Annex II

Rapid Cumulative Impact Assessment (RCIA)

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

REV-1

December 2024

ECO Consult

SLR

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABREVIATION AND ACRONYMS

Acronym	Definition
AC	Alternating Current
AoI	Project Area of Influence
BCM/year	Billion cubic meters per year
BOO	Build, Own and Operate
BSDA	Benban Solar Developer Association
CDC	Centers for Disease Control and Prevention
EBRD	European Bank for Reconstruction and Development
EEAA	The Egyptian Environmental Affairs Agency
EETC	Egyptian Electric Holding Company
EMP	Environmental Management Plan
E&S	Environmental and Social
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FGD	Focus Group Discussions
FMC	Facilities Management Company
GFDRR	Global Facility for Disaster Reduction and Recovery
GW	Gigawatt
DC	Direct Current
IBA	Important Bird Areas
IFC	The International Finance Corporation
KBA	Key Biodiversity Areas
kg	Kilogram
km	Kilometer
km^2	Squared Kilometer
kV	Kilovolt
m	Meters
m^3	Cubic meters
MSB	Migratory and Soaring Birds
MW	Megawatt
NAWWCo	National Aswan Water and Wastewater Company
NCE	Nature Conservation Egypt
NGO	Non-Governmental Organization
NREA	New and Renewable Energy Authority
OHSP	Occupational Health and Safety Plan
OHTL	Overhead Transmission Lines
PPA	Power Purchase Agreement
PV	Photovoltaic
RCIA	Rapid Cumulative Impact Assessment
SESA	Strategic Environmental and Social Impact Assessment
SLR	SLR Consulting (Africa) Pty Ltd
VEC	Valued Environmental and Social Components
Wp	Watt-Peak

1. BACKGROUND AND INTRODUCTION

This document presents Annex 2 of the ESIA for the Abydos for Renewable Energy Solar Photovoltaic (PV) Plant in Egypt. This document presents a Rapid Cumulative Impact Assessment (RCIA) undertaken according to the *Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets.*

This document has been prepared by ECO Consult and SLR Consulting (Africa) Pty Ltd (SLR).

The RCIA addresses potential cumulative impacts that may arise from the incremental impact of the proposed Project in combination with potential impacts of other existing and probable planned projects. The cumulative impacts have been assessed based on the spatial and temporal overlap of the proposed Abydos for Renewable Energy Solar PV Project activities and predicted impacts. The impacts are assessed assuming that the mitigation measures provided in the ESIA are in place for each of the contributing projects. The RCIA evaluates the potential cumulative impacts using their relative magnitude, general spatial extent and anticipated duration of impact.

1.1 Objective

The objective of the RCIA is to assess the incremental and cumulative impact resulting from temporal and spatial overlap of impacts from other existing and planned projects in the area of influence of the Abydos for Renewable Energy Solar PV Project.

The overall goal is to identify Environmental and Social (E&S) impacts and risks that, in the context of past, existing, and reasonably foreseeable developments, may generate cumulative impacts that could jeopardize the overall long-term environmental, social and economic sustainability of the Project and/or compromise the integrity of the assets or resources in the region in which the Project is situated. The assessment has the following objectives:

- Assess the potential impacts and risks of the Project over time, in the context of potential effects from other developments and external E&S factors.
- Verify that the Project's cumulative impacts and risks will not compromise the sustainability or viability of the social and natural environment.
- Identify mitigation for potential cumulative impacts when applicable.
- Confirm that the Project's value and feasibility are not limited by cumulative effects.
- Ensure that the concerns of affected communities about the cumulative impacts are identified, documented and addressed.
- Manage potential reputation risks.

The assessment outcomes are as follows:

- Identification of selected features of the social and natural environment that are likely to result in cumulative impacts.
- Identification of other existing and reasonably anticipated and/or planned projects in the vicinity of the Project.

- Identification of external E&S stressors that could contribute to cumulative impacts.
- Assessment of the future condition of the selected E&S components, as the result of the Project's cumulative impacts combined with those of other developments and external stressors.
- Identification of cumulative impact avoidance and minimization measures.
- Definition of management and monitoring of cumulative E&S risks and impacts, where applicable.

1.2 Methodology

The methodology used for this RCIA is aligned with the IFC's Good Practice Handbook on Cumulative Impact Assessment and Management for the Private Sector in Emerging Markets (IFC, 2013). The assessment focuses on the E&S aspects of the receiving environment that are considered important for assessing risk and which are referred to collectively as "Valued Environmental and Social Components" (VECs). A 6-step approach has been used for the assessment as illustrated in Figure 1-1.

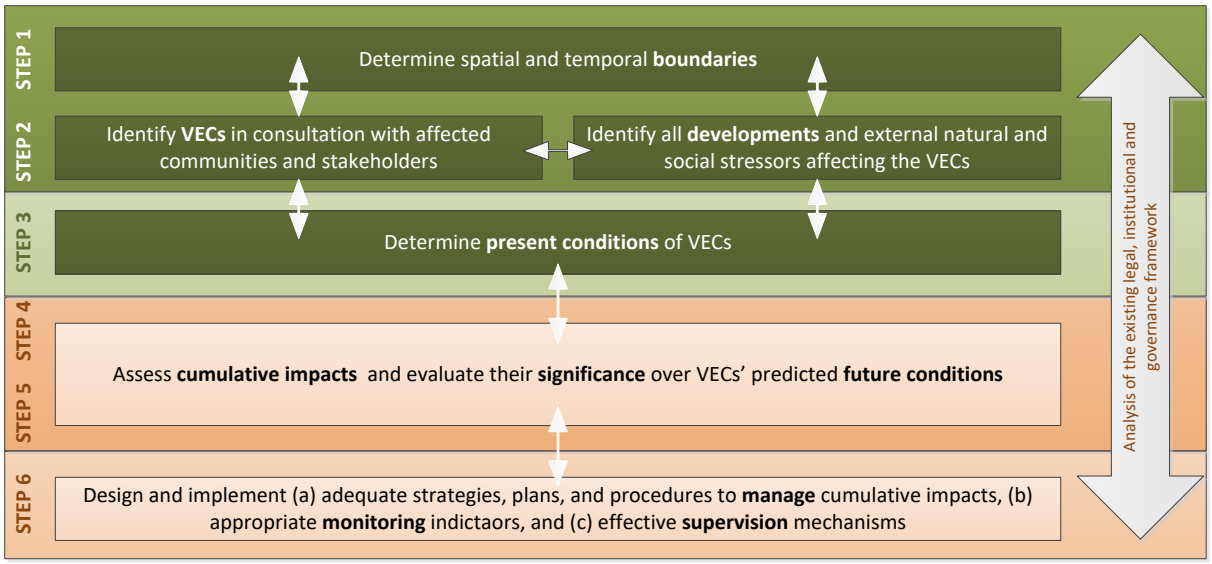


Figure 1-1: Six-Step Approach for CIA (Source: IFC 2013)

The 6-step approach can be summarized as follows:

- **Steps 1 and 2 – Scoping**: The scoping steps 1 and 2 comprise the identification of the VECs to be studied and determination of the spatial and temporal boundaries of each VEC. The VECs were identified by the ESIA team based on their assessment of the Project's E&S impacts. External activities and natural and social stressors were identified through review of secondary data and from E&S baseline survey work conducted in the frame of the present ESIA.
- **Step 3 - Determination of the Present Condition of VECs**: Baseline conditions of VECs were characterized as part of the ESIA and are documented within "Sections 8 – 17" of the ESIA.
- **Steps 4 and 5 – Assess Cumulative Impacts and Evaluate Significance**: The assessment uses a VEC-centered approach as illustrated in Figure 1-2. Cumulative impacts are quantified where possible in terms of a given VEC's response and predicted future changes to its condition. For each VEC, pressure-receptor indicators are selected which are used as a metric to "measure" the changes in the state of

the VEC. The selected indicators are simple quantifiable or qualitative measures of the condition or dynamics of broader, more complex attributes of the ecosystem or watershed state. These indicators act as surrogates for the underlying ecological processes.

- **Step 6 - Preparation of a Framework for the Management of Cumulative Impacts**: The framework for the management of significant cumulative impacts identified in Step 5 are managed through the control and mitigation measures for the Project impacts assessed elsewhere in the ESIA. Note: this step is not necessarily applicable where impact mitigation in the ESIA and Environmental and Social Management Plan (ESMP) adequately caters for project impacts and where no cumulative impacts are identified.

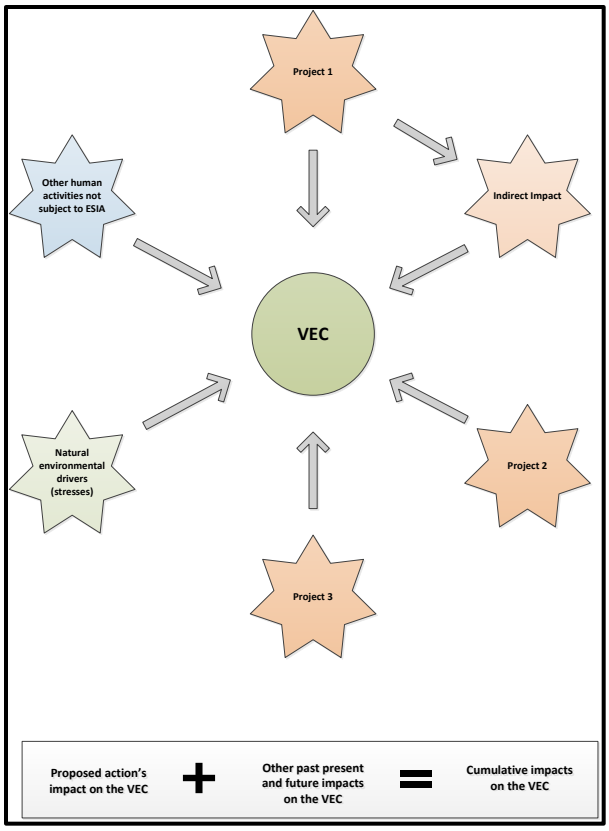


Figure 1-2: Schematic Illustrating VEC Centered Approach (Source: IFC 2013)

1.3 Summary Description of the Abydos for Renewable Energy Solar Project

A brief summary of the Abydos for Renewable Energy Solar Project is provided as context for identifying the VECs that may overlap spatially or temporally with other adjacent existing or planned projects.

The Abydos for Renewable Energy Solar Project comprises:

- Size and land take: The project will be constructed in a 20 km^2 concession area located in the Daraw District on the sandy plains located 8.5 km west of the Nile River.
- AoI: The Project Area of Influence (AoI) is defined as the 20 km^2 area plus a 5 km buffer.
- Components: The Project will consist of:

- Blocks containing PV arrays, each made of mono-crystalline silicon panels (610–620Wp capacity) with anti-reflective glass for efficiency. Panels will be mounted on single-axis horizontal trackers, optimizing sunlight capture throughout the day. Silicon, a non-hazardous material, serves as the primary semiconductor for electricity generation.
- A central inverter station for each block, totaling 144 within the Project site. The inverter station converts the electricity produced from the panels from Direct Current (DC) to Alternating Current (AC).
- Underground electrical cables connecting the central inverter stations to the onsite substation.
- Substation to 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)

- Road network to include: (i) internal road network within the 20 km^2 solar site for ease of access to the modules for operation and maintenance purposes, (ii) a security road around the fenced perimeter of the Project site for security patrolling; and (iii) access road of ~1 km from the main highway to the site.
- Workforce: 4,000 workers are expected during the 17-month construction phase and 90 during operation. At this point it is unclear how many of these workers will be expatriates, Egyptian and/or from local communities. Most unskilled workers are expected to be sourced from the Al Raqaba Local Unit and to be bussed in each day and not accommodated on site.
- Camps and laydown: A temporary laydown area is expected be in the project footprint where tools equipment and vehicles are stored when not in use.
- Water supply: 145,000 m^3 of water for construction and 20,000 m^3 for operation per year to be abstracted via surface stations from the Nile River. No groundwater will be used.
- Wastewater: During construction, wastewater, including black and grey water, is estimated at 160 m^3/day, based on 80% generation factor from potable water use. Wastewater will be stored in onsite collection tanks and transported by licensed tankers to the nearest WWTP or manhole.
- Solid waste:
  - During construction, solid waste will include ~1,000 kg/day of municipal waste and ~2,000 kg/day of construction waste (e.g., debris, cables, wood). The total solid waste generation during this phase is ~3,000 kg/day. Operational waste will primarily consist of municipal waste.
  - 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 ~50 kg/day.
  - Hazardous waste from construction and operation will include spent oil, lubricants, paint cans, and solvents with estimated quantities of ~20 kg/day during construction and ~2 kg/day during operation that will be disposed of at the Nasreya landfill in Alexandria approximately 800 km from the project site This is based on similar solar PV projects.

2. CUMULATIVE IMPACT SCOPING

The scoping of cumulative impact comprises (i) identification of the VECs to be studied and their spatial and temporal boundaries of each VEC; and (ii) identification of past, present and future planned projects as well as natural and social stressors.

2.1 Identification of VEC's

2.1.1 Stakeholder Engagement

VECs were identified by the ESIA team during the stakeholder consultation process for the ESIA. Meetings with a range of stakeholders were undertaken in late August to October 2024. Stakeholders were given the opportunity to express concerns and expectations and voice concerns regarding VEC's potentially impacted by the Project. Comments and responses of the various issues raised by different stakeholders are described in the ESIA. Stakeholder engagement involved a public scoping meeting, separate focus group discussions and separate meetings with relevant institutions. Please refer to "Section 6" of the ESIA for additional details.

Disclosure meetings and disclosure of ESIA documentation is also planned.

Public Scoping Meeting:

A public scoping meeting was held in Aswan City which was advertised and to which Non-Governmental Organizations (NGOs), local community representatives and governorate stakeholders were invited. The scoping meeting was attended by 145 participants of which 82 were from the Al Raqaba community and 14 from senior village leadership: 12 from civil society and NGOS and several others from various government departments.

Focus Group Discussions (FGD):

Prior to the public scoping meeting, focus group discussions were held on 7 and 8 September 2024 with various community members in the village of Al Raqaba and its affiliated hamlets, attended by 763 people (of which 650 were male). A separate FGD was held with the Sheikh Fadl Hamlet, representing the Nubian community. Issues raised were mostly focused on employment and job allocation, and corporate social responsibility for local community members. Other issues raised included pressure on health services and need for upgrade of facilities, need for designated waste, wastewater, and sewage disposal, and potential emissions during operation (not relevant).

The Nubian community of Sheikh Fadl confirmed that there is no foreseeable impacts or risks to their community given the distance from the Project site but wished to be consulted regularly and have job and training opportunities.

Institutional Stakeholder Consultation:

The following meetings with key institutional stakeholders were undertaken to notify them of the ESIA process and scope, provide an opportunity to address any concerns:

- Ministry of Antiquities (25 August 2024) and Directorate of Antiquities of Aswan Governorate (10 September 2024)
- Nature Conservation Egypt (NCE) - Birdlife International's local partner in Egypt (26 August 2024)

- The Egyptian Environmental Affairs Agency (EEAA) (27 August 2024)
- Egyptian Electric Transmission Company (EETC) and Egyptian Electric Holding Company (EEHC) (29 August 2024)
- New and Renewable Energy Authority (NREA) (29 August 2024).
- Environmental Affairs Department for Aswan Governorate (the relevant entity responsible for Hazardous Waste) (9 September 2024)
- National Aswan Water and Wastewater Company (NAWWCo) and Ministry of Transport, Roads and Bridges Directorate in Aswan Governorate (10 September 2024).
- Umm Habiba Association (affiliated with the Aga Khan Foundation) (10 September 2024)
- Union of Nubian NGOs in Aswan Governorate (10 September 2024)
- Benban Solar Developer Association (BSDA) (10 September 2024)
- Urban Planning Directorate in the Aswan Governorate (10 September 2024). Information on other planned projects was requested and they confirmed the only planned project is the agriculture rehabilitation project outlined in Section 2.2.2.

In particular, further consultations were undertaken with the entities below as part of the RCIA process, in order to obtain information on any planned developments projects within the region.

- New and Renewable Energy Authority (NREA) (November 2024). NREA were requested to provide information on other planned renewable projects within the area. NREA indicated that there are other planned solar PV projects within the region but at this point, such information is considered confidential. Alternative sources of information were used to obtain such information and this is provided in Section 2.2.
- Urban Planning Directorate in the Aswan Governorate (November 2024). Information on other planned development projects within the project region was requested and they confirmed the only planned development in the area is an agriculture reclamation project as discussed in further details in Section 2.2.2.

Issues relevant to scoping VECs in or out of the RCIA are summarized in Table 2-1.

2.1.2 Expert Identification of VECs

In addition to inputs from stakeholders described above, E&S experts for this assignment reviewed all the specialist inputs in the ESIA and identified and screened additional potential VECs to be considered in the RCIA. Relevant information for each VEC is incorporated into the table below to justify the rationale for screening VECs in or out.

Table 2-1: Selection of VEC's for the RCIA

VEC	Rationale For Selection	Boundaries	
		Spatial	Temporal
VECs scoped in			

VEC	Rationale For Selection	Boundaries	
		Spatial	Temporal
Water Resources	Identified in consultation with National Aswan Water and Wastewater Company (NAWWCo), as project water requirements could have constraints on existing water resources and users.	Landscape scale	Project life
Waste Generation	Identified in consultation with national and municipal government departments, waste generated from other projects (including solid waste, wastewater and hazardous waste) could increase constraints on existing utilities.	Landscape scale	Project life
Traffic and Transportation	Traffic and transportation requirements of all projects cumulatively could entail constraints on existing highways.	Project AoI	
Worker influx	Identified by ESIA team that influx of workforce to the project area could result in community health, safety and security impacts on local people and from increased pressure on services.	Project AoI	Period of construction
VECs scoped out			
Community expectations on stakeholder engagement/jobs/procurement/ on the Abydos for Renewable Energy Solar Project (in context of community experiences of past projects in the area)	Communities may have raised expectations in terms of engagement, jobs and other benefits to be derived from the proposed Abydos for Renewable Energy Solar Project, informed by exposure and experience from past solar projects in the area. For instance, communities in villages that benefitted from some projects in the Daraw District may expect to obtain jobs that would be prioritized for communities in Al Raqaba Local Unit. This issue, while informed from past projects, is a project specific risk that does not warrant further assessment in the context of this RCIA and would be managed at the project level. Unlike environmental or infrastructural impacts, which often extend regionally, these community expectations depend on each project's unique management and stakeholder engagement processes, which vary in scope, capacity, and context. Moreover, any potential impacts will be mitigated through the implementation of the Stakeholder Engagement Plan (SEP) and the Local Recruitment and Procurement Plan as discussed in further details in "Section 17.4" of the ESIA. In addition, to further enhance community benefits, the Developer is considering introducing a Community Development Plan aimed at addressing local needs effectively as also discussed in "Section 17.4" of the ESIA.		
Conflicting Land Use	Consultations with the General Administration of Urban Planning in Aswan Governorate confirmed that the project site is under governmental ownership and not allocated to any specific development. No land uses are evident on or within proximity to the site (including grazing, agriculture or nomadic Bedouin activity) and none have been detected from satellite imagery analysis from 1984. No restrictions on land use or potential conflicts with local communities have been identified. The site is located 6.5 km from the closest settlement of Al Raqaba Local Unit to the east and therefore no restrictions are posed on or by urban settlement. In summary, the Project site does not pose any conflicts with other future land use plans for the Al Raqaba Local Unit. Further, none of the planned renewable energy projects or planned agricultural developments overlap spatially with each other. Additional details are provided in "Section 9" of the ESIA.		

VEC	Rationale For Selection	Boundaries	
		Spatial	Temporal
Geology, Hydrology and Hydrogeology	The site and surroundings comprise of undulating terrain with some low hills with steeper sloes in the west of the site with no drainage lines (wadis) crossing the site indicating a general lack of surface water flow. The nearest wadi (Wadi Qubaniyea) is 3 km southwest and drains to the east and south of the Project site) and could be prone to flooding risks in heavy rainfall. The site overlies a productive groundwater aquifer important for water supply for agriculture and other development but confirmed to have low potential due to a thick clay layer that restricts groundwater movement and recharge. Groundwater levels are estimated to be 100 m minimum below surface level. The site has some exposed sandstone and shale outcrops but is dominated by sand, gravel silt and clay deposits. There are no unique geological or hydrological features, and no risk of cumulative surface hydrology impacts from adjacent areas or developments. More detailed description and figures representing the topography and drainage are shown in "Section 10" of the ESIA. Project impacts from site preparation for construction are site specific and are not expected to have incremental impacts to the regional profile.		
Archaeology and Cultural Heritage	Consultation with the Ministry of Antiquities of Egypt and Directorate of Antiquities of Aswan Governorate confirmed that there are no known archaeological or cultural heritage sites in the Project site and no significant finds are expected. A field survey was undertaken in October 2024 by an archaeology and cultural heritage expert and no archaeology and cultural heritage sites were identified or recorded within the Project site and nor any evidence for such sites in the vicinity. The nearest archaeological site is the Kom Ombo Temple, 15 km northeast. No cumulative impacts on archaeology or culture heritage are expected.		
Air Quality and Noise	Concerns about air quality during construction were raised at the public scoping meeting. While the Project may generate increased noise and dust during construction, the nearest community Al Raqaba Local Unit is located 6.5 km to the east and would not reach the village. Noise and dust impacts are project and site-specific and likely to occur in a localized area mainly during construction with no overlapping spatial extent with other projects. Therefore, no cumulative air or noise impacts are expected. Standard mitigation measures will be applied to suppress dust and are predicted to be of negligible significance.		
Visual / aesthetic impacts	Potential increase in reflection from the solar panels causing glare and glint related visual impacts was raised at the public scoping meeting. The panels will have anti-reflective coating to reduce reflection. Since the Abydos for Renewable Energy Solar Project is located 6.5 km from the nearest community of Al Raqaba Local Unit and 5.5 km from the next nearest solar project, the cumulative visual impact is considered negligible in the local land use context. The site would mainly be visible by road users on the Aswan – Luxor Highway located 1 km west of the site.		
BIODIVERSITY			
Proximity to Protected Areas & Key Biodiversity Areas	The ESIA consultant met with NCE who confirmed that the project is located in an area of low sensitivity and not located in or near any Key Biodiversity Areas (KBAs) or near a known bird migration route. The Abydos for Renewable Energy Solar Project is located 45 km northeast of the Kor Kor and Dongol Protected Area and, 30 km north of the lake Nasser IBA, and 56 km south of the Upper Nile IBA (see Figure 2-1 and Figure 2-2). The nearest major bird migration flyway is the Rift Valley/Red Sea flyway which is more than 200 km away. In addition, during field surveys covering flora and fauna on the site, no species of conservation concern has been identified in the project area.		

VEC	Rationale For Selection	Boundaries	
		Spatial	Temporal
Habitat Loss	The Project site comprises entirely natural habitat (as there has been no previous land use on the site) and it is located in the Desert and Xeric Shrublands Biome and the South Sahara Desert Ecoregion and is less than 7 km from the Nile Valley Flooded Savanna Ecoregion. The Project site is extremely dry and poorly vegetated and 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. Therefore, given the widespread occurrence of the habitat types, there are unlikely to be cumulative impacts from habitat loss for the Project. A project-specific Biodiversity Management Plan will cover the mitigation and management requirements for biodiversity features potentially impacted by the Project.		
Loss of Flora Species	A botanical assessment was undertaken in Sept 2024 which was deemed sufficient as most plants were visible and it was suitable time to identify any rare or important species. Vegetation covers is typically limited to sandy vegetated depressions where scarce rainfall collects. Fifteen native plant species were confirmed on site and no alien species. Ony one endemic plant species was recorded (9 individuals in two locations) in a northern part of the site (*Hyoscyamus boveanus*) out of six potential endemic species known from the wider area. This species has an estimated population of 3000-6000 and an extent of occurrence of 81,000 km^2 (and therefore does not qualify as a restricted range species that could qualify for critical habitat species under IFC PS6 thresholds). However, it's population is fragmented, and it is declining due to climatic change and over-collecting. It is primarily found in the Saint Katharine Protectorate and Mediterranean coastal strip, but also found in oases and other vegetated areas in the Red Sea coast and South Sinai areas of Egypt. Any impacts on this species will be mitigated through seed collection from existing specimens of *Hyoscyamus boveanus* at the appropriate time of year (likely October-November) and micropropagation of existing specimens within the Project site once during the operation phase. It is required that collected seeds will be stored in appropriate conditions and any specimens collected for micropropagation should be managed and maintained by appropriately experienced botanists.		
Loss of Fauna (excluding Bird) Species	Surveys confirmed two mammals, one lizard, and two invertebrate species, all Least Concern, and indicated that no suitable habitat is present that would support faunal species of conservation concern. Given the widespread habitat types across a large area, paucity of faunal species present, cumulative impacts of habitat loss for site development are expected to be minimal and non-significant.		
Loss of Bird Species	Surveys confirmed eight birds, all least concern, and indicated that no suitable habitat is present that would support species of conservation concern. Habitat loss for the Project will displace desert adapted birds and there is a predicted low risk of bird mortality with panels. The cumulative impacts of solar development on birds are considered of low significance given low abundance of common species and widespread similar habitats. The increase shade and water runoff on soil moisture from the panels may create improved habitat conditions for biodiversity but these impacts as well as bird collision will need to be monitored. No migratory bird species or birds of potential collision risk with transmission lines were recorded. Satellite tracking information on migratory and soaring birds (MSB) confirmed the project is located a significant distance from main migration routes of MSB species (see Figure 2-3) which mainly follow the Nile River valley and western coast of the Red Sea although some may occasionally pass over the Project vicinity. Birdlife International Soaring Birds Sensitivity mapping tool for the site and 5 km buffer indicated that the site sensitivity is zero. All 15 MSB species that may pass over the area are Least Concern.		

VEC	Rationale For Selection	Boundaries	
		Spatial	Temporal
	A corridor of three parallel 500 kV overhead transmission lines (OHTLs) are aligned north-south along the Aswan Highway, a distance of 1 km from the Project site (Figure 2-4). Other OHTLs traverse the wider area east-west in places. The Project will only require construction of an OHTL that will connect the Project site to the existing national grid. Once OHTL is identified it will be subject to a standalone ESIA assessment. However, this OHTL will have a negligible incremental impact on birds in the context of the existing grid network of OHTLs, paucity of collision prone bird species in the project area, and the large distance from main migration routes.		

In summary, the following VECs have been screened in for further assessment:

- Water use
- Waste generation
- Traffic generation
- Worker influx

2.1.3 Supporting Maps on Biodiversity

The maps below are extracted from the ESIA and are useful to support the predicted lack of significant cumulative impacts on biodiversity described in Table 2-1.

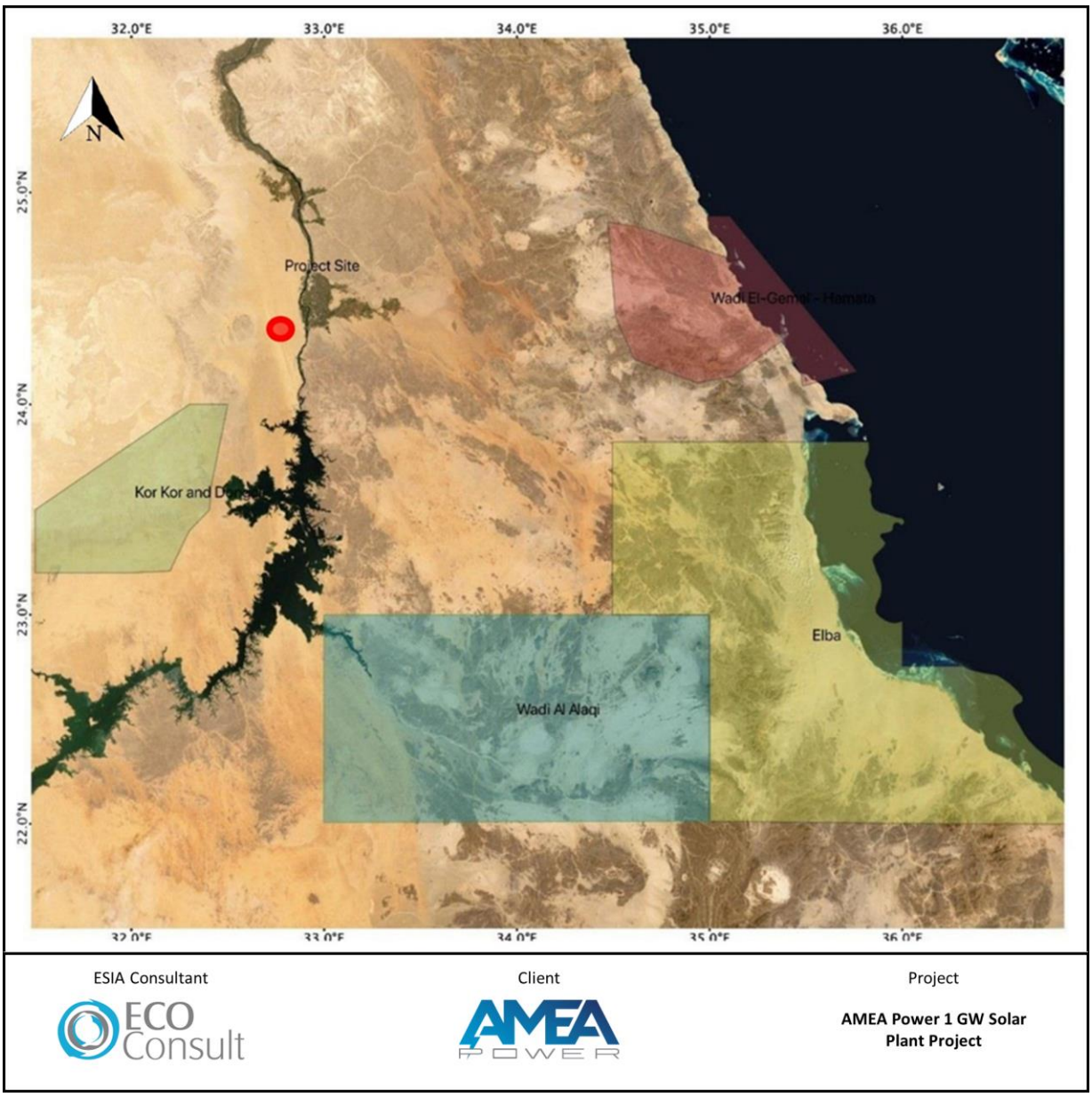
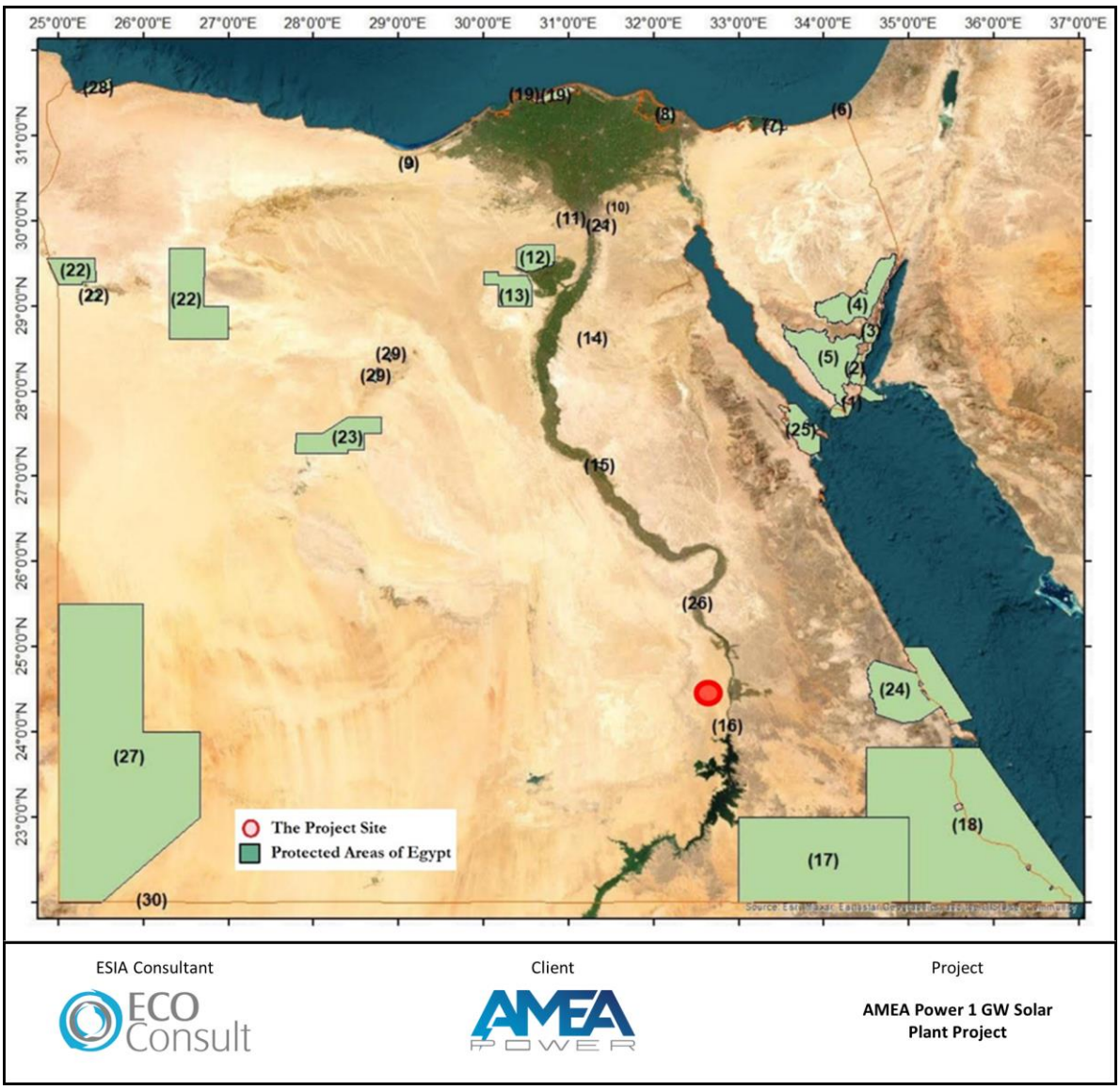


Figure 2-1: Location of the Project Site in Relation to Protected Areas



12: Upper Nile IBA (59 km); 13: Aswan Reservoir IBA (36km); 14: Lake Nasser IBA (59km).

Figure 2-2: Location of the Project Site in Relation to IBAs

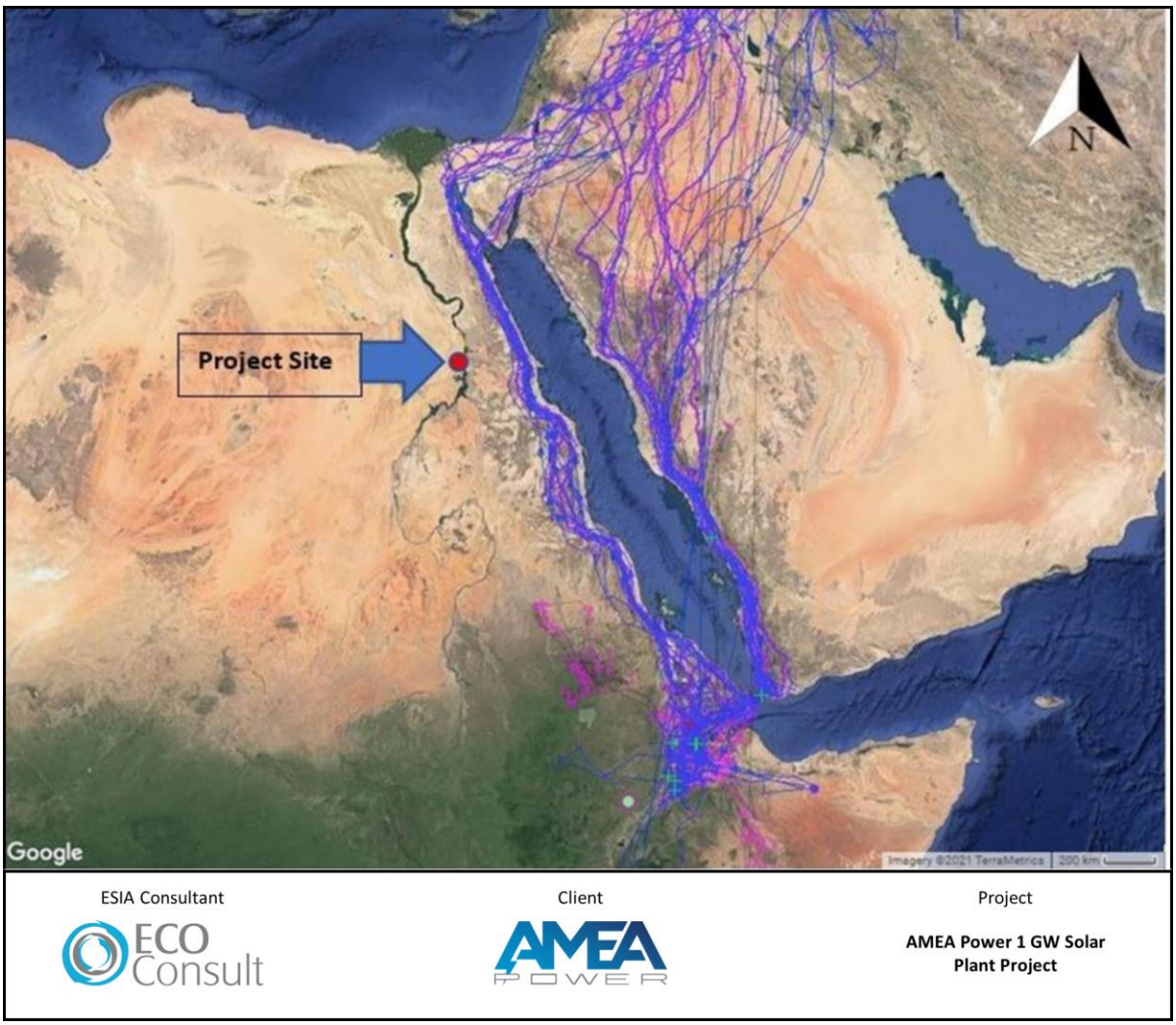


Figure 2-3: Location of the Project Site in Relation to Bird Migration Routes

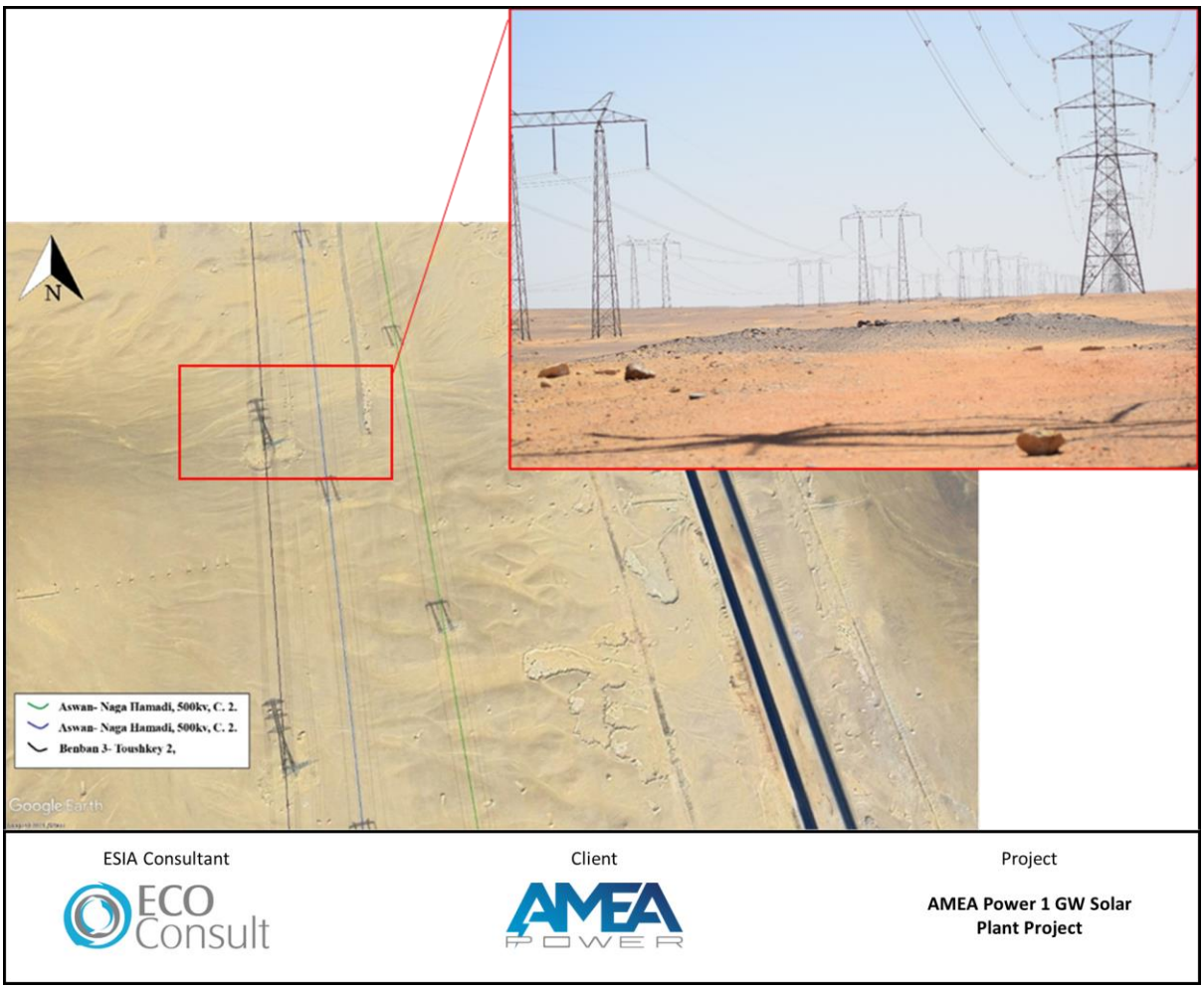


Figure 2-4: Existing Network of Transmission Lines Close to the Project Site

2.2 Identification of Other Activities & Environmental Drivers

2.2.1 Introduction

This step requires identifying other past, existing or planned activities within the overlapping spatial or time boundaries and assessing the potential presence of natural and social external influences or stressors that may cumulatively impact on environmental resources and/or social receptors.

To gather information on existing and planned developments in the area, the ESIA Consultant engaged with the Urban Planning Directorate in Aswan Governorate and NREA.

- New and Renewable Energy Authority (NREA) (November 2024). NREA were requested to provide information on other planned renewable projects within the area. NREA indicated that there are other planned solar PV projects within the region but at this point, such information is considered confidential. Alternative sources of information were used to obtain such information.

  Through such alternative sources of information, it is known that another 1.2GW solar PV development project through a private sector developer is planned that will be distributed across two sites:

1. A 900 MW facility located approximately 400 km from the Project site in a different Governorate, rendering it irrelevant to this assessment (its exact location is not disclosed due to confidentiality).
2. A 300 MW project planned within the existing and operational Benban Solar Park (discussed in further details below).

- Urban Planning Directorate in the Aswan Governorate (November 2024). Information on other planned development projects within the project region was requested and they confirmed the only planned development in the area is an agriculture reclamation project known as "Jannah Misr".

2.2.2 Other Existing and Planned Activities

(i) Surrounding Solar Developments

Within Aswan Governorate, there are five solar PV projects within 50 km of the proposed Abydos for Renewable Energy Solar Project, all of which are already operational and one that is planned (to be located within the operational Benban Park). These include the Benban Solar PV Project, the Abydos Solar Power Company (ASPC)500 MW PV Solar Project, the ACWA Power Kom Ombo 200 MW Solar PV Project, and the NREA 26 MW Solar PV Project, as summarized in Table 2-2. Additional information on each project is provided below.

Table 2-2: Summary of Existing Solar Projects

Solar Projects	Status	Size (km^2)	Distance from Abydos for Renewable Energy Solar Project
Abydos for Renewable Energy Solar Project	Proposed	20 km^2	-
Benban 1.8GW Solar PV	Operational since November 2019	37.2 km^2	5.5 km northwest
Benban 300MW Solar PV	Planning phase	Unknown	5.5 km northwest
ASPC 500 MW PV	Final construction phase. Operation due to start Nov 2025.	2.77 km^2	26 km northwest
ACWA Power Kom Ombo 200 MW Solar PV	Operational since July 2024	5 km^2	27 km to North
NREA 26 MW Solar PV	Operational since 2020	0.5 km^2	27.5 km to North (adjacent to Kom Ombo)
	Total:	~66 km^2	

The Abydos for Renewable Energy proposed solar plant at 20 km^2 in size will comprise approximately 30% of the total land area occupied by all the five solar projects.

Figure 2-5 presents the boundaries of these surrounding solar PV projects, as well as the Project boundary.

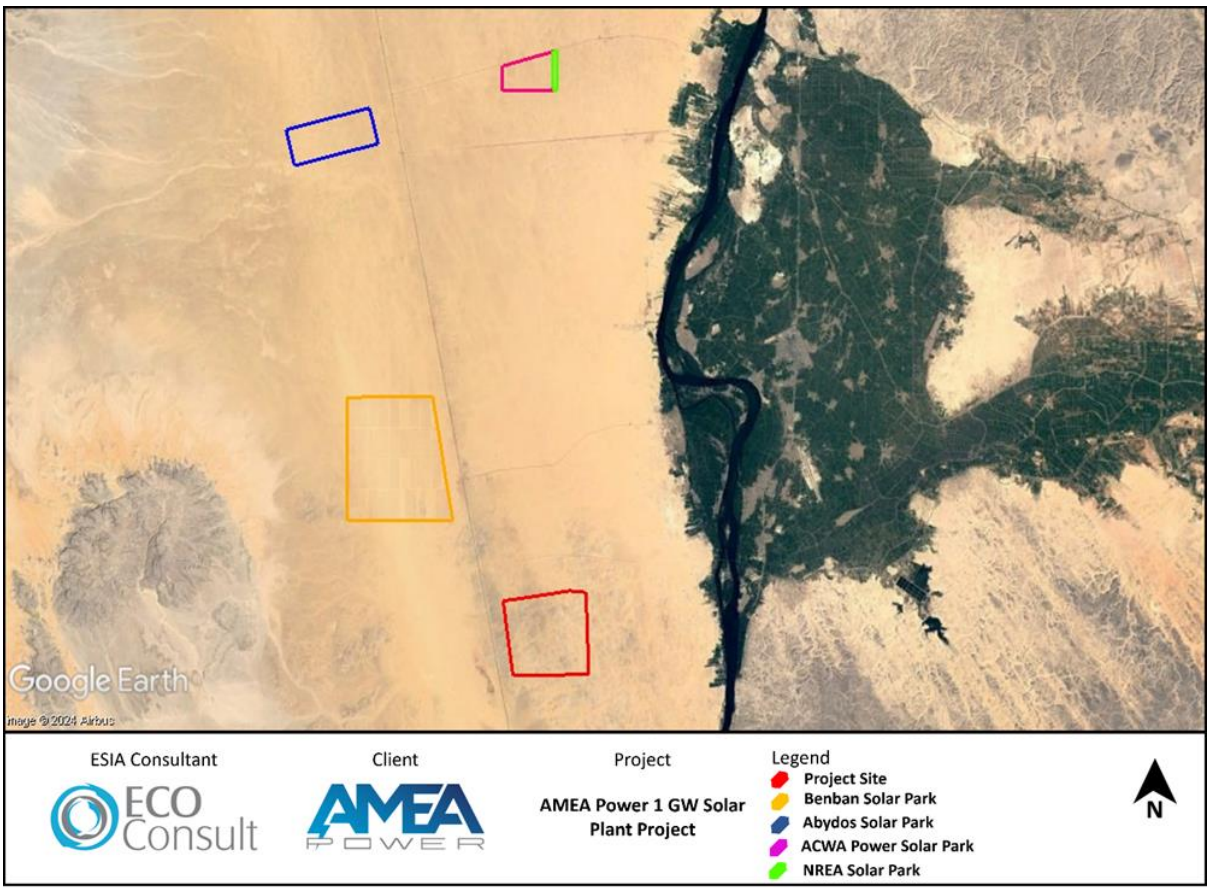


Figure 2-5: Other Solar PV Projects in the Project AoI

Benban 1.8GW Solar PV Project

The Benban Solar PV Project is located approximately 5.5 km northwest of the Project site. The development is an operational 1.8 GW Solar PV Park. This solar PV Park has an area of approximately 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.

There is currently a planned 300MW solar PV Project planned which will be located inside Benban Park.

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.

Abydos Solar Power Company (ASPC) 500MW PV Solar Project

Through the Build, Own and Operate (BOO) mechanism, a direct proposal was submitted by AMEA Power Ltd. to the Egyptian Electricity Transmission Company (EETC) for the development of a 500 MW Solar PV Park in Aswan Governorate, more specifically within the Kom Ombo area. The Power Purchase Agreement (PPA) was signed accordingly. The Project is currently operational since November 2025.

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

ACWA Power Solar PV Development

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

The Park is located around 27 km to the north of the Project site, on an area of around 5 km^2. This Park is also located within Kom Ombo District and the closest village is Fares located around 8 km to the east.

NREA Solar PV Development

NREA has developed a 26 MW Solar PV Park that is operational. The Park is located around 27.5 km to the north of the Project site and has an area of about 0.5 km^2.

(ii) Planned Agricultural Reclamation Project

Consultations with the Urban Planning Directorate in Aswan Governorate revealed that the only planned development within the Project AoI is a government-led agricultural reclamation initiative called "Jannah Misr." The approximate location of this project was determined based on qualitative information. The indicative area is illustrated in Figure 2-6, but does not represent precise locations or boundaries.

The agricultural reclamation project will involve converting barren land into arable farmland, typically through land levelling and the establishment of irrigation systems. Groundwater extraction via wells serves as the primary water source, with irrigation methods like drip or sprinkler systems tailored to the crops or trees being cultivated also being utilized.

The project aims to provide opportunities for local community members to claim plots for agricultural use once the reclamation work is complete.

Currently, the initiative remains in the planning phase, and no construction activities are expected within the next 1.5 years. As such, no overlap with the construction phase of the Abydos for Renewable Energy Solar Project is expected. Furthermore, the reclamation work will be implemented in phases rather than as a single, large-scale undertaking, minimizing potential cumulative impacts during the early stages of operation of the Abydos for Renewable Energy Solar Project.

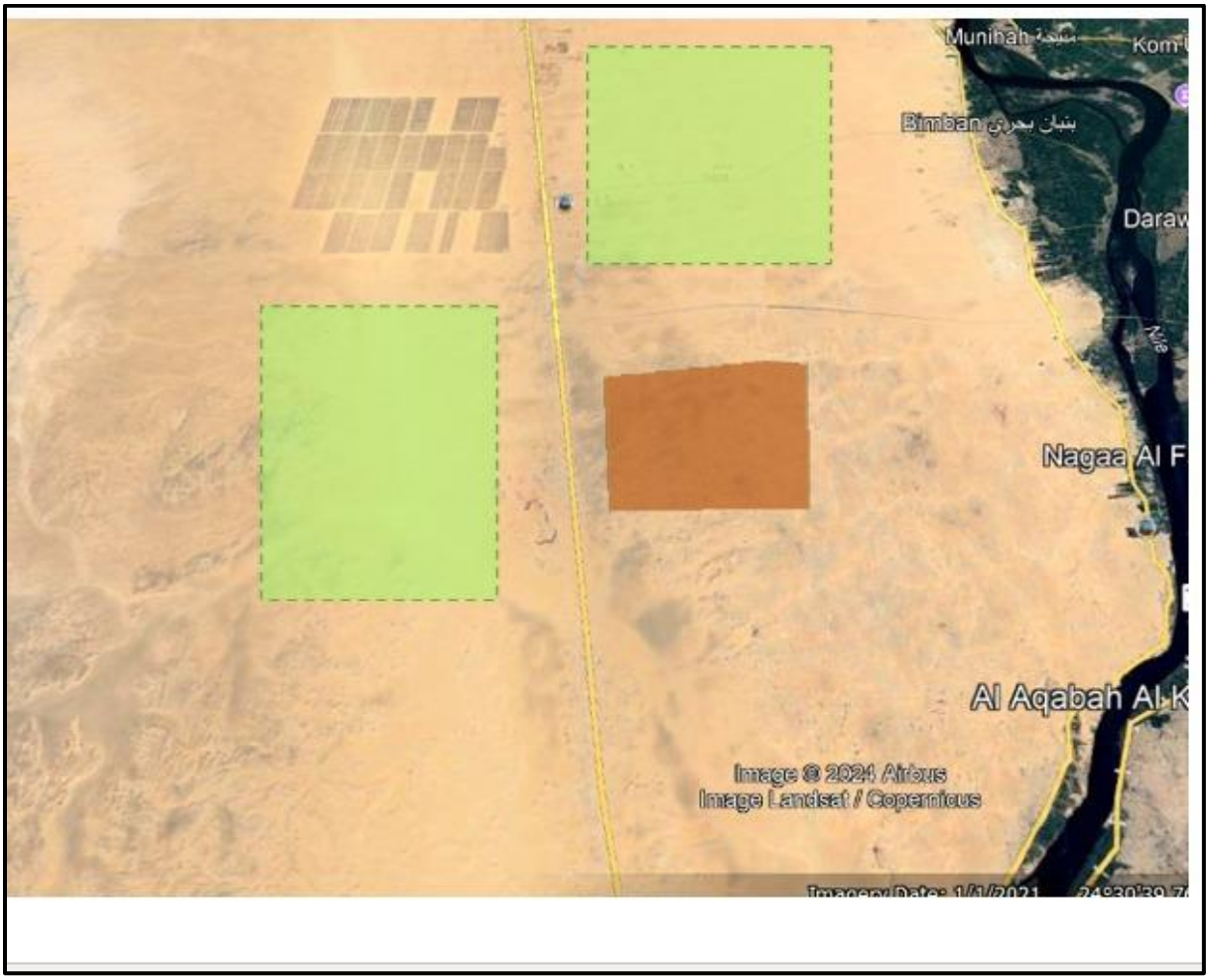


Figure 2-6: Indicative Agricultural Areas for the Planned Jannah Misr Project

(iii) Existing and Other Planned Infrastructure

A. Road Networks

The Abydos for Renewable Energy Solar Project site is located approximately 1 km east of the Aswan – Luxor Highway, a major highway in Egypt along the Nile River in the Aswan Governorate. The highway connects the Aswan Governorate to other governorates in the north. The highway has a width of 12 m and has moderate traffic consisting of vehicles including heavy goods vehicles. From this highway, a short access road of less than 1km in length will be required to connect with the Abydos for Renewable Energy Solar Project site.

In addition, from the Aswan – Luxor Highway there are four secondary access 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 Figure 2-7.

According to consultations undertaken with the Roads and Bridges Directorate in Aswan Governorate it emerged 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 illustrated in Figure 2-7.

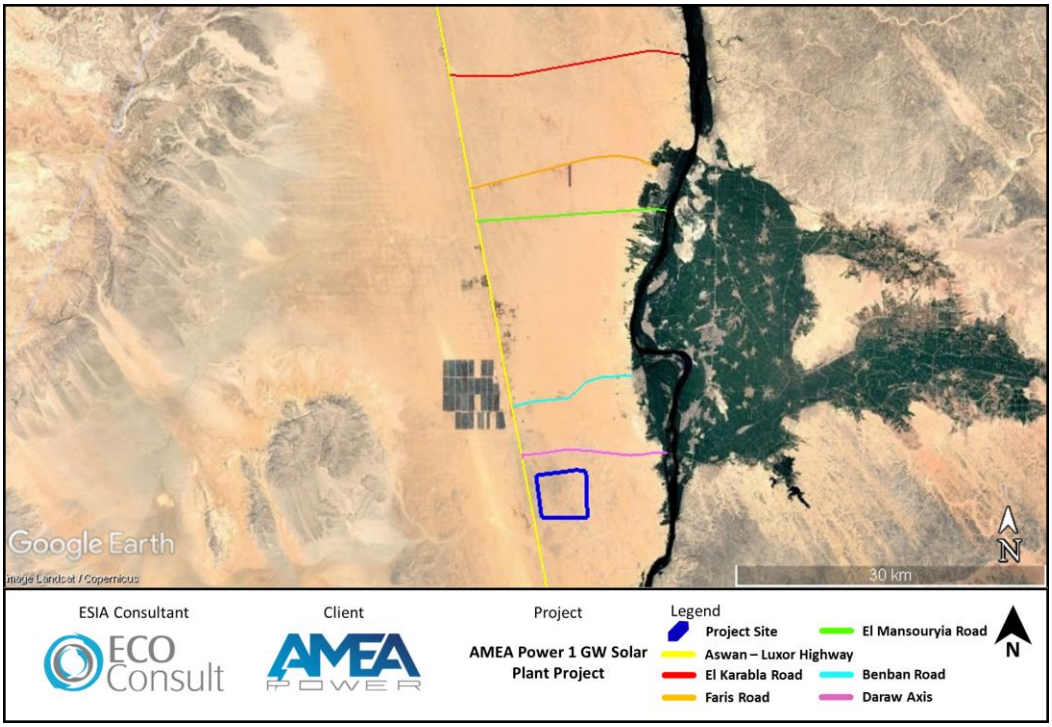


Figure 2-7: Road Networks within Project AoI

B. Gas Infrastructure

Based on a site visit undertaken by the ESIA team, a natural gas pipeline was observed to run parallel to the Aswan – Luxor Highway, some 800 m to the west of the Project site (Figure 2-8). In addition, a natural gas pumping station is located approximately 2 km to the southwest of the Project site (Figure 2-8).

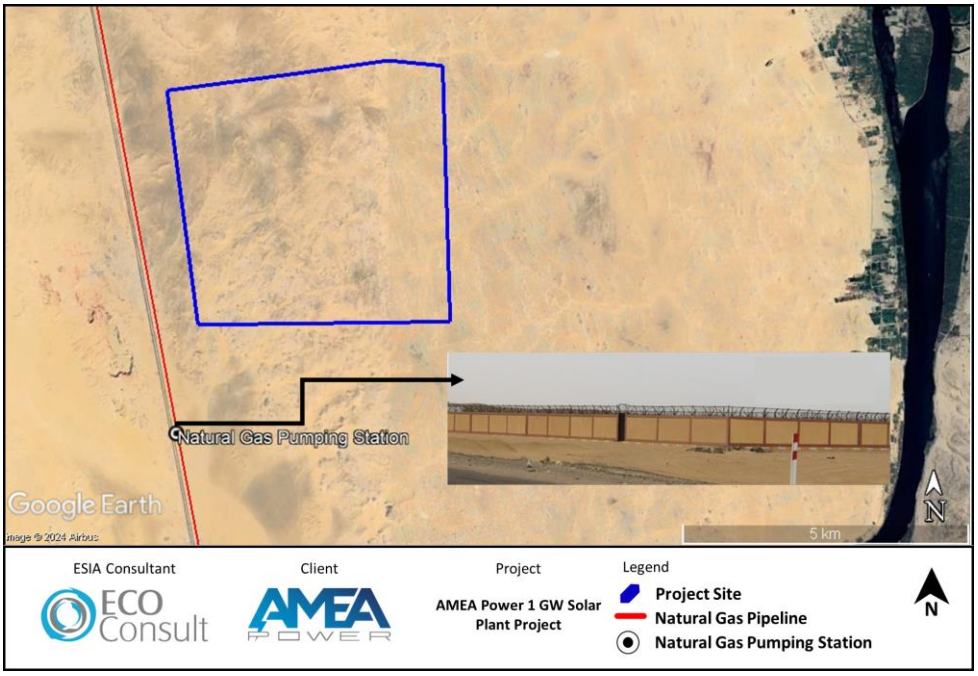


Figure 2-8: Natural Gas Pipeline and Pumping Station in relation to the Project Site

C. *Electricity Networks*

Three high voltage overhead transmission lines (OHTLs) are located approximately 1.4 km west of the Project site and run parallel to the Aswan – Luxor Highway as depicted in Figure 2-9. The OHTLs are operated by the EETC.

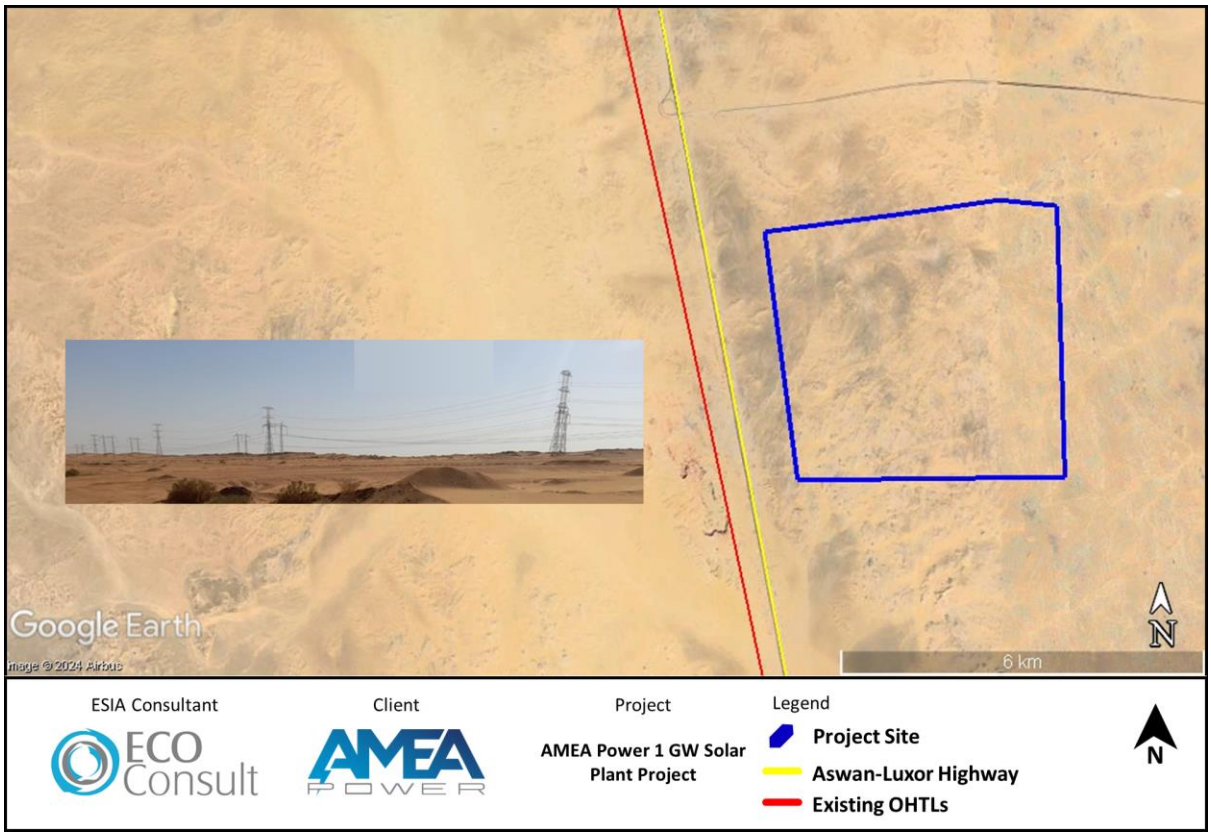


Figure 2-9: Existing OHTLs near the Project Site

2.2.3 *Other Anthropogenic Activities*

(i) *Agriculture*

Agriculture is a key economic activity within the Daraw District of Aswan Governorate. Agricultural activities in the region have been significantly impacted by anthropogenic developments, such as the construction of the Aswan High Dam. While the dam has facilitated irrigation and flood control, it has also led to reduced sediment deposition downstream, impacting soil fertility. Additionally, water scarcity and the potential effects of climate change, including rising temperatures and changing precipitation patterns, pose challenges to agricultural activities in the Aswan Governorate. These dynamics influence the region's ability to meet the increasing demands for food and water from a growing population.

Agriculture is a primary user of water from the Nile River using an estimated 86% of all abstraction (Sayed 2022). The cumulative impact of all irrigation projects along the Nile is substantial relative to the requirements for solar projects.

As discussed within "Section 9" of the ESIA, there is no evidence of any agriculture activities or grazing activities which are common practices undertaken by local communities within the Project Area.

(ii) Road Traffic

As detailed in the ESIA Report, consultation was undertaken with the Ministry of Transport, Roads and Bridges Directorate in Aswan Governorate on 10 September 2024 in addition to a traffic study conducted over two days (14 and 17 October 2017). The following key observations were noted:

- The Aswan – Luxor Highway is a key route for transporting goods and equipment. The condition based on the 2017 study is classified as "good," with certain sections undergoing maintenance to improve safety and capacity.
- The Aswan - Luxor Highway typically has two lanes in each direction, with a total width of about 12 meters, suitable for heavy machinery and equipment transit.
- 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.
- 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 road and other 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 Aswan – Luxor Highway.
- The transportation of oversized equipment along the Aswan – Luxor Highway must follow Egyptian regulations. The Project must coordinate with relevant authorities to secure permits and ensure any transportation does not disrupt regular traffic.
- Traffic management measures are needed to ensure the safety of construction vehicles and civilian traffic during peak periods.
- The Project entrance design must consider accommodating 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.

Typical impacts associated with road traffic are noise pollution, air pollution, collisions with wildlife and wear and tear of roads. There are about three farm settlements in close proximity of each other 12 km north of the Project Area alongside the Aswan – Luxor Highway that could be impacted by project transport.

(iii) Waste Management (Solid Waste, Wastewater, and Hazardous Waste)

As indicated in the ESIA Report, consultation was undertaken with the Solid Waste Management Department, the relevant authority on Hazardous Waste at the Egyptian Environmental Affairs Agency (EEAA) in Aswan Governorate on 9 September 2024 and with the National Aswan Water and Wastewater Company (NAWWCo) on the 10 September 2024. The following was noted during the consultation:

- The Nasreya Landfill is currently the only certified government hazardous waste landfill in Egypt and operates according to local standards under Egyptian law. The Environmental Department does not have details regarding its compliance with international standards.
- Hazardous waste (oil, lubricants, paint cans and solvents) 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. As part of consultations expected quantities to be generated were provided, and it was confirmed that such facility will be able to accept and handle such amounts.
- 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 2024 to meet the governorate's waste disposal needs.
- The Project site and neighboring areas use the El Alaqi Landfill, which accepts solid, demolition, and construction waste, and complies with the waste management legislation and Egyptian standards.
- The Project's solid waste disposal will not strain existing facilities as the new Edfu Landfill will be available soon. As part of consultations, expected quantities to be generated were provided, and it was confirmed that such facilities will be able to accept and handle such amounts.
- In general, the water supply sources for Aswan Governorate in the past five years has been the Nile River which provides the principal water source for supply of substantial volumes for domestic, agricultural, and industrial purposes. Water is extracted from the Nile River via intake stations, where it undergoes treatment before being distributed for various uses. As part of consultations with NAWWCo, expected quantities of water required were provided, and it was confirmed that such quantities can be provided without any constrains or limitations on any users.
- Finally, consultations with NAWWCo also indicate that expected quantities of wastewater generated from the Project can be easily handled by the New Aswan City WWTP

Poor waste management practices can result in (i) pollution of soil and water resources (on land and sea) including related impacts on biodiversity; (ii) contribution to climate change and air pollution; (iii) the spread of litter; (iv) the spread of diseases; and (v) affect the aesthetics of the landscape.

2.2.4 Environmental Stressors

The information provided below is synthesized from "Section 20" of the ESIA – Climate Change Risk Assessment.

Below is table summarizing the stressors and their interaction levels with the project as described.

Table 2-3: Summary of relevant climate change related stressors and their interaction with the project

Stressor	Interaction Level	Comment
		■ High ☐ Moderate

Stressor	Interaction Level	Comment
		☐ Low/Negligible
Temperature Increase and Heat Waves	☐	Increased temperature and effects on evaporation and water demand could potentially reduce water availability over time
Sea Level Rise and Riverine Floods	☐	Project location in inland areas far from coastlines limits direct impact.
Urban Floods	☐	No direct link with project; project is located in a desert area with no connection to urban flood risks.
Extreme Weather Events	☐	Temperature increases, heatwaves, and storms could disrupt operations and maintenance.
Wildfires	☐	Low risk in desert areas due to lack of vegetation
Infectious Diseases	☐	Low risk of climate related disease changes in desert environment
Water Scarcity and Drought	☐	Increased drought could reduce water availability for solar and agricultural projects at cumulative level. Water is critical for project construction and operations, especially for cleaning panels and cooling.

(i) Temperature Increase and Heat Waves

The World Bank's "Climate Risk Country Profile: Egypt" (2021) highlights the escalating climate risks posed by rising temperatures. Historical data from 1991–2019 indicate an annual mean temperature of 22.5°C, with monthly averages ranging from 13°C in January to 30°C in July. Observations show an accelerating warming trend, with annual temperatures increasing by 0.53°C per decade over the past 30 years, compared to 0.1°C per decade between 1901–2013.

Projections under a high-emission scenario Representative Concentration Pathway (RCP 8.5) estimate average maximum temperatures of 30.04°C in 2024, rising to 31.56°C by 2050. Days with a heat index exceeding 35°C are expected to surge by the century's end, signaling significant health and operational risks. Aswan Governorate is classified as high-risk for extreme heat.

Higher temperatures are anticipated to accelerate water loss through evaporation, especially in reservoirs and open water bodies like the Nile. Some projections estimate evaporation could reduce water availability by up to 70% in certain scenarios. However, the specific impact will depend on localized conditions and mitigation measures. These findings underscore the importance of integrating heat resilience measures into the Project design and operations (as well as water efficiency).

(ii) 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 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 in the desert fringes, approximately 8 km west of the Nile River floodplain, at an altitude of 80 m above the Nile River's ground level. The potential rise in water levels in the Nile River due to climate change remains uncertain.

(iii) 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. 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.

(iv) Extreme Weather Events

Sand and Dust Storms:

Egypt is projected to experience an increase in the frequency and intensity of sand and dust storms due to climate change (World Bank, 2021). These storms, already prevalent in the region, pose significant respiratory health risks, including asthma, pneumonia, and pulmonary fibrosis. The Project is assessed to face moderate risk from such storms, which could impact outdoor workers during construction and operation phases.

Earthquakes:

In the Aswan Governorate, earthquakes are classified as a low-risk hazard by the Think Hazard tool. While the risk of earthquakes is minimal, seismic considerations are incorporated into the detailed design of the Project to ensure resilience.

Other Risks:

Other natural disasters, including tsunamis, volcanoes, and cyclones, are not relevant to the Project area. These assessments ensure appropriate planning to mitigate risks and safeguard workers and infrastructure.

(v) Wildfires

Wildfire is defined as an unplanned, unwanted, and uncontrolled fire occurring in an area with combustible vegetation. 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.

(vi) Infectious Diseases

Climate change is expected to indirectly affect public health in Egypt by altering the distribution of vector-borne diseases, waterborne pathogens, and air quality. Evidence links climatic conditions to the prevalence of infectious diseases, and Egypt's vulnerability to mosquito-borne, fly-borne, and snail-borne parasitic infections may worsen with ongoing climate shifts. Malaria and dengue fever, in particular, are highly sensitive to climate fluctuations, posing significant health concerns for the Project.

According to the Centers for Disease Control and Prevention (CDC), Egypt eliminated malaria, with the last locally transmitted case reported in 1998. However, sporadic outbreaks have occurred, such as the 2014 locally acquired *P. vivax* malaria cases in Aswan Governorate, attributed to Sudanese migrants. These cases underscore the potential for re-emergence of diseases under favorable conditions.

The World Bank's Climate Risk Country Profile (2021) projects an increase in climate-sensitive diseases like malaria, dengue fever, and respiratory infections across Egypt. For the Project, the influx of 4,000 workers during construction heightens the risk of introducing new disease reservoirs, potentially affecting both workers and local communities. Effective health management and mitigation strategies are essential to minimize these risks and ensure community well-being during the Project's implementation.

(vii) Water Scarcity and Drought

Based on the "Water Saving in Irrigated Agriculture in Egypt" (Lambert, 2017), the 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, the 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.

(viii) Climate Change Risks for the Project

The assessment concludes that the climate-related risks are highly vulnerable and significant in the Project area. Water scarcity, droughts, erratic rainfall, sea level rise and wildfire are already affecting local population regarding livelihood and living conditions aspects.

From a project perspective, climate-related risks are quite low. However, some factors need to be monitored, and these include extreme weather events, temperature increase and heat waves. 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. Working in outdoor areas and exposure to high temperatures entails occupational health and safety risks on workers during the construction and operational phase. The Occupational Health and Safety Plan (OHSP) is to be prepared for the construction and operational phase and should take into account risks from working in sunny

conditions and high temperatures._sand and dust storms, which could adversely affect the Project by impacting on outdoor workers and laborers.

3. ASSESSMENT OF CUMULATIVE IMPACTS

The assessment considers the Project's anthropogenic activities, external factors and environmental stressors in the landscape that could contribute to the alteration of the baseline conditions of each VEC selected during the scoping task (see Section 2.1). For each VEC, a parameter is identified that is used as a metric to estimate the relative contribution of each contributor (project, activity, factor, stressor) to the overall alteration of the VEC. Cumulative impacts are considered significant when there is more than one main contributor to the overall impact, of which one is the Abydos for Renewable Energy Solar Project. The cumulative impact on each of the four screened in VECs (water, waste, traffic and worker influx) is discussed below.

3.1 Water Resources

3.1.1 Description of the VEC and the Spatial and Temporal Boundaries

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. The main source of water supply in Aswan Governorate is surface water, particularly from the Nile River, which plays a crucial role in meeting the region's water needs (CAPMAS, 2023).

It is expected that the Project throughout the construction and operational phase will require water for potable usage (drinking, showering, etc.) and non-potable usage (e.g. cleaning of machinery and vehicles). The spatial boundary considered is the landscape region of Aswan Governorate and the temporal boundary is the Project life cycle (construction and operation).

Table 3-1: Summary of Water Consumption for Solar Projects

SOLAR Projects	Consumption (m^3/year)	Comment
Benban Park (operational projects)	11,040	Provided by FMC based on consultation undertaken by ESIA Consultant.
ASPC Project	3,000	Scaled from FMC numbers
ACWA Power Project	1,230	Scaled from FMC numbers
NREA Project	160	Scaled from FMC numbers
Project Site (Abydos for Renewable Energy Solar Project)	73,000	Assumed worst-case scenario and therefore numbers for construction are considered in calculation.
Benban Park (planned 300MW project)	20,000	Assumed worst-case scenario and therefore numbers for construction are considered in calculations. Scaled from Abydos for Renewable Energy Solar Project numbers.
TOTAL	**108,430**	**This amount is worst-case and applicable during construction phase of** Abydos for Renewable Energy **and planned 300MW project in Benban Park.**

3.1.2 Assessment Metrics

The metric for water resources selected as a proxy for the assessment of cumulative impacts comprises: Water availability and demand.

3.1.3 Assessment

Table 3-2: Assessment of Cumulative Impacts on Water Resources

Contributors to cumulative Impact	Description of impact on water resources	Spatial and Temporal Overlap of Impacts
		■ High ☐ Moderate ☐ Low/Negligible
Water availability and demand		
Abydos for Renewable Energy Project	Total water requirements during the construction phase are estimated at 73,000 m^3/year and sufficient water has been confirmed by Aswan Water and NAWWCo to be available without restricting access from other users. Although this is significantly greater than the combined water use of the other four solar projects in the wider area (as they are operational), the impact of the Project on water availability is insignificant.	☐
Other solar development projects	Total water consumption/usage from the other solar projects are estimated at 35,430 m^3 per year for operational projects along with the 300MW planned project. Given the confirmed water availability from the Nile River (confirmed by the Aswan Governorate), the combined impacts on water resources are minimal and the cumulative impact on water availability is insignificant.	☐
Agriculture and Planned Agricultural areas	Agriculture demand in Aswan accounts for 86% of all water use). The planned Jannah Misr Reclamation Project has not been scaled yet and is still in the planning phase. It is only likely to start after 1.5-2 years which will not overlap with the construction phase of the Abydos for Renewable Energy Solar Project or the planned 300MW project in Benban Park, but only the operational phase when water requirements are significantly reduced. In addition, this project in specific is expected to rely on groundwater wells within the agricultural area.	☐
Other industries and households	Water abstraction from the Nile River for municipalities and industry accounts for 11% and 3%, respectively. Growing population and urbanization are increasing pressure on water supplies but the cumulative impact of the Project on water resources, taking into account the relatively small proportion required and the confirmed availability, is negligible.	☐
Climate change	Climate change related increase in temperature rise and heatwaves, and associated evaporation will place increased pressure on water resources. 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 water stress in the country.	☐

3.1.4 Significance of the Cumulative Impact

While Egypt relies heavily on the Nile River for water supply with agriculture being the largest water user by far (86%) and water demand for human needs increasing, the water demand for the Abydos for Renewable Energy Solar Project will contribute a very small portion of the cumulative impact of existing and planned projects on water availability. In addition, construction of the Project along with the planned 300MW project in Benban Park will be done while all other solar projects are already in operation (when water requirements are lower) and before any planned agriculture development is initiated by which point construction of Abydos for Renewable Energy will be completed. Finally, as noted earlier, NAWWCo confirmed they will be able to provide water requirements without restricting access from other users. The cumulative impact is assessed as non-significant.

Climate change is an important factor forecast to increase stress on water resources. A proposed strategy for managing this issue is provided in "Section 20.5" of the ESIA.

3.2 Waste Generation

3.2.1 Description of the VEC and the Spatial and Temporal Boundaries

The project will generate three different waste streams namely solid waste, wastewater and hazardous waste. The majority of solid waste will be generated during the construction phase, and will comprise general municipal waste, and packaging materials, estimated at 2,000kg per day and construction waste such as cables, metal, and wood also estimated at 1,000kg per day (total 3,000kg per day). During operation solid waste will comprise municipal waste of 45kg/day.

Wastewater during construction and operation includes black water (sewage water from toilets and sanitation facilities) and grey water (from sinks, showers, etc.). Hazardous waste during construction and operation from them 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.

The spatial boundary for waste is considered the landscape region of Aswan defined by the disposal sites and waste transport routes while the temporal boundary is the Project life span of 25 years (construction and operation).

Table 3-3: Summary of Cumulative Waste Generation from Existing and Proposed Solar Projects

Project	Waste Generation				Comment
	Solid Waste (non-hazardous) (kg/year)	Wastewater (m3/year)	Liquid hazardous waste (Liters/year)	Solid hazardous waste (kg/year)	
Benban Park (operational projects)	11,196	11,928	1,260	2,232	Provided by FMC based on consultation undertaken by ESIA Consultant.
ASPC Project	3,110	3,313	350	620	Scaled from FMC numbers
ACWA Power Project	1,244	1,325	140	248	Scaled from FMC numbers

NREA Project	162	172	18.2	32.24	Scaled from FMC numbers
Abydos for Renewable Energy Solar Project Site (this Project)	1,100,000	58,400	N/A	7,300	Assumed worst-case scenario and therefore numbers for construction are considered in calculation.
Benban Park (planned 300MW project)	21,900	17,500	N/A	2,190	Assumed worst-case scenario and therefore numbers for construction are considered in calculations. Scaled from Abydos for Renewable Energy Solar Project numbers.
Total	1,137,612	92,638	1,768	12,622	This amount is worst-case and applicable during construction phase of Abydos for Renewable Energy Solar Project and planned 300MW project in Benban Park.

3.2.2 Assessment Metrics

The metric selected as a proxy for the assessment of waste impacts is the amount of waste generated by the Project in the context of other Projects in the spatial and temporal boundary.

This impact is only assessed in the context of other solar project waste generation in the 28km radius around the Abydos for Renewable Energy Solar Project, and not relative to municipal waste generation from settlements and industry/commercial operations.

3.2.3 Assessment

Table 3-4: Assessment of Cumulative Impacts on Waste Management

Contributors to cumulative Impact	Description of impact on Waste Management	Spatial and Temporal Overlap of Impacts
		■ High ☐ Moderate ☐ Low/Negligible
Amount of Waste Generated for Disposal		

Contributors to cumulative Impact	Description of impact on Waste Management	Spatial and Temporal Overlap of Impacts
Abydos for Renewable Energy Solar Project	The maximum worst-case overall expected waste generated is 1,100,000 kg/year for solid waste and 58,400m3/year for wastewater. With correct storage and disposal measures in place the impact of waste from the Project is not expected to be significant. In addition, consultations with relevant utility entities confirmed that they will be able to accommodate and handle such waste quantities. Decommissioning of the Project after 25 years or more will require dismantling and disposing of old panels to landfill (worst case) or preferably recycling the solar panels at the end of their operational life by which stage recycling will likely be efficient at scale. A disposal plan will be prepared prior to decommissioning. The Abydos for Renewable Energy Solar Project will be constructed while the most other solar projects are in operation when waste generation will be reduced. This will at least reduce the cumulative waste impact in overlapping time scale.	☐
Other solar development projects	The maximum worst-case overall expected waste generated is 37,612 kg/year for solid waste and 34,238m3/year for wastewater. With mitigation measure it is not expected to be significant. In particular, the planned 300MW solar PV project in Benban is expected to undertake consultations with utility providers to confirm that they will be able to handle their waste streams.	☐

3.2.4 Significance of the Cumulative Impact

Based on consultations and quantities of waste provided, both Aswan Solid Waste Management and NAWWCo have confirmed they will be able to accommodate the Project waste requirements easily without affecting existing capacities. While the project will have increased waste management impacts on existing landfills, over and above other existing solar projects and waste generators, the cumulative impacts on waste facilities are not considered an issue of concern.

3.3 Traffic and Transportation

3.3.1 Description of the VEC and the Spatial and Temporal Boundaries

Delivery of equipment, machinery and materials, and labor to and from the project site for the construction phase will require an increase in heavy-duty vehicles on the roads and highways, with risk of increased traffic congestion, accidents, and degradation of road surface. Number of traffic vehicles is estimated at 740 equivalent vehicles per day at peak construction (please refer to "Section 14.2.4" in the ESIA for additional details on how this was calculated). Equipment such as solar panels will be brought in by road from the Ain Sokhna Port, but the route is not confirmed.

The spatial boundary for this VEC includes all roads and highways from the project site all the way north until Ain Sokhna Port. This is because all project vehicle journeys will converge onto the Luxor – Aswan

highway. The temporal boundary will only cover the construction phase (17 months). There are no significant operational impacts identified.

Table 3-5: Summary of Traffic Generation for Solar Projects and Existing Traffic

Project	Maximum Equivalent Vehicles per Year[1]	Comment	Equivalent per hour	equivalent Existing traffic per Hour For Luxor – Aswan
Benban Park (operational projects)	220	Provided by FMC based on consultation undertaken by ESIA Consultant.	9.2	170
ASPC Project	65	Scaled from FMC numbers	2.7	
ACWA Power Project	25	Scaled from FMC numbers	1.0	
NREA Project	3	Scaled from FMC numbers	0.1	
Project Site	740	Assumed worst-case scenario and therefore numbers for construction are considered in calculation.	30.8	
Benban Park (planned 300MW project)	222	Assumed worst-case scenario and therefore numbers for construction are considered in calculations. Scaled from Abydos for Renewable Energy numbers.	9.3	
TOTAL	**1,275**	**This amount is worst-case and applicable during construction phase of** Abydos for Renewable Energy **and planned 300MW project in Benban Park.**	**53**	**With all Projects (170 + 53 = 223)**

As noted within "Section 14.2.4" of the ESIA, the Luxor-Aswan highway currently is a 2-lane highway with a capacity of 3,500 equivalent vehicles per hour. As noted in the table above, the cumulative traffic is considered negligible taking into the existing traffic condition and highway capacity.

[1] Equivalent vehicles were determined whereby a double truck is equivalent to 5 vehicles, single truck to 3 vehicles and a half truck is equivalent to 2 vehicles).

3.3.2 Assessment Metrics

Assessment metrics selected as a proxy for the assessment of cumulative traffic impacts comprise in the context of existing and planned projects is: The number of vehicles by the project.

3.3.3 Assessment

Table 3-6: Assessment of Cumulative Impacts on Traffic and Transportation

Contributors to cumulative Impact	Description of impact on water resources	Spatial and Temporal Overlap of Impacts
		■ High □ Moderate □ Low/Negligible
Increased Traffic Loads		
Abydos for Renewable Energy Solar Project	The maximum expected vehicles for Project construction are estimated to be 280 per day (trucks, buses and service contractors) equivalent to 740 vehicles per day (whereby a double truck is equivalent to 5 vehicles, single truck to 3 vehicles and a half truck is equivalent to 2 vehicles). Over a 24-hour period this equates to approximately 30 vehicles per hour.	■
Other solar development projects	The maximum expected equivalent vehicles from other solar projects (during operation) are estimated to be 535 per day equating to an additional 22 vehicles per hour.	□
Future agricultural development	Traffic requirements for the future Jannah Misr project are unknown and are only likely to be required once the Abydos for Renewable Energy Solar Project is constructed and therefore there is a lower cumulative risk of increased traffic.	□
Existing traffic	Current approximate vehicles from existing traffic loads are estimated to be 4080 per day equating to 170 vehicles per hour.	■

3.3.4 Significance of the Cumulative Impact

The Abydos for Renewable Energy Solar Project will create an increase in construction traffic between the Ain Sokhna Port and the project site as well as between local settlements for transport of labor, as well as other construction traffic from nearby towns and suppliers. This is estimated to increase hourly traffic by 30 vehicles on average relative to the existing 170 equivalent vehicles. Since the Luxor-Aswan Highway has been upgraded to a 4-lane highway with a capacity of 3500 vehicles per hour, the contribution of the Project to cumulative traffic increase is considered non-significant. Further, increased traffic required for the planned agricultural project "Jannah Misr," will not overlap the construction phase and would occur during the operational phase of Abydos for Renewable Energy Solar Project, when traffic generated by Abydos for Renewable Energy Solar Project will have significantly decreased.

3.4 Worker Influx

3.4.1 Description of the VEC and the Spatial and Temporal Boundaries

The influx of workers associated with the project poses several potential community health, safety, and security impacts. A sudden increase in workforce can place significant pressure on local infrastructure and services, including roads, waste management systems, electricity, housing, recreational facilities, water and wastewater systems, and communication networks. These strains may disrupt daily life for local residents and challenge the capacity of existing resources.

Health risks associated with worker influx include the potential introduction of new reservoirs of diseases, such as vector-borne and waterborne illnesses, as well as the spread of communicable diseases, including sexually transmitted infections (including HIV/AIDS). A lack of awareness about disease transmission further exacerbates these risks, potentially endangering both workers and the local community.

Security concerns may also arise from a sudden population surge. Local communities could experience an increase in criminal activities such as theft, physical assaults, substance abuse, prostitution, and human trafficking, potentially leading to a heightened sense of insecurity among residents. Furthermore, local law enforcement agencies may be under-resourced or unprepared to manage the increased demand for safety and security measures.

Mitigation strategies must prioritize community health awareness, infrastructure support, and coordination with local authorities to address these challenges proactively and minimize potential adverse impacts

The spatial boundary is the entire Aswan region as workers may be sourced from Aswan City, Al Raqaba and other areas, while expatriate workers will be accommodated within Aswan City. The temporal boundary mainly relates to the construction phase (17 months) when majority of workforce is required.

Table 3-7: Summary presenting number of workers per project

<table>
<tr><th>Project</th><th>Number of workers</th><th>Comment</th></tr>
<tr><td>Benban Park (operational projects)</td><td>174 of which 46 are based in Aswan city and 22 are from local community of Al Raqaba.</td><td>Based on discussions with FMC, the following breakdown has been provided:
<table>
<tr><th>Governorate/City/Village</th><th>Total</th></tr>
<tr><td>Benban Qebly</td><td>33</td></tr>
<tr><td>Benban Bahry</td><td>22</td></tr>
<tr><td>El-Mansoria</td><td>16</td></tr>
<tr><td>El-Raqba</td><td>22</td></tr>
<tr><td>Edfu – Kom Ombo-Daraw</td><td>27</td></tr>
<tr><td>Aswan</td><td>46</td></tr>
<tr><td>Others</td><td>8</td></tr>
<tr><td>Total</td><td>174</td></tr>
</table></td></tr>
<tr><td>ASPC Project</td><td>75</td><td>Based on information from AMEA Power, none are from or based in Aswan or Al Raqaba.</td></tr>
<tr><td>ACWA Power Project</td><td>20</td><td>Based on information from ACWA Power, none are from or based in Aswan or Al Raqaba</td></tr>
</table>

NREA Project	2	Scaled from FMC numbers. None are expected to be from Aswan or Al Raqaba, and they are likely to be from Fares Village.
Project Site	4000 (peak only)	Assuming worst-case therefore the number of workers from construction are considered. Majority of workers are expected to be from Al Raqaba Local Unity while expatriate workers will be accommodated in Aswan City.
Benban Park (planned 300MW project)	1,000 (peak only)	Assuming worst-case therefore the number of workers from construction are considered. Majority of workers are expected to be from Fares and Benban village while expatriate workers are expected to be accommodated in Aswan City.
Total	**5,2271**	**This amount is worst-case and applicable during construction phase of** Abydos for Renewable Energy **Solar Project and planned 300MW project in Benban Park.**

3.4.2 Assessment Metrics

The metric selected as a proxy for the assessment of cumulative worker-related impacts is: Number of workers

3.4.3 Assessment

Table 3-8: Assessment of Cumulative Impacts on Worker Influx

Contributors to cumulative Impact	Description of impact from Workforce influx	Spatial and Temporal Overlap of Impacts
		■ High ☐ Moderate ☐ Low/Negligible
Number of workers		
Abydos for Renewable Energy Solar Project	Maximum assuming worst case scenario the project would bring about 4000 workers during construction phase. Majority of these workers are expected to be from local communities with priority given to workers from the nearby Al Raqaba community followed by other communities within the Daraw District; and it is expected they would be bussed each day. This would reduce the risks of worker influx and increased pressure on local communities and services, and other social ills associated with construction camps.	☐

Contributors to cumulative Impact	Description of impact from Workforce influx	Spatial and Temporal Overlap of Impacts
	Expatriate workers (although numbers not available at this stage) are not expected to be a significant number and they will be accommodated within Aswan City. As discussed within "Section 16.2.2" of the ESIA, Aswan City is considered a key urban center in Egypt that is a fully serviced hub recognized and worker influx is expected to be less than 0.5% of total population of Aswan City. This is based on assuming that 40% of workers are expatriates (at peak) and taking into account Aswan city population of 408,000 (2024). EPC contractor will submit an Accommodation Management Plan and Labor and Working Conditions Management Plan including code of conduct and other mitigation for managing worker related issues, including those related to worker influx.	
Benban Planned 300MW Project	Maximum assuming worst case scenario the project would bring about 1000 workers during construction phase. Majority of these workers are expected to be from local communities with priority given to Benban and Fares community (which are different from those of the Abydos for Renewable Energy Solar Project); and it is expected they would be bussed each day. This would reduce the risks of worker influx and increased pressure on local communities and services, and other social ills associated with construction camps. Expatriate workers (although numbers not available at this stage) are not expected to be a significant number and they are likely to be accommodated within Aswan City. This will result in overlap with workers from Abydos for Renewable Energy Solar Project. However, even under such circumstances, total expatriate workers will still remain less than 0.5% of total population of Aswan City. This is based on assuming that 40% of workers are expatriates (at peak) and taking into account Aswan city population of 408,000 (2024). It is expected that the EPC contractor on this project, will submit an Accommodation Management Plan and Labor and Working Conditions Management Plan including code of conduct and other mitigation for managing worker related issues, including those related to worker influx.	☐
Other solar development projects	As these projects are either in their operational phase, the number of reported workers is currently at 273. In addition, these workers are mainly from local communities such as Benban, Fares, etc. all of which are not similar to the local communities considered for Abydos for Renewable Energy Solar Project or the area within which expatriate workers will be accommodated (i.e. Aswan City).	☐

Contributors to cumulative Impact	Description of impact from Workforce influx	Spatial and Temporal Overlap of Impacts
Future agricultural development	As noted earlier, this development project is targeted for the local communities in the area. Therefore, cumulative impacts are irrelevant.	N

3.4.4 Significance of the Cumulative Impact

It is assessed that there is an increase in the Project's impact from the estimated worker influx during the construction phase. However, majority of these workers are expected to be from local communities with priority given to Al Raqaba Local Unit, followed by other communities within the Daraw District. This would reduce the risks of worker influx and increased pressure on local communities and services, and other social ills associated with construction camps.

Expatriate workers (although numbers not available at this stage) are not expected to be a significant number and they will be accommodated within Aswan City. However, even with the planned 300MW Benban Project which is expected to also accommodate expatriate workers in Aswan city, this is expected to be less than 0.5% of total population of Aswan City.

Remaining operational solar PV projects in the area have hosting communities that are not similar to the Abydos for Renewable Energy Solar project and workers are mainly from such hosting communities.

Therefore, taking the above into account, cumulative impacts are not considered an issue of concern.

4. SUMMARY AND CONCLUSION OF THE RCIA

This RCIA systematically evaluated the spatial and temporal overlap of potential impacts from the Abydos for Renewable Energy Solar Project with those of past, existing, and foreseeable planned developments, as well as external factors and anthropogenic activities. VECs were identified through a screening process involving review of stakeholder issues raised during the ESIA process and E&S expert review of the Abydos for Renewable Energy Solar Project ESIA documentation. Through the screening process, potential cumulative impacts that overlap spatially or in time with predicted impacts of the Abydos for Renewable Energy Solar Project were assessed. Four Valued Environmental and Social Components (VECs) were identified for more detailed assessment, as follows:

- Water Resources
- Waste Generation
- Traffic and Transportation, and
- Worker Influx

VECs that were screened out after review were land conflict; geology, hydrology and geohydrology; archaeology and cultural heritage; air and noise; visual/landscape; and biodiversity (i.e. protected and important biodiversity areas; loss of habitat and species).

The screened in VECs were subject to closer scrutiny to confirm whether significant cumulative impacts may arise in combination with other existing or planned projects. These are limited to four existing solar projects within a 28 km radius of the proposed Abydos for Renewable Energy Solar Project and one planned agricultural reclamation project. Relevant information on water, waste, traffic and workers was compiled and analyzed for other solar projects in the wider Project Area by the ESIA team to contextualize the incremental or combined impact of the current Abydos for Renewable Energy Solar Project.

The analysis determined that the other existing or planned projects are not expected to result in any significant incremental increase in project-related impacts on the identified VECs.

The mitigation and management measures for the Abydos for Renewable Energy Solar Project as presented in: (i) the Environmental and Social Management Plan (ESMP) and (ii) Environmental and Social Management System (ESMS) to be implemented by the Developer, EPC Contractor and Project Operator, are sufficiently robust to adequately manage the Project's impacts on the identified VECs and to avoid and minimize risk of cumulative effects. This will ensure that the Project's environmental and social footprint remains within acceptable limits, supporting sustainable development in the region.

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