coordinate with Aswan Solid Waste Management Department or hire a competent private contractor for the collection of solid waste from the site to El Alaqi Landfill.	Mitigation	Review contract with contractor	Once; before operation commences	Project Operator
		Prohibit fly-dumping of any solid waste to the land.	Mitigation	Inspection	Continuous	
		Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste"	Mitigation	Inspection	Continuous	
		Implement proper housekeeping practices on the project site at all times	Mitigation	Inspection	Continuous	
		Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill. The numbers within the records are to be consistent to ensure no illegal dumping at the site or other areas.	Mitigation	Review manifests to ensure consistency	Continuous	
				Undertake audit to ensure disposal as designated site	Continuous	Developer
		Coordinate with NAWWCo to hire a private contractor for the collection of wastewater from the site to the closest WWTP (being New Aswan City WWTP).	Mitigation	Review contract with contractor	Once; before construction commences	Project Operator
		Prohibit illegal disposal of wastewater to the land.	Mitigation	Inspection	Continuous	
		Ensure that collection tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing.	Mitigation	Inspection	Continuous	
		Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP.	Mitigation	Review manifests to ensure consistency	Continuous	
				Undertake audit to ensure disposal as designated site	Continuous	Developer
		Coordinate with and hire a private contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities.	Mitigation	Review contract with contractor	Once; before construction commences	Project Operator
		Ensure that hazardous waste is disposed in a dedicated area that is enclosed, of hard surface, with proper signage and suitable containers as per hazardous waste classifications and that they are labelled for each type of hazardous waste. The area should be properly ventilated due to the intense heat which could increase evaporation of chemicals that could make the ambient air of the storage potentially toxic and, in some cases, explosive.	Mitigation	Inspection	Continuous	
		Ensure hazardous waste storage area is equipped with spill kit, fire extinguisher and anti-spillage trays and a hazardous waste inventory is available	Mitigation	Inspection	Continuous	
		Prohibit illegal disposal of hazardous waste to the land.	Mitigation	Inspection	Continuous	
		Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste.	Mitigation	Inspection	Continuous	
		Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing.	Mitigation	Inspection	Continuous	
		Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous waste Facility.	Mitigation	Review manifests to ensure consistency	Continuous	

				Undertake audit to ensure disposal as designated site	Continuous	Developer
		Ensure that hazardous materials are stored in proper areas and in a location where they cannot reach the land in case of accidental spillage. This includes storage facilities that are of hard impermeable surface, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another as per Material Safety Data Sheet (MSDS);	Mitigation	Inspection	Continuous	Project Operator
		Maintain a register of all hazardous materials used and accompanying Material Safety Data Sheet (MSDS) must present at all times. Spilled material should be tracked and accounted for.	Mitigation	Inspection	Continuous	
		Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.).	Mitigation	Inspection	Continuous	
		Regular maintenance of all equipment and machinery used onsite. Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refueling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material.	Mitigation	Inspection	Continuous	
		Ensure that a minimum of 1,000 Liters of general-purpose spill absorbent is available at hazardous material storage facility. Appropriate absorbents include zeolite, clay, peat and other products manufactured for this purpose.	Mitigation	Inspection	Continuous	
		If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste.	Mitigation	Inspection	Continuous	
				Reporting of incident and measures taken to minimize impact	Upon occurrence	
Biodiversity	Disturbance of existing habitats (flora, fauna, avi-fauna) and any threatened or endangered species which might be present within the Project site. In addition, other impacts could be from improper management of the site (e.g. improper conduct and housekeeping practices)	Implement proper management measures to prevent damage to the biodiversity of the site. This could include establishing a proper code of conduct and awareness raising / training of personnel and good housekeeping to include: (i) prohibiting hunting; (ii) ensure proper storage, collection, and disposal of waste streams generated; and (iii) restrict activities to allocated areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances	Mitigation	Inspection	Continuous	Project Operator
		Maintain a gap between the base of the fence and the ground. This could occur across the full extent of, or at regular intervals, along the fence line to allow reptiles and small mammals to pass beneath.	Mitigation	Inspection	Continuous	
		Implement a bird morality program for one year after which it will be reevaluated based on the outcomes and results. Throughout the year, a complete bird fatality search survey of the Project site will be undertaken through dividing the site into sections and it will be ensured that the entire Project site is covered at least once a week. For each fatality found, all information should be entered on to the 'bird and bat fatality search survey recording form'. Photographs of each fatality should be numbered and be cross referenced on the recording form.	Additional Requirement	Submission of report	First year of operation	
Infrastructure and Utilities	Water requirements – water requirements of the Project could entail constraints on existing users	Coordinate with Aswan Water and Wastewater Company to determine the most feasible and practical approach for securing the water requirements of the Project. In the case a well is to be used a permit is required and, in the case, tankers are to be used, list of authorized water tankers should be obtained.	Additional Requirement	Submit proof for coordination with authorities	Once; before ration commences	Project Operator
		Document water consumption of the Project		Submit monthly report	Continuous	
		If Project utilizes a local water well, a baseline analysis should be undertaken that indicates the water level, production capacity and water quality of the groundwater and nearby wells within the area. In addition, during the operation phase, regular reporting (e.g. annually) on groundwater monitoring and groundwater situation should be provided.	Additional Requirement	Submit Report	Once annually	
	Waste utilities – it is important to ensure that existing utilities would be able to handle the amount solid waste, wastewater and hazardous waste	Coordinate with the Aswan Solid Waste Management Department, National Aswan Water and Wastewater Company and Environmental Affairs Department for disposal of solid waste, wastewater and hazardous waste respectively.	Additional Requirement	Submit proof of coordination with authorities	Once; before operation commences	

	Road Networks- transportation activities required for the Project could affect existing road networks and public health and safety.	Develop a Traffic and Transport Plan before commencement of any transportation activities to ensure that the transportation process is properly and adequately managed and does not pose a risk of damage to the existing roads or existing users on the road. Plan to include but not limited to: (i) identify the traffic requirements of the Project; (ii) identify types of vehicles to be utilized; (iii) identify procedures for onsite management of traffic; (iv) identify requirements to be adhered to and enforced on all haulage suppliers; (v) identify a code of conduct to be adhered to and enforced on all drivers in the Project ; (vi) identify speed limits onsite and identification of all traffic signage requirement onsite; (vii) identify a procedure for management of onsite/offsite traffic accidents; (viii) identify if any abnormal loads are required and obtain permits to carry these loads on highways from GARBLT accordingly	Additional Study	Submit Traffic and Transport Plan	Once; before construction commences	
Socio-economic	The Project is expected to provide job opportunities for local communities. This could contribute to enhancing the living environment for its inhabitants and bring social economic prosperity to the local community.	Project Operator to adopt and implement a Local Recruitment and Procurement Plan and Procedure for working with the local community members during the construction phase. The plan must aim to support the local community stating its aims and objectives and should acknowledge the importance of building a strong socio-economic relationship with the local community through a participatory planning program. The plan must be developed under supervision of the Developer and should include measures related to addressing community tensions.	Recommendation	Regular Reporting of outcomes of Plan implementation	Continuous	Project Operator (under supervision of the Developer)
		Project Updates to local communities in accordance with identified measures in the SEP which also includes measures related to management of local stakeholder expectations on jobs during the construction phase. This should include the following in particular: (1) Undertake continuous and ongoing consultations (at least monthly) with local communities to: (i) manage expectations on employment and procurement opportunities for the Project; (ii) emphasize that job opportunities for this Project are huge and will be met throughout various entities that will include local communities but possibly other districts and Governorates as well; (iii) provides updates on Project implementation and overall schedule; and (iv) other as appropriate. (2) Provide updates on implementation of the local recruitment and procurement procedure to date (e.g. number of locals employed to date from each village as appropriate); (3) As required by the local communities all communication / updates to the local communities should be provided through the following channels in particular: (i) notifications via key local platforms in Aswan, to include but not limited to Local Unit Offices, mosques, commercial areas, CBOs, other local governmental entities; (ii) key Facebook pages related to the Aswan Governorate and Al Raqaba Local Unity (e.g. Sheikh Fadl Local Community Development Association); (iii) public announcements through the Mayor of Al Raqaba Local Unit.	Recommendation	Submission of Local Employment and Recruitment Procedure	Once; before commencement of operation	
			Recommendation	Submission of local community employment and procurement register by area/district/region along with evidence for announcements and selection process.	Semi-annual	
		Adopt and implement a Local Employment and Recruitment Procedure the procedure must identify the following: (i) number of job and procurement opportunities targeted for local communities to include skilled and unskilled workers, (ii) details on how job and procurement opportunities will be announced; (iii) a selection process that is fair and transparent and provides equal opportunities for all including females; and (iv) order of priority with respect to employment and procurement subject to availability of qualifications and skills.	Recommendation	Submission of community development plan	Once during the 1st year quarter of operation	
		Implementing a Community Development Plan which aims to benefit the local communities to the greatest extent possible. It is recommended that a structured approach is developed for such a program that takes into account the community's needs and priority development projects which could benefit local communities (which logically should also take into account other factors such as allocated budget by the Developer, timeline for implementation of such projects, etc.)	Recommendation	Submission of community development plan update report	Annually	
		Stakeholder grievance mechanism should be implemented in relation to implementation of the requirements of the Stakeholder Engagement Plan (SEP) and the Local Employment and Recruitment Procedure. Any grievances submitted should be handled fully in accordance with the mechanism that is included within the SEP. Please refer to the SEP for additional details.	Mitigation	Submission of stakeholder grievance log sheet Submission of grievance close-out forms	Monthly	

Worker Welfare, Health and Safety	There will be some generic risks to workers health and safety from working on operational sites, as it increases the risk to injury or death due to accidents.	Prepare an Occupational Health and Safety Plan and adopt and implement its recommendations/provisions of the Occupational Health and Safety Plan.	Mitigation	Visual inspections and investigation on electrical safety, working at height, confined spaces, crane operation, excavations, welding and cutting, concreting, PPE use, training and tool box talks, etc.	Daily/weekly	Project Operator
				Reporting on: (i) number of near misses; (ii) number of injuries; (iii) number of medical evacuations; (iv) number of working condition complaints; (v) lost working hours; (vi) number of working days since the last accident; (vii) number of HS audit/inspections; (viii) number of HS training/toolbox talks; (ix) number of HS meetings; (x) number of unsafe acts/conditions	Monthly	
		Prepare a Site-specific Emergency Preparedness and Response Plan (EPRP). Identify (i) emergency response procedure for implementation; (ii) training requirements; (iii) onsite assembly points; (iv) emergency kits and signs; (v) worker grievance mechanism; (vi) emergency controls measures.	Mitigation	Inspection and Audits Submission; training records and grievance mechanisms. Reporting on all EPRP procedures	Monthly	
	Worker Accommodation	Prepare an Accommodation Management Plan. The objective of the plan is to identify the required management standards and specifications for accommodation that shall be met for the workforce.	Mitigation	Regular Inspections and Audits Submission of Workers grievances		
	Worker Human Rights	Prepare and implement a LWCMP guided by the "Labor Law No. M/51 of 2005", IFC PS2 (Labor and Working Conditions) and ILO Fundamental Labor Conventions.	Mitigation	Inspection	Monthly	

				Reporting on: (i) number of workers employed; (ii) number of local community members employed; (iii) total number of casual and day workers (disaggregated by sex); (iv) total number of working hours; (v) number of disciplinary actions issued; (vi) number of drinking water units; (vii) number of rest areas provided; (viii) number of sanitary facilities provided; (ix) number of worker grievances submitted; (x) number of unresolved complaints; and (xi) number of incidents and/or non-compliances in relation to this plan	Monthly	
	GBVH and SEAH impacts to workers and community members.	Inappropriate management of the workforce (some of which could be from the local communities) during both the construction and operation phase could entail gender-related issues such as Gender Based Violence and Harassment (GBVH) or Sexual Exploitation, Abuse and Harassment (SEAH).	Mitigation	Submission of signed GBVH code of conduct.	Monthly	
			Mitigation	Monitoring and Inspection. Documentation of grievances submitted	Monthly	
Community Health and Safety	Trespassing of unauthorized personnel into the Project site could result in potential risk from several hazards	Detailed design the security measures to prevent unauthorized access to the Project site will be identified which in turn will control any such impacts. The detailed design is expected to include security measures such as fencing around the entire perimeter, use of CCTV, utilization of security guards onsite and other.	Mitigation	Inspection	Continuous	Project Operator
	Inappropriate management of security issues and incidents by security personnel towards local communities	Prepare Security Risk Assessment which must identify appropriate measures for hiring, rules of conduct, training, equipping, and monitoring of security personnel to control and manage such issues.	Mitigation	Documentation of copies of clearance for security guards	Weekly/monthly	
				Visual inspections and investigation on the following: (i) site security arrangements (guards, schedule, uniforms, fencing, etc. (ii) security operating procedures to include access to the site, security force management, etc.	Weekly/monthly	

				Reporting on the following: (i) security related incidents/accidents; (ii) security related grievances and complaints	Monthly	
Subcontractor and Supplier Management	Improper management of subcontractors and supplier poses risks of major environmental impacts, human right abuses, criminal abuses or other.	Develop a Contractor and Supply Chain Management Plan which should: (i) identify the key subcontractors and suppliers that will be involved, (ii) identify a screening process where during the tendering process the key E&S requirements should be identified and included within the tender documents. This may include adherence to International Financial Institution (IFI) E&S requirements, national E&S regulations, ESIA and ESMS requirements and other; (ii) selection process where selected subcontractor / supplier risks have been identified, Developer / Operator will assess these risks further with the subcontractor / supplier concerned to understand their capacity to avoid and manage such risks and to understand the controls the subcontractor / supplier has in place; (iii) contractual control will put in place controls to avoid and manage potential risks. This will include but not limited to contractual controls, including corrective actions and exit mechanisms, to avoid and manage potential risks; (iv) proactive management and a system of contractor accountability.	Mitigation	Submit Contractor and Supply Chain Management Plan	Once before commencement of operation	Developer/ Operator
			Mitigation	Submission of outcomes of screening processes for all selected subcontractors and suppliers (e.g. tender E&S requirements, reputational assessments)	Throughout entire operation period	
			Mitigation	Submission of risk assessment for subcontractor / supplier selected and E&S controls for risks identified	Throughout entire operation period	
			Mitigation	Submission of E&S contractual controls	Throughout entire operation period	
			Mitigation	Visual Inspections	Daily HSE monitoring	

			Mitigation	For suppliers, depending on the risks associated with a supply plan, put in place monitoring approach including reports from suppliers, ad hoc audits, etc. to the extent this is feasible. Monitoring will seek to ensure compliance with the mitigation defined, and in cases of non-compliance, help define corrective actions with the supplier concerned. Developer / Operator will maintain appropriate records of its supply chain assessment and risk management. Where this is conducted by Operator it will be reported to Developer on a regular basis.	Throughout the entire Operational Period	

23. ANNEXES

23.1 Annex I – Minutes of Meetings of Targeted Consultations

23.2 Annex II – Rapid Cumulative Impact Assessment (RCIA)